



Mount Peake Project Notice of Intent

June 2013

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1. Introduction

1.1 Overview

TNG Limited (TNG), under wholly owned subsidiary Enigma Mining Limited, is proposing to develop the Mount Peake Project (the Project) consisting of:

- the mining of a polymetallic ore body, beneficiation and hydrometallurgical processing of the ore to produce hematite powder (Fe_2O_3), vanadium pentoxide flake (V_2O_5) and titanium dioxide (TiO_2) at the Mount Peake mining area, 280 km north-northwest of Alice Springs in the Northern Territory (NT);
- transport of the products to a new railway siding and load-out facility on the Alice Springs to Darwin railway near Adnera; and
- rail transport of the products to the Port of Darwin's East Arm Wharf for export.

The description above forms the Project base case. TNG is also assessing the option of locating the hydrometallurgical process plant offsite.

The objectives of this Notice of Intent (NOI) are to:

- notify the Northern Territory (NT) Government of the proposed Project;
- provide an overview of key elements of the Project;
- understand the existing environment of the Project area;
- identify potential Project impacts and their management; and
- provide the NT Department of Mines and Energy (DME) with sufficient information to determine whether the Project needs referral to the NT Environment Protection Authority for assessment under the *Environmental Assessment Act 1982*.

The Project is currently at a Feasibility Study stage and information on some of the Project elements is still being refined. Additional information will be developed throughout 2013 / 2014 and included in any future assessment documentation.

The structure of this report is based on the NT DME Advisory Note on the Environmental Assessment of Mining Proposals (Nov 2012) and the former Natural Resources, Environment, the Arts and Sport (NRETAS)' Information Guidelines for a NOI (currently under review).

1.2 History and Products

The magnetite bearing Mount Peake deposit was identified using airborne magnetic and electromagnetic surveys. Initial exploration activities targeted nickel and in 2008 TNG discovered a substantial ferrous metal deposit which has subsequently emerged as a potentially world-class vanadium-titanium-iron resource of 160 million tonnes (Mt).

The Mount Peake project licences were granted to Tennant Creek Gold (NT) Pty Ltd (TCG) on the 22 August 2002. TCG is a wholly owned subsidiary of TNG Ltd. On 29 May 2007, TCG transferred the licence ownership to Enigma Mining Ltd, another wholly owned subsidiary of TNG Ltd with TCG remaining the operator of the project. TNG originally set up Enigma Mining to hold all the company's nickel assets at that time.

Following on from the success of Scoping studies and pre-feasibility work, TNG submitted an application for a Mineral Lease number 28341 in October 2010 to cover the existing resource area and on 28 February 2013, applied for two Mineral Leases numbered 29855 and 29856

for the purpose of infrastructure and facilities ancillary to future mining conducted under Mineral Lease 28341.

The following products will be produced by the project by hydrometallurgical processing of the intermediate product of magnetite concentrate (approximately 54-56% Fe):

- vanadium pentoxide – a strategic metal which is used as a strengthening additive in steel and other iron and titanium alloys. Vanadium is also used as an additive in high carbon steel applications such as high speed power tools. A rapidly growing and exciting market is the use in Vanadium Redox Batteries (VRB) technology. Vanadium is expected to grow rapidly in demand and price as the above markets grow. Mount Peake could be one of the largest suppliers of high purity V_2O_5 ;
- titanium dioxide – a strategic metal that is used in pigments and because of its high strength to weight ratio is used in many high strength alloy applications including the high technology and aerospace industry; and
- hematite – a high quality iron product produced in a very pure form (69.2% Fe at 99.9% purity) and will be marketed in the pigment industry as red ochre and also as a feedstock for blast furnaces. The Mount Peake hematite product purity provides a range of market opportunities nationally and internationally.

1.3 The Proponent

The proponent for the project is TNG, an Australian resource company focussed on exploration, evaluation and the development of a multi-commodity resource portfolio in the NT and Western Australia. Contact details for TNG are provided in Table 1.

Table 1 Proponent Contact Details

Company	TNG Limited
ABN	12 000 817 023
ASX Code	TNG
Contact	Paul Burton Managing Director, TNG Ltd
Address	PO Box 1126, Subiaco, WA 6904, Australia
Phone	+61 8 9327 0900
Fax	+61 8 9327 0901
Email	peb@tngltd.com.au

1.4 Consultant

GHD Pty Ltd (GHD) has been engaged by TNG to prepare the NOI and to progress environmental baseline studies and any approvals documentation for the Project. Contact details are provided in Table 2.

Table 2 Consultant Contact Details

Company	GHD Pty Ltd
Contact	Ian McCardle Principal Environmental Scientist
Address	PO Box 3106, Adelaide Terrace, Perth WA 6832
Phone	+61 8 6222 8995
Fax	+61 8 6222 8083
Email	ian.mccardle@ghd.com

2. Project Location and Description

2.1 Project Location

2.1.1 Mount Peake Project Area

The Mount Peak Project Area refers to the mining area, accommodation camp facilities area, transport corridor, infrastructure (gas / slurry pipeline) corridor, and rail siding and load-out facility (Figure 1).

The mining area is located approximately 280 km north-northwest of Alice Springs and approximately 60 km west of the Stuart Highway. The mining area will be accessed via a restricted, unsealed road from the Stuart Highway.

Mining and processing will occur within the mining area, located within Mineral Lease Application (MLA) 28341 for the mine pit and MLA 29855 for all mining facilities. The accommodation facilities will be located within MLA 29856, 5 km to the east of the mining area.

A proposed transport corridor for site access and product haulage runs 90 km south-east and then east from the mining area to a proposed new rail siding and load-out facility near Adnera. A proposed infrastructure corridor for a potential gas pipeline and slurry pipeline runs to the north of the transport corridor. The two corridors pass from MLA 29855, through Exploration Lease (EL) 29578, EL 27069, Pastoral Lease (PPL) 1057, EL 27941 and PPL 1103 before they cross the Stuart Highway, and then traverse PPL 1138 and PPL 1103 to the Adnera loading facility.

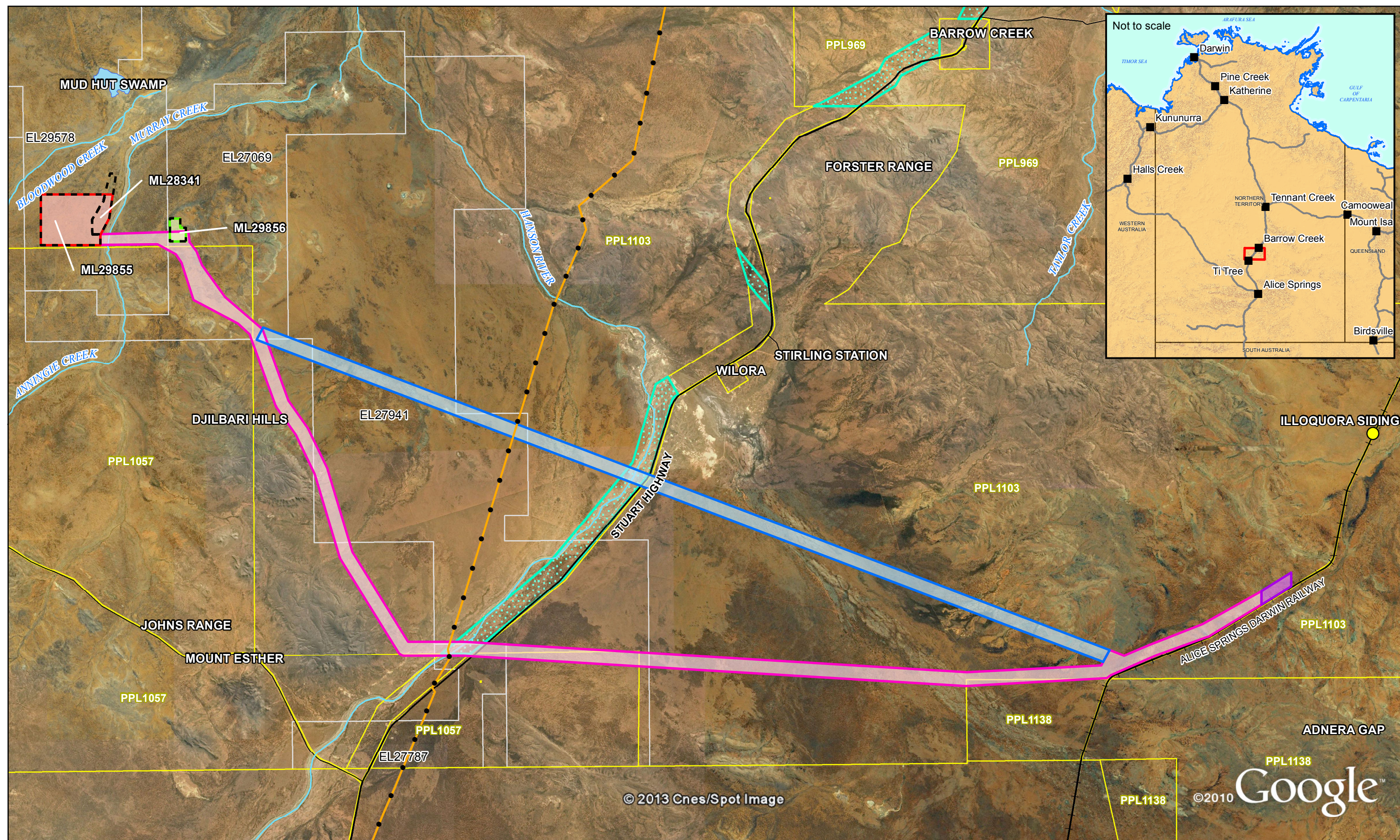
All tenements lie within the Stirling and Anningie perpetual pastoral leases aside from a portion of crown land adjacent to the Stuart Highway that is intersected by the two corridors.

Surrounding Land Use

Land use immediately adjacent to the Mount Peake Project Area is pastoral activities.

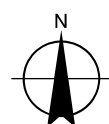
Existing infrastructure includes the Stuart Highway, Adelaide to Darwin Railway, the Amadeus Basin to Darwin Gas Pipeline, pastoral station tracks and wells for stock watering.

The nearest sensitive receptor to the mining area is Anningie Station homestead approximately 30 km to the south west of the mining area. The infrastructure corridor passes 10 km south of the Wilora Aboriginal community, and the transport corridor 20 km south of the same community.



1:250,000 @ A3
0 2.5 5 7.5 10
Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 53



LEGEND

- Illoquora Siding
- Principal Road
- Minor Road
- Major Watercourses

- Railway
- Aradeus Basin to Darwin Gas Pipeline
- Mud Hut Swamp
- Rail Siding Loading Facility

- Mount Peake Mining Area
- Camp Facilities
- Gas / Slurry Pipeline Study Corridor
- Transport Study Corridor

- Crown Land
- Mount Peake Granted Tenements
- Mount Peake Mineral Leases
- Cadastral Boundaries



TNG Ltd
Mount Peake EIS

Job Number 61-29057
Revision 0
Date 25 Jun 2013

Project Location
Mount Peake Project Area **Figure 1**

G:\61\29057\04 GIS\Maps\6129057_001.mxd

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Data source: TNG - Gas / Slurry Pipeline Study Corridor, Camp Facilities, Transport Study Corridor, Mount Peake Mining Area, Rail Siding Loading Facility, Mount Peake Granted Tenements, Mount Peake Mineral Leases (2013), Geoscience Australia - Waterways, Roads, Place Names, Mud Hut Swamp, States, Oceans, Aradeus Basin to Darwin Gas Pipeline (2008), DLPE - Cadastral Boundaries (2013), Google Earth Pro - Imagery (Date extracted: 16/04/2013), GHD - Illoquora Siding (2013), Created by: CM

GHD House, 239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com W www.ghd.com

2.1.2 East Arm Wharf

East Arm Wharf is located on the East Arm Peninsula, 7 km south of Berrimah and 18 km east of the Darwin CBD by road (Figure 2). The Darwin Port Corporation owns the East Arm Wharf precinct and provides facilities that serve a number of shipping and cargo markets including manganese and iron ore stockpiling and export.

Surrounding Land Use

East Arm Wharf is zoned Industrial (DV) (industrial use, ports) under the town planning scheme. The wharf is located close to the Elizabeth River estuary. Mangroves surrounding the site are zoned for conservation, including Catalina Island to the east of the wharf and Charles Darwin National Park to the north.

Surrounding Marine Uses

Darwin Harbour has a mixture of commercial shipping, military activity and recreational boating and fishing. Coastal recreational facilities such as sailing and diving are also popular.

Beneficial uses for Darwin Harbour, declared under the *Water Act 1992*, are Aquatic Ecosystem Protection and Recreational Water Quality and Aesthetics.

2.2 Project Timing

TNG proposes to commence construction in the second half of 2014 and commission the plant in the second half of 2015.

2.3 Project Description

The site layout at the Mount Peake mining area is shown in Figure 3.

2.3.1 Mining

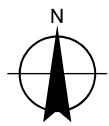
The proposed mine will be an open-pit truck and shovel operation. Extracted ore will be transported by haul truck from the mine pit and stockpiled on-site at a run of mine (ROM) pad prior to processing. Mining will commence with a “starter pit” accessing high grade and low strip ratio ore to feed a beneficiation plant. The throughput of the beneficiation plant will be 5 Mtpa initially and the hydrometallurgical plant will be designed for 2.5Mtpa with an upgrade to 5Mtpa scheduled after 4 years. The life of the mine is expected to be 20 years.

Depth to groundwater within the aquifer associated with the ore body ranges from 20 to 25 metres below ground level (mbgl). The maximum depth of the pit is expected to be 150 to 200 mbgl, thereby intersecting the water table and requiring dewatering to facilitate mining.

The resource is estimated at approximately 160 million tonnes (Mt) and there is the potential to increase the resource size to 500-700 Mt. Some 176 Mt of material is expected to be extracted over the life of the mine, comprising around 93 Mt of ore and 83 Mt of waste. Waste material will be stored in a Waste Rock Dump (WRD).



1:10,000 @ A3
0 100 200 300 400 500
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 52



LEGEND
— Port Storage and Ship Loading Facilities
— Major Roads
Vegetation

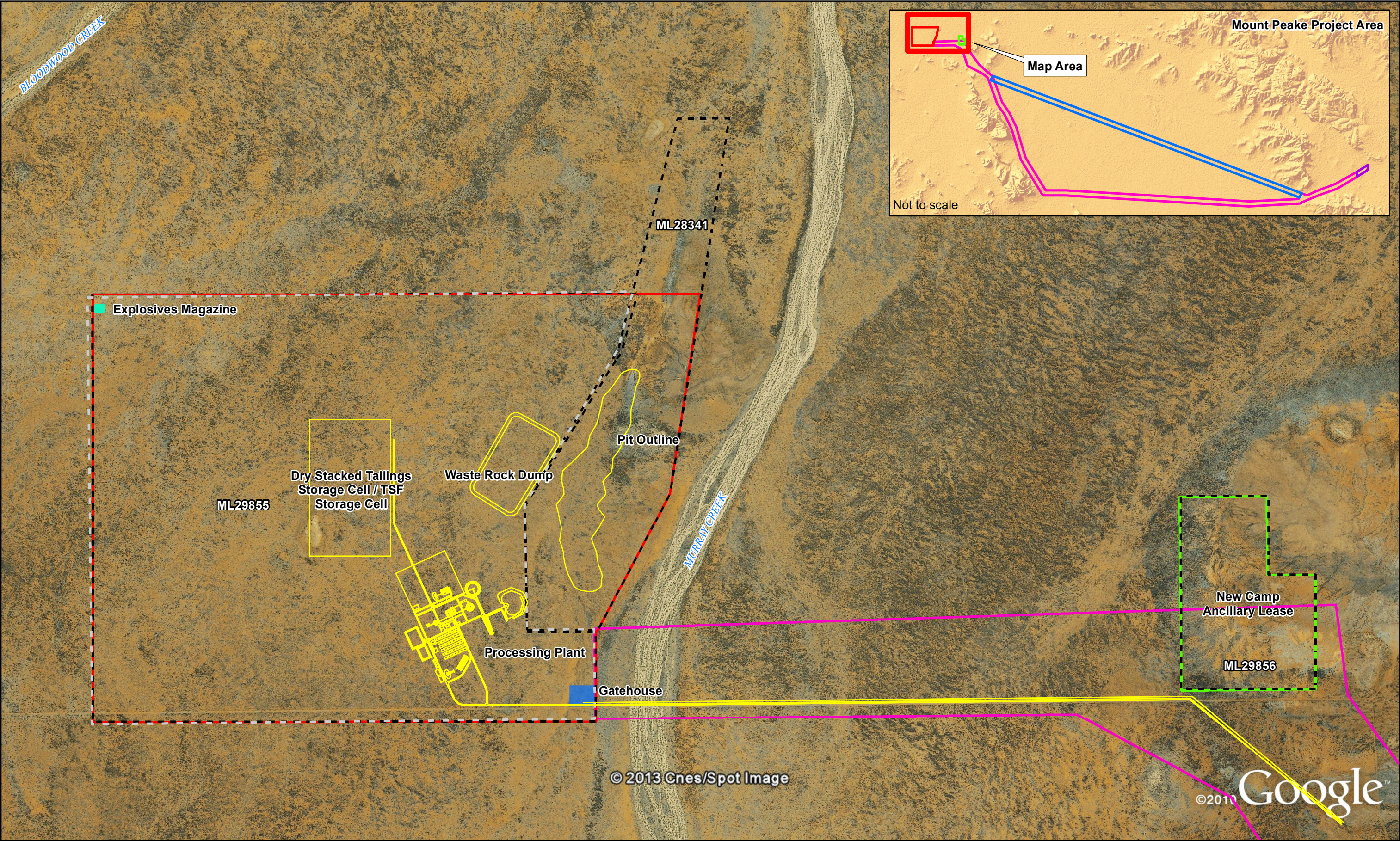


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Date 20 Jun 2013

Proposed Site Layout
East Arm Wharf

Figure 2



2.3.2 Processing

Beneficiation

Beneficiation involves crushing, grinding and magnetic separation to produce a concentrate (Figure 4).

Ore will be loaded from the ROM pad to a grizzly by front-end loader with ore broken by a rock crusher. Screened oversize material will be crushed with crushed product conveyed to a primary screen bin feed. Oversize material will be secondary crushed, then recombined with screened undersize material and conveyed to High Pressure Grinding Rolls (HPGR).

The HPGR will reduce the feed size to <1 mm prior to feeding a bank of Rougher Magnetic Separators (RMS) with magnetic separation anticipated to recover some 91% of vanadium, 58% of the iron and 78% of the titanium. The rougher magnetic concentrate will be directed to a ball mill whereby the material will be further reduced to less than 100 microns prior to cleaning in a bank of Cleaner Magnetic Separators to further upgrade the concentrate. Belt feeders will reduce the moisture content of the concentrate prior to transfer to a stockpile where a front-end loader will feed the material into the leaching circuit for hydrometallurgical processing.

If hydrometallurgical processing is to be undertaken offsite the magnetite concentrate will be either trucked or slurried by pipeline to Adnera siding. It is estimated that up to 1.8Mtpa of magnetite concentrate will be produced under this scenario.

Both non-magnetic tailings streams are combined and contained in a storage cell.

Conventional tailings deposition will be evaluated against the benefits of dry stacked tailings during the Detailed Feasibility Study (DFS).

Hydrometallurgical Processing

Production of vanadium pentoxide, hematite and titanium dioxide will be based on the *TIVAN®* process, trademarked by TNG. This is a new process developed to extract high purity products from the magnetite concentrate through an acid leach process.

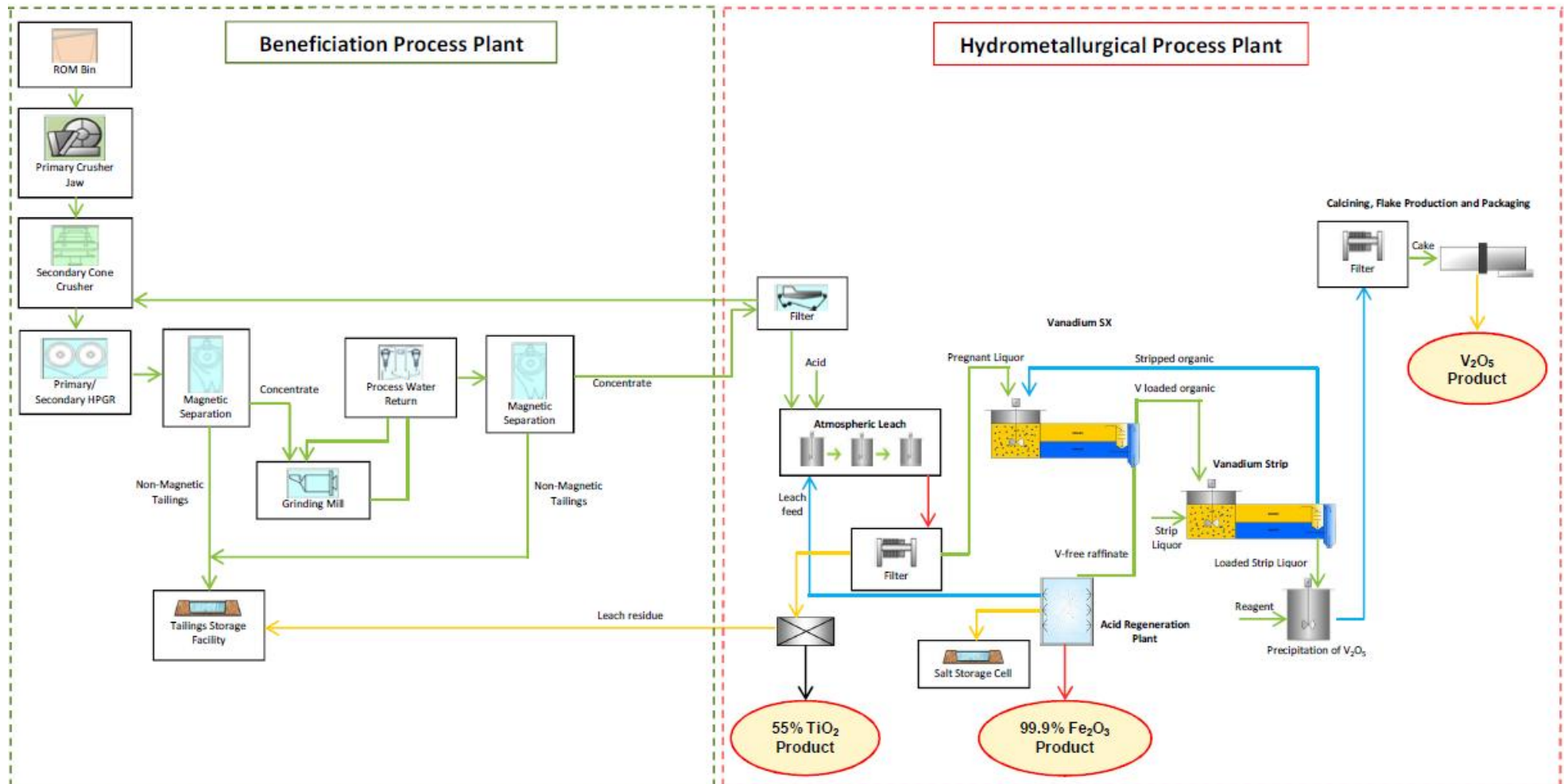
Figure 4 provides a schematic of the hydrometallurgical processing circuit.

Concentrate from the leach feed stockpile will be conveyed to a heated leach tank where it is mixed with acid to make a slurry from which vanadium and iron will be extracted into solution. Filtered residue from the leach process will be stored in the leach residue stockpile pending processing for titanium recovery.

Titanium beneficiation follows. The preferred approach is to use magnetic separation where material from the leach residue stockpile is slurried to a magnetic separator from which concentrate, middlings and tailings are produced. Tailings will be pumped to a thickener, middlings recycled back to the magnetic separator and concentrate pumped to a cleaner magnetic separator that further separates concentrate and tailings. Flotation may also be investigated should the leach residue not be amenable to the magnetic separation technique outlined above.

Pregnant leach solution (PLS) from the leach circuit will be pumped to a reduction and pH adjustment tank with filtered PLS then pumped to the Vanadium Extraction Circuit where vanadium transfers from the aqueous to the organic phase. The aqueous stream, depleted in vanadium, is then subjected to acid recovery resulting in the precipitation of iron.

Figure 4 Simplified Process Schematic – Beneficiation and Hydrometallurgical Processing



From the Vanadium Extraction Circuit, organic phase liquor flows to the Organic Stripping Circuit where vanadium is stripped from the organic phase into the aqueous phase and emerges as loaded strip liquor (LSL). LSL is pumped to a vanadium oxidation tank and, following precipitation, product is pumped to a product hopper. Filtered solids precipitate will be conveyed to a calcining rotary kiln to remove moisture. The resultant dried vanadium will be conveyed to a fusion furnace and flaking wheel to melt the vanadium and solidify it into flakes for packaging. Flakes will be passed through a crusher to ensure correct product size and then sealed in drums or bags prior to being loaded in sea containers for transportation.

At full capacity the plant is estimated to produce 15,000 tpa of vanadium pentoxide, 1.11 Mtpa of hematite and 375,000 tpa of titanium dioxide.

Reagents used in the process include hydrochloric acid, organic solvent, sulphuric acid, sulphur, sodium hydroxide, sodium chloride, calcium carbonate, oxygen, sodium hypochlorite and flocculent, all commonly used in the mining industry.

2.3.3 Product Transportation and Export

Either the titanium, vanadium and hematite products (for the integrated plant option), or the intermediate product of magnetite concentrate (for the offsite hydrometallurgical process plant option) will be transported by either road haulage or slurry pipeline to a new rail siding and load-out facility at Adnera. For the integrated plant, loose bulk titanium dioxide and hematite will be stored in product stockpiles with a hardstand area for vanadium container storage (Figure 5).

Should road haulage be the preferred option, it is expected that up to 92 return truck movements will occur per day at peak project activity. To ensure safety for users of the Stuart Highway grade separation at the haul road crossing of the highway will be considered.

Train loading will be via front-end loader to a conveyor and loading bin located over the rail siding. Containers will be loaded via fork lift. Around 10 train movements per week are expected.

At East Arm Wharf bulk product will be unloaded via the existing dump pocket and conveyed to the Darwin Port Corporation nominated Bulk Storage Area (Figure 2). Loose titanium dioxide and hematite (or intermediate magnetite product) will be stored in product stockpiles. Containerised vanadium pentoxide will be stored in a container storage area.

The Project is expected to result in one panamax or handymax ship movement per week.

2.3.4 New Facilities

New facilities proposed at the Mount Peake Project Area include:

- mine access road;
- gas and water pipelines;
- waste rock dump (WRD) and dry stacked tailings cell, or conventional TSF;
- run of mine (ROM) pad;
- beneficiation plant;
- hydrometallurgical plant including acid plant and oxygen generation facility;
- concentrate stockpile;
- leach and salt residue storage cells;
- product stockpiles for titanium dioxide and hematite (or magnetite);
- water treatment ponds or tanks;

- water and waste water treatment plants;
- gas fired power station;
- explosives and detonator magazines;
- construction camp and accommodation village;
- administrative, control, laboratory, workshop and storage buildings;
- gatehouse and weighbridge;
- bulk fuels storage area and water storage tanks;
- workshops and offices;
- rail siding at Adnera;
- product rail load-out facility at Adnera including hard stand storage shed for containerised vanadium and product stockpiles for titanium dioxide and hematite (or magnetite) (Figure 5); and
- air strip.

Additional new facilities required at the Adnera Rail Siding if transport via slurry pipeline is selected (Figure 6) include:

- filtration area with;
 - thickeners;
 - pressure filters;
 - control room; and
 - buffer tanks.
- transfer pond or tank;
- slurry pipeline from the Project Mining Area to Adnera Rail Siding; and
- return water line.

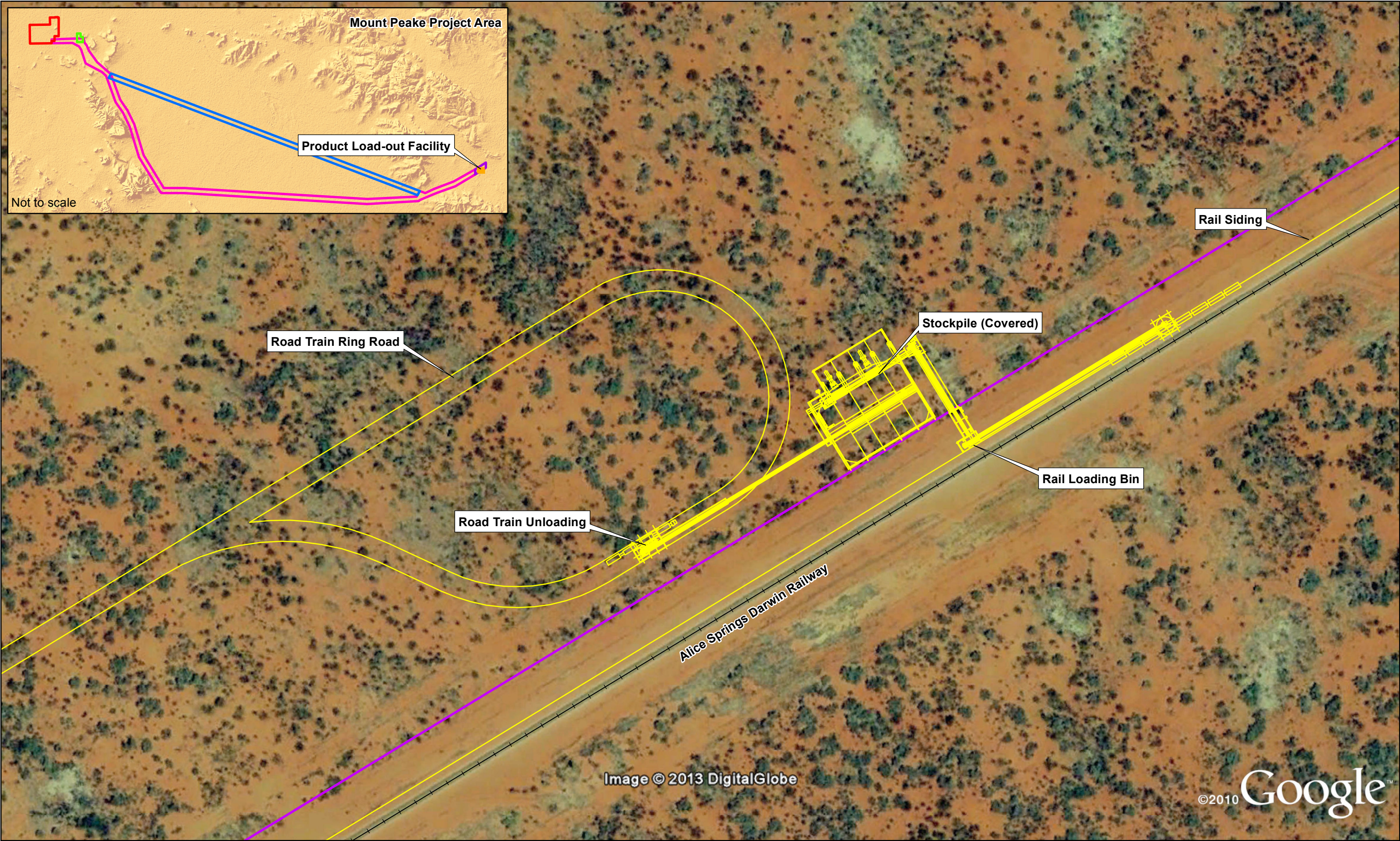
New facilities proposed at the ore storage facility at East Arm Wharf (Figure 2) include:

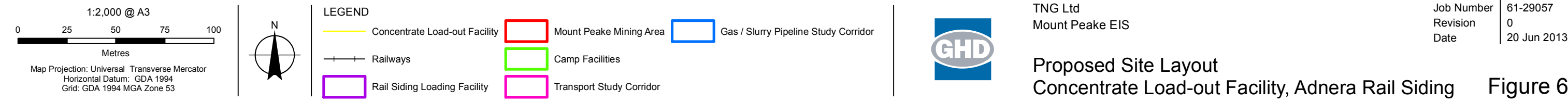
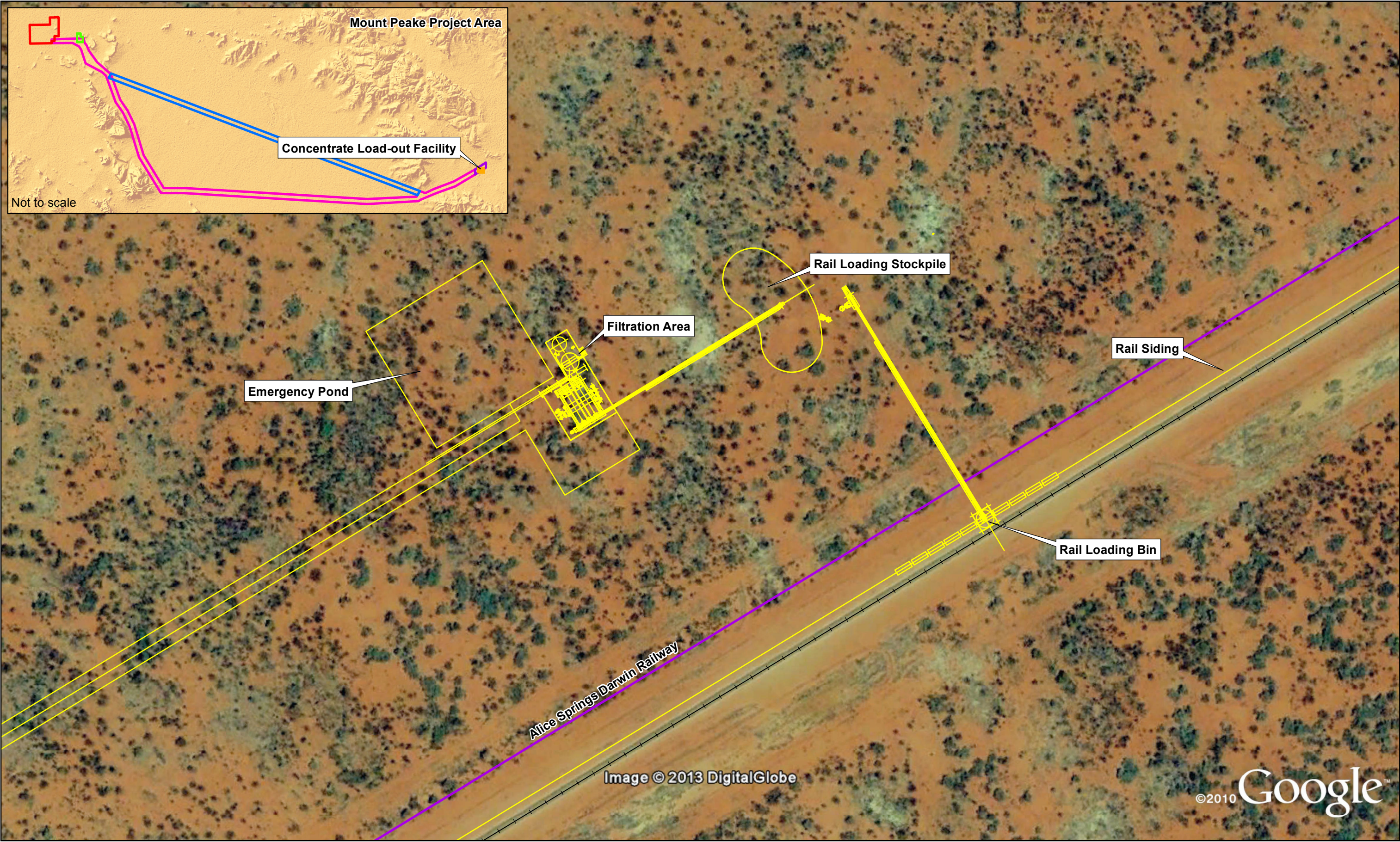
- product stockpiles for titanium dioxide and hematite;
- laydown area for containerised vanadium pentoxide; and
- reclaim hopper.

Other required infrastructure within the East Arm Wharf precinct, such as conveyors, will be developed as multi-user facilities by the Darwin Port Corporation. Materials handling, including container transfer will be by a third party.

Estimated Project footprints are as follows:

- Project Mining area (including the accommodation facilities) = 425 ha;
- Transport corridor = 310 ha;
- Infrastructure (gas / slurry pipeline) corridor = 100.8 ha;
- product load-out facility at Adnera = 3.5 ha; and
- East Arm Wharf stockpiles and facilities = 3 ha.





2.3.5 Water Requirements

Approximately 1 GLpa of make-up water will be required for mining, beneficiation, dust suppression, accommodation village operations, Adnera rail siding requirements, and slurry pipeline (if required). Mine site water will be sourced from pit dewatering and, if required, augmented from a purpose built borefield.

Approximately 7 GLpa of make-up will be required for the integrated hydrometallurgical process plant at the 5 Mtpa peak production.

A process water dam or tank will be constructed to manage plant water supply. Water will be treated to a standard appropriate for its intended use. A Water Treatment Plant (WTP) will be constructed for potable water supply.

Water at East Arm Wharf, for dust suppression and potable use, will be supplied via existing reticulation.

2.3.6 Power and Gas Supply

It is estimated that the beneficiation plant would consume 2PJ/a of gas for power generation and the hydrometallurgical plant would consume a further 21.8PJ/a of gas for both power generation and thermal heating requirements.

At full production the power draw for the hydrometallurgical process plant is estimated at 44 megawatts (MW) and 26MW for the mine and magnetic concentrator.

Power may be supplied by an on-site gas fired power station or other on-site power generation facility. If natural gas is selected as the preferred option, gas supply from the Amadeus Basin to Darwin Natural Gas Pipeline via an off-take lateral along the infrastructure (gas / slurry pipeline) study corridor east to the mining area will be investigated.

Power at East Arm Wharf will be grid supplied.

2.3.7 Waste and Emissions

A WRD (approximately 40ha) will be constructed at the mine site to contain waste rock.

Either a storage cell to contain dry stacked tailings from the beneficiation plant or a conventional TSF will be constructed.

Waste streams from the hydrometallurgical plant will be a leach residue and a crystalline salt product. Both of these streams will be contained in purpose built cells and an investigation into the suitability for these waste streams to be used as by-product in either road base applications or geopolymer concrete applications will be undertaken.

Air emissions will occur from:

- vacuum pumps, vapours evaporating in tanks, oxide drying and calcination in the hydrometallurgical plant; and
- the power station stack containing NO_x, CO, particulate matter and negligible SO₂.

Two pump stations will be installed to collect sewage and wastewater for treatment in a Wastewater Treatment Plant. One station will service the processing plant and mine site with a second station servicing the construction camp / accommodation village.

There will be no uncontrolled discharges of untreated process water at the Mount Peake Project site.

2.3.8 Workforce and Accommodation

The construction and operations workforces are estimated to peak at 350 and 250 personnel respectively at Mount Peake for the integrated hydrometallurgical process plant case and 350 and 175 personnel for the stand alone beneficiation plant and mine.

A construction camp will be established within the New Camp Ancillary Lease to the east of the mine site (Figure 3). This will be converted to a fully serviced accommodation village for the operations workforce that will be staffed by workers on either a fly-in, fly-out (FIFO) or drive-in, drive-out (DIDO) roster.

2.3.9 Closure and Rehabilitation

Closure and rehabilitation at Mount Peake will recognise the following objectives (DoR, 2008):

- reduce the need for long term monitoring and maintenance through design and construction of landforms that are geotechnically and geochemically stable;
- develop landforms that are consistent with the surrounding landscape;
- develop an environmental monitoring and reporting program which is focused towards demonstrating the achievement of closure outcomes;
- undertake progressive rehabilitation of the site during operations; and
- ensure that the full cost of decommissioning and rehabilitation is understood and that a mechanism for funding exists.

A concept for mine closure will be presented as a component of future approval documentation with the plan finalised in consultation with the regulator.

Post mining, land use is expected to be largely returned to pastoralism.

3. Legislation

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth EPBC Act, any development requires assessment if it has the potential to affect one or more of eight matters of National Environmental Significance (MNES). The MNES include:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- Listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park; and
- nuclear actions (including uranium mines).

The environment under the EPBC Act includes:

- a) ecosystems and their constituents;
- b) natural and physical resources;
- c) qualities and characteristics of locations, places and areas;
- d) heritage values of places; and
- e) the social, economic and cultural aspects.

The EPBC Protected Matters Search Tool indicates that the Mount Peake Project area contains habitat suitable for five species listed both nationally under the EPBC Act and under NT legislation. The Mount Peake Project Area may also provide habitat suitable for an additional six migratory and one vulnerable species of bird which are protected under the EPBC Act. Site specific surveys will be conducted to determine whether these species occur at Mount Peake and, if so, whether the species are likely to be significantly impacted by the Project.

A decision will be made following completion of the surveys on whether referral of the Project to the Department of Sustainability, Environment, Water Population and Communities (DSEWPac) is required.

If referred, and if the Federal Minister for the Environment declares the action (the Project) to be a “controlled action”, assessment of the Project will occur through accredited assessment under the NT *Environmental Assessment Act* 1982.

The NT DME and EPA recommend referral to DSEWPac (particularly if the Project requires assessment under the NT *Environmental Assessment Act* 1982).

3.1.2 Native Title Act 1993

The objectives of the *Native Title Act* 1993 are to:

- provide for the recognition and protection of native title;
- establish ways in which future dealings affecting native title may proceed and to set standards for those dealings;
- establish a mechanism for determining claims to native title; and
- provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.

Registration of Native Title Determination Application – DC11/12 Stirling and Neutral Junction NTD17/2011 was registered with the National Native Title Tribunal on 17 August 2011 under section 190A of the *Native Title Act* 1993. The application was accepted for registration and entered onto the Register of Native Title Claims on 19 August 2011. The Mount Peake Project tenements are covered by the application.

The Native Title Claimant Group comprises members of the Akalpere, Amakweng, Alapanp, Alhalker Anangker, Arlwekarr, Arnerre, Arnmanapwenty, Errene/Warlukurlangu, Jarra Jarra, Kwerrkepentye, Twerrpe, Wake and Wurrulju landholding groups.

TNG is currently in discussions with the Native Title Claimant Group on the development of an Indigenous Land Use Agreement (ILUA) to permit the project to commence. ILUA negotiations are progressing well with both Traditional owners and the Central Land Council and TNG anticipate an agreement to be in place by late 2013.

3.1.3 Clean Energy Act 2011

The Clean Energy Future legislation has introduced a carbon pricing mechanism that has a broad coverage from commencement, encompassing the stationary energy sector, transport, industrial processes, non-legacy waste and fugitive emissions. The carbon pricing mechanism commenced on 1 July 2012, with a fixed price for the first three years, after which the carbon price will transition to a fully flexible price under an emissions trading scheme, with the price determined by the market.

Key regulations that are relevant to the carbon pricing mechanism include the Clean Energy Regulations 2011 and the National Greenhouse and Energy Reporting Regulations 2008.

Participation in the carbon pricing mechanism will be determined based on actual Project greenhouse gas emissions.

3.1.4 National Greenhouse and Energy Reporting Act 2007

In the 2012-2013 reporting year, the National Greenhouse and Energy Reporting Scheme applies to facilities that emit over 25,000 t CO₂-e per year or consume more than 100 TJ of energy or corporations that emit over 50,000 t CO₂-e per year or consume more than 200 TJ of energy. These thresholds relate to Scope 1 and Scope 2 emissions.

Project participation in the scheme will be dependent on whether facility and / or corporation thresholds are exceeded based on actual annual greenhouse gas emissions and energy consumption.

3.1.5 Energy Efficiency Opportunities Act 2006

The Energy Efficiency Opportunities program requires businesses to identify, evaluate and publicly report cost effective energy saving opportunities. Participation in Energy Efficiency Opportunities program is mandatory for corporations that use more than 0.5 PJ of energy per year.

Participation in the program will need to be assessed based on actual energy consumption to determine the first year the threshold is exceeded.

3.2 Northern Territory Legislation

3.2.1 Minerals Titles Act 2012

The Mining Act (1980) has been repealed and replaced with the Mineral Titles Act on 7 November 2012. The objects of the Mineral Titles Act are as follows:

- to establish a framework for granting and regulating mineral titles that authorise exploration for, and extraction and processing of, minerals and extractive minerals;
- to facilitate the commercialisation of activities conducted under mineral titles by authorising the creation and transfer of interests in the titles; and
- to authorise other activities relating to minerals or extractive minerals to be conducted without mineral titles.

3.2.2 Mining Management Act 2001

The *Mining Management Act* 2001 provides for authorisation of mining activities, management of mining sites, protection of the environment on mining sites and related purposes. The Act is administered by DME. The objectives of the Act are:

- ensure the development of the Territory's mineral resources in accordance with environmental standards consistent with best practice in the mining industry;
- protect the environment by:
 - requiring authorisation for and monitoring of mining activities;
 - requiring appropriate management of mining sites through implementation of management systems;
 - facilitating consultation and cooperation between management and workers in implementing environment protection management systems;
 - implementing audits, inspections, investigations, monitoring and reporting to ensure compliance with agreed standards and criteria; and
 - specifying the obligations of all persons on mining sites with respect to protection of the environment.
- assist the mining industry to introduce programs of continuous improvement to achieve best practice environmental management;
- enable persons connected with the mining industry to participate in the implementation of this Act through the establishment of a Mining Board to advise the Minister on:
 - guidelines for the industry;
 - specification of competencies required by persons involved in the industry;
 - best practice in mining activities; and

- minimising the liability of the Territory by requiring the payment of security to provide for the rehabilitation of mining sites or to rectify environmental harm caused by mining activities.

The Mining Management Amendment Bill 2011 was passed and came into force on 1 July 2012. Key changes include:

- enabling the Chief Executive Officer (CEO) of DME to require investigations of less-serious environmental incidents that do not result in material environmental harm (in addition to the current requirements for incidents causing material environmental harm);
- allowing the publication of reports by operators or mining officers following environmental incidents;
- obligation for mining operations on mineral leases to publically report environmental performance in the form of a Environmental Mining Report (EMR) which forms part of the annually submitted Mining Management Plan (MMP);
- introducing new environmental offences and confirming the application of Part IIAA of the Criminal Code Act (NT) (the Criminal Code) to offences under the Act; and
- Community Benefits Plan (CBP) required for mining authorisation of a new mine.

Approval for the Project is required from the Minister for Mines and Energy. The environmental assessment process will allow the Minister to be informed of potential environmental impacts and proposed management to assist in the decision making process.

An approved MMP will be required prior to commencement of proposed works if the Project is approved. The Minister will require security for potential costs of rectifying environmental harm and rehabilitating the site.

3.2.3 Environmental Assessment Act 1982 and Environmental Assessment Administrative Procedures Act 1984

The *Environmental Assessment Act* 1982 (EA Act) and the *Environmental Assessment Administrative Procedures Act* 1984 ensure each matter affecting the environment is fully examined and taken into account in, and in relation to:

- formulation of proposals;
- carrying out of works and other projects;
- negotiation, operation and enforcement of agreements and arrangements (including agreements and arrangements with authorities of the Commonwealth, the states and other territories);
- making of, or the participation in the making of, decisions and recommendations; and
- incurring of expenditure.

The NT Lands, Planning and Environment Minister would determine whether the proposal is likely to have a significant impact on the environment following submission of the NOI and referral from the Minister for Mines and Energy. If the impact is likely to be significant, a Public Environment Report or Environmental Impact Statement will be required.

3.2.4 Northern Territory Environmental Protection Authority Act 2012

The *Northern Territory Environment Protection Authority Act* 2012 commenced on 1 January 2013. The Act establishes the new Northern Territory Environment Protection Authority (NT EPA) as an independent regulatory authority and makes consequential amendments to the

Waste Management and Pollution Control (WMPC) Act 1998 and the Environmental Assessment Act 1982.

Amendments to the WMPC Act identify the NT EPA as the entity responsible for administration of the regulatory functions of that Act.

Amendments to the Environmental Assessment Act also identify the NT EPA as the entity responsible for administration of the assessment functions and impose additional transparency and reporting responsibilities on the Environment Minister and the responsible Minister for specific projects.

3.2.5 Northern Territory Aboriginal Sacred Sites Act 2004

The *Northern Territory Aboriginal Sacred Sites Act 2004* is administered by the Aboriginal Areas Protection Authority (AAPA). The Act provides for the location, recognition, description and protection of sites sacred under Aboriginal tradition. All sacred sites (even if not registered) are protected under the Act and it is an offence to enter or carry out work on a sacred site without permission or a certificate issued by the AAPA. The certificate sets out conditions under which the work may be carried out.

Consultation with the CLC has been undertaken by TNG as part of exploration activities.

A number of aboriginal sites are present within the proximity of the Project mining area and transport and infrastructure corridors. CLC has provided TNG with sacred site clearance certificates for exploration work and exploration drilling (certificate numbers C2008-090, C2010-015, and C2012-007a). Spatial data provided by the CLC has informed TNG of no-go areas for exploration works and has informed the selection of locations of various project elements.

3.2.6 Heritage Act 2011

The Heritage Act 2011 commenced on 1 October 2012. It replaced the Heritage Conservation Act, which had been in operation since 1991.

Chapter two of the Act allows for the establishment of the NT Heritage Register. Members of the community can nominate areas, places, sites, buildings, shipwrecks and heritage objects to the register. If the Minister agrees that these features are of special significance to the heritage of the NT, the place is added to the register. The place will then be protected from accidental and deliberate damage or harm. The Act allows for processes to approve works and maintenance for a heritage place. There are no nominated or declared heritage places in the Mount Peake Project Area.

Sections 17 and 18 of the new Act declare all Aboriginal and Macassan archaeological places and objects heritage places, providing the same level of protection as places on the Heritage Register. Part 3.2 of the Act allows for applications to work on heritage places, including work on, or salvage of, Aboriginal archaeological sites. In practice, permits to salvage Aboriginal Archaeological places will be issued under conditions which include the approval of the appropriate Traditional Owner or Site Custodian for a site. Permits under the new Act will also require reasonable study of each site disturbed, and appropriate curation of any artefacts salvaged. This will normally mean repatriation of artefacts to the appropriate Traditional Owners of an area.

The Act includes a provision for the declaration of classes of places or objects that are known to be of significance in the NT but where not all locations are currently mapped and recorded.

3.2.7 Water Act 1992

The *Water Act* 1992 covers allocation, use, control, protection and management of NT water resources.

Pollution under the Act includes directly or indirectly altering the physical, thermal, chemical, biological or radioactive properties of the water so as to render it less fit for a prescribed beneficial use for which it is or may reasonably be used, or to cause a condition which is hazardous or potentially hazardous to:

- public health, safety or welfare;
- animals, birds, fish or aquatic life or other organisms; and
- plants.

A Waste Discharge Licence (WDL) for the Project is applicable under the act.

3.2.8 National Environment Protection Council (Northern Territory) Act 1994

The *National Environment Protection Council (Northern Territory) Act 1994* establishes the National Environmental Protection Council to set national environmental goals and standards for Australia through the development of National Environment Protection Measures.

Section 14(1) of the National Environment Protection Council Act prescribes that National Environment Protection Measures may relate to any one or more of the following:

- ambient air quality;
- ambient marine, estuarine and fresh water quality;
- the protection of amenity in relation to noise;
- general guidelines for the assessment of site contamination;
- environmental impacts associated with hazardous wastes; and
- the re-use and recycling of used materials.

3.2.9 Waste Management and Pollution Control Act 2009

The purpose of the *Waste Management and Pollution Control Act* 2009 is to protect the environment through objectives and approvals, encouraging effective and responsible waste management and reduction and response to pollution. This Act facilitates the implementation of national environment protection measures made under the *National Environment Protection Council (Northern Territory) Act* 1999, and incorporates environmental compliance plans and audits.

Section 14 of the Act establishes a process for notifying the NT EPA (the administering agency for the Act) about incidents causing, or threatening to cause pollution. Schedule 2 of the Act requires environment protection/licensing for certain activities.

3.2.10 Other legislation

Other legislation that may be applicable to the project includes:

- *Territory Parks and Wildlife Conservation Act 2006*;
- *Soil Conservation and Land Utilisation Act 1980*;
- *Weeds Management Act 2001*;
- *Bushfires Act 2009*;
- *Fire and Emergency Act 1996*;
- *Dangerous Goods Act 1998*;
- *Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2011*;
- *Traffic Act 2012*;
- *Work Health and Safety Act 2011* and Regulations; and
- *Work Health and Safety (National Uniform Legislation) Act 2011* and Regulations (in transition).

3.2.11 Guidelines

The following NT Guidelines may be applicable to the Project:

- *Guidelines to Prevent Mosquito Breeding*, Department of Health and Community Services, 1988;
- *Erosion and Sediment Control Plan Content*, NRETAS, 2006;
- *Policy – Road Traffic Noise of NT Government Controlled Roads*, DPI, 2006; and
- *Requirements for Mining, Construction and Bush Camps (Environmental Health Information Fact Sheet No. 700)*, NT Health and Families.

3.3 List of Approvals Required

The Project will likely require approvals, permits and licences for various components, including:

- an approval under the *Mining Management Act 2001*;
- a permit under the *Heritage Act 2011* to destroy or damage archaeological sites (if any are discovered);
- the grant of Mineral Leases, Mineral Leases (for ancillary purposes) and Access Authorities (for transport and infrastructure corridors) under the *Mineral Titles Act 2012*;
- a permit under the *Dangerous Goods Act 1998* for blasting activities;
- an extractive permit under the DME Guidelines for the development of any borrow pit sites outside of approved mining areas;
- a Waste Discharge Licence (WDL) - management of water discharge from the site is subject to a WDL authorised under Section 74 of the *Water Act 1992*; and
- any wastewater treatment plant may be subject to requirements under the *Public Health Act 1987* and Regulations.

4. Site Descriptions, Potential Impacts and Mitigation

4.1 Site Selection

4.1.1 Mount Peake Project Area

The Mount Peake Project Area location was selected due to the location of the target polymetallic ore body. Locations selected for other Project elements including the transport corridor, infrastructure (gas and slurry pipeline) corridor, rail load-out facility at Adnera and the camp facilities were chosen after consideration of environmental and aboriginal heritage constraints and through consultation between TNG and Traditional Owners, landowners and other relevant stakeholder groups.

4.1.2 East Arm Wharf

East Arm Wharf was selected by TNG as the Project export location after consideration of a number of alternative ports. The site was selected due to TNG's preference to strongly focus its operations on the NT, and key product markets being located in Asia, bringing down shipping costs when compared with alternative port options in South Australia.

4.2 Environmental Setting

4.2.1 Mount Peake Project Area

The Mount Peake Project Area is primarily located on the Stirling pastoral station with a small component of the transport corridor located on Anningie pastoral station. The land is dominated by mulga vegetation communities and rocky outcrops, with some areas of bloodwood, spinifex, coolabah, open shrubland and river redgums particularly along braided river bed systems.

Key environmental and social elements of, or surrounding the Mount Peake Project Area include (Figure 1):

- the Djilbari Hills approximately 14 km to the south east of the proposed mining area;
- the Walabanba Hills approximately 12 km to the west of the proposed mining area;
- Bloodwood Creek approximately 2.5 km to the north west of the proposed pit;
- Murray Creek approximately 250 m east of the proposed pit at its closest point;
- Mud Hut Swamp approximately 7.7 km to the north of the proposed mine pit is considered to be a downstream receptor to the Murray and Bloodwood creeks;
- Wilora Aboriginal community, approximately 10 km north of the infrastructure corridor, as the nearest sensitive receptor to the infrastructure corridor;
- Stirling Swamp located south of the Wilora Aboriginal community;
- Hanson River approximately 25 km north east of the proposed pit and across which the transport and infrastructure corridors will traverse on-route to the rail siding. Extensive areas of mulga occur on these alignments;
- Stirling Station homestead approximately 50 km east of the mining area and 12 km north of the infrastructure corridor; and
- Anningie pastoral station homestead approximately 30 km south west as the nearest sensitive receptor to the mining area;

4.2.2 East Arm Wharf

East Arm Wharf is an existing shipping facility within the Port of Darwin, established to provide facilities to serve a number of shipping and cargo markets and the handling of product including manganese and iron ore.

Key environmental features of, or surrounding the site, include (Figure 2):

- the Darwin CBD, approximately 18 km to the west;
- Catalina Island approximately 2 km to the east;
- South Shell Island 200 m to the south;
- Charles Darwin National Park to the north and north west;

As a part of Darwin Harbour, the area is characterised by mangrove forest lining the tidal boundaries. There are no established vegetation communities at East Arm Wharf as the site has been cleared or reclaimed to form the existing wharf, cargo storage, stockpile and administration building areas.

4.3 Climate

4.3.1 Mount Peake Project Area

The climate of the region is arid to semi-arid with a mean annual rainfall of approximately 320 mm recorded at Barrow Creek, approximately 65 km east of the mining area. The climate is characterised by hot, wet summers and warm, dry winters. Rain tends to fall during heavy rain events between November and March, with little follow on rain (Bureau of Meteorology 2011). The highest annual rainfall for Barrow Creek of 1,153 mm was recorded in 2010. Annual rainfall is highly variable.

Temperatures vary significantly, with mean daily maximum temperatures ranging from 22°C (August) to 37°C (January), and mean daily minimum temperatures from 8°C (July) to 24°C (January). Average annual evaporation for Barrow Creek totals around 2,980 mm, with average monthly evaporation exceeding rainfall in all months.

4.3.2 East Arm Wharf

Darwin's climate is characterised by a hot, humid 'wet season' (usually November to March) and a hot, dry 'dry season' (May to December). The mean annual rainfall of 1,700 mm is seasonal, varying from 1 mm in July to 400 mm in January. High precipitation events are commonly experienced during storm events during the wet season.

Relative humidity varies from 62% at 9.00 am and 30% at 3.00 pm in June to 84% at 9.00 am and 71% at 3.00 pm in February. Temperatures remain in a relatively narrow range throughout the year, with daily minimums varying from 19.2°C in July, to 25.2°C in November, and daily maximums for the same months varying from 30.3°C to 33.1°C.

Mean daily evaporation ranges from 5.7 mm in February, to 8.0 mm in October, with average daily evaporation rates at 6.8 mm.

4.4 Soils and Geology

4.4.1 Mount Peake Project Area

Existing Environment

The proposed Mount Peake Project Area lies within outliers of Neoproterozoic sediments of the Georgina Basin, which rest on metasediments of granites of the Aileron Province within the Lower Proterozoic Arunta Region (TNG, 2012).

The Mount Peake orebody is located in a magnetite bearing gabbro occurring at a shallow depth of around 40 m, striking along a 1.3 km length, 500 m wide and 80 to 100 m thick.

Soils within the proposed mining area consist of shallow sands and massive earths.

Potential Impacts

It is considered unlikely that construction and/or operational activities will impact the geology of the region due to the confined and shallow nature of the planned activities.

Results from geochemical characterisation of ore and waste samples show very low percentages of Sulphur within the ore body (approximately 0.02%). As such, AMD is not expected to be an issue in relation to waste management at Mount Peake.

Soils will be stripped in areas where new structures are to be constructed, with material stockpiled and used for rehabilitation.

Soil quality may be affected during construction and operations as a result of discharge of contaminants via seepage or spills, or from dust deposition.

Depleted soil quality can impact plant germination and fauna, and contaminants can be bioaccumulated through the food chain.

Soil erosion has the potential to impact Murray Creek and the downstream Mud Hut Swamp through the release of sediment from site during flow events.

Mitigation Measures

Contamination will be managed during construction and operation through identification, storage and handling of potential contaminants, spill response and dust reduction measures through construction and operation Environmental Management Plans (EMP's).

Soil erosion and discharge of sediments to waterways will also be addressed through management measures outlined in an EMP, including minimising disturbance areas, progressive rehabilitation and provision of sediment traps.

4.4.2 East Arm Wharf

Existing Environment

East Arm Wharf was constructed through land reclamation with fill obtained from the surrounding area (Coffey 2010). Acer Vaughan *et al.* (1993) reported in a draft EIS for the East Arm Wharf Expansion that two land systems of the Quarantine Island area and East Arm Peninsula were amalgamated through land reclamation to create the East Arm Wharf area are: the Bustard system and the Littoral system.

Acid sulfate soils (ASS) exist in coastal areas of the Darwin Harbour below 5 m AHD, and risk mapping undertaken by CSIRO in 2008 indicated that soils in this East Arm Wharf area have a high probability of generating acid when exposed to oxygen through activities such as excavation (BHP, 2009).

Regional geology shows that the East Arm peninsula is underlain by Quaternary intertidal marine alluvium consisting of clay and mud, and colluvial sediments deposited by un-concentrated surface runoff consisting of sand, silt and clay (AECOM, 2009). Unconsolidated and concretionary lateritic soils of Cainozoic age have been mapped in the area. Early Proterozoic metamorphic Burrell Creek Formation form isolated outcrops on the East Arm peninsula.

In 2008 URS sampled contamination of surface marine sediments of near-shore areas, including around East Arm Wharf. They found that samples for the East Arm Wharf area included chromium and mercury concentrations above screening levels, but not above maximum guideline levels. Petroleum hydrocarbons were recorded in East Arm but were below screening levels, and are likely to be as a result of historical industrial and port operations.

Potential Impacts

No works are expected to be conducted on undisturbed land. No impacts will occur to land-units from activities associated with export of product from East Arm Wharf.

Ground disturbance and construction earthworks have the potential to expose ASS to oxygen, generating sulphuric acid.

Mitigation Measures

An ASS assessment of the Project footprint will be carried out. If ASS are encountered and likely to be disturbed, an ASS Management Plan will be implemented for construction and operation of the facility in line with the Darwin Port Corporation's (DPC) East Arm Wharf EMP (Coffey 2010).

4.5 Surface Water

4.5.1 Mount Peake Project Area

Existing Environment

The Mount Peake Project area lies within the Wiso Catchment. Regional climate results in a number of ephemeral drainage lines with three major surface water features being:

- Bloodwood Creek to the north;
- Murray Creek to the east; and
- Hanson River to the east into which regional drainage channels typically discharge.

The ephemeral Mud Hut Swamp is located within the footprint of exploration lease EL 29578, approximately 7.7 km to the north of the proposed mine pit and is considered to be a downstream receptor to the Murray and Bloodwood creeks. Mud Hut Swamp is not included within a formal network of protected areas, however it has been identified by NRETAS as a Site of Conservation Significance and is listed in the 'Inventory of sites of international and national significance for biodiversity values in the Northern Territory'.

The Anmatyerr North site which includes the Stirling Swamp to the south of the Wilora community has also been identified by NRETAS as a Site of Conservation Significance and is listed in the 'Inventory of sites of international and national significance for biodiversity values in the Northern Territory' (NRETAS 2009). It too is not formally protected. This site is crossed by the proposed Project corridors.

No water quality information is available for the watercourses in the area.

Potential Impacts

Changes to existing topography will occur through mine construction, construction of associated infrastructure and the development of the transport corridor.

The infrastructure and transport corridors will cross the Murray Creek and the Hanson River. Structures installed across these water courses have the potential to interrupt or alter surface water flow and to affect downstream ecosystems.

Construction, mining and processing activities have the potential to impact surface water quality through the discharge of sediment or contaminants. Contaminated surface water has the potential to adversely affect downstream ecosystem health resulting in loss of biodiversity.

Mitigation Measures

The Project mining area is being designed so there will be no uncontrolled discharges of untreated process water at the Mount Peake Project site.

Design and siting of key infrastructure such as the processing plant, WRD and water treatment ponds will be based on topographical, geotechnical and hydrological studies.

Opportunities for surface water interaction with groundwater and changes to existing drainage regimes will be minimised during site design. For example, structures that potentially contain contaminated materials will be isolated from groundwater.

Standard management strategies will be in place to manage surface spills and storage of hydrocarbons and chemicals. Monitoring and reporting of spills and emissions will be implemented.

A Water Management Plan will be developed for construction and operational activities which will include ongoing monitoring and evaluation of water resources and potential impacts.

4.5.2 East Arm Wharf

Existing Environment

The topography of the Darwin Harbour region ranges from flat intertidal and estuarine (marine) plains of negligible slope, through to undulating hills and plateaus. Elevation ranges from sea level at the coastal margins to around 140 m in the southern foothills (BHP, 2009).

East Arm was originally designed and constructed for surface water to run-off directly to the ocean. However, surface water is now managed through a series of stormwater drains and collection pits that discharge to a collection pond.

The wharf area of East Arm is subject to storm surge during cyclonic conditions with maps indicating that the site is within the “Primary Storm Surge Zone” could be inundated for a storm tide event of 100 year Average Recurrence Intervals (ARI) (GHD 2010). The same mapping shows that the proposed footprint for the bulk storage area sits partly within the Primary Storm Surge Zone.

Potential Impacts

Potential impacts include:

- inundation of product stockpiles during storm surge conditions;
- increased runoff from hard stand areas;
- dust from stockpiles and materials handling; and
- spillage from product ship loading.

Mitigation Measures

TNG recognises DPC expectations in relation to product storage during potential storm surge events. TNG understands and will comply with DPC's standard operating procedures outlined in the East Arm Wharf EMP (Coffey 2010).

A storm water assessment will be undertaken to assess the likely impact that construction and operation of storage and product transportation facilities will have on flooding and drainage structures.

Surface Water Management Plans will be developed for TNG construction and operational activities in line with DPC's East Arm Wharf EMP (Coffey 2010).

Dust levels will be controlled through maintaining moisture levels in product stockpiles and through capture of particulate matter during materials handling.

4.6 Groundwater

4.6.1 Mount Peake Project Area

Existing Environment

The Project mining area is located within the Arunta Geological region and is underlain by fractured and weathered rock aquifers. The fractured rock aquifer system is considered to be semi-confined. Fractured and weathered rock aquifer generally provides variable groundwater yields ranging from 0.05 to 2.5 litres per second (L/s).

Palaeovalleys in-filled with Tertiary and Quaternary sediments are located close to the Mount Peake Project Area (around 35 km north northeast). The identified palaeovalley aligns the Hanson River in a north south orientation, with the palaeovalley beginning at the intersection of the Mount Peake Creek and the Hanson River. The palaeovalley is approximately 10 km (east to west) at its widest and extends approximately 50 km to the north. Bore search data identified that yields of approximately 1.5 L/s can be expected from palaeochannel aquifers, and all bores installed into the aquifer have been used for stock watering purposes.

Standing water level data indicates that groundwater within the fractured rock aquifer in the mining area generally ranges from 20 to 25 mbgl. Groundwater bores that are likely installed within the palaeovalley aquifer indicate depths to groundwater ranging from 10 to 15 mbgl.

It is considered that groundwater flow is to the north-east, consistent with local topographic relief and groundwater recharge and discharge is likely to be seasonal, with enhanced recharge in the wet season, and enhanced discharge in the dry season when receiving ephemeral watercourses are dry.

Elevated fluoride concentrations in a number of wells within the mining area and the palaeovalley aquifer exceed the Australian Drinking Water Guideline (ADWG) of 1.5 mg/L. Elevated fluoride concentrations are typically derived from granitic rocks in the Arunta block.

Additionally, nitrate and sulphate were reported at concentrations exceeding the ADWG guidelines (50 and 500 mg/L respectively).

Existing uses of the groundwater within, and surrounding, the mine area is generally stock watering (total dissolved solids (TDS) ranging from 0 to 13,000 mg/L) and industrial purposes (TDS ranging from >13,000 mg/L).

In general, groundwater would need to be treated prior to potable use.

Potential Impacts

Mining activities have the potential to impact groundwater quality. TNG will consider the construction of a storage cell to contain dry stacked tailings or the use of a conventional Tailings Storage Facility.

Dewatering will be required to allow mining to proceed. Groundwater drawdown has the potential to impact groundwater dependant ecosystems or wetlands (e.g. Mud Hut Swamp) occurring within the cone of depression. Post-mining the pit void has the potential to operate as a groundwater sink resulting in a permanent localised reduction in groundwater levels.

Mitigation Measures

Groundwater modelling and groundwater quality assessments will be undertaken as part of the hydrogeological studies. These studies will determine the potential extent of groundwater drawdown, the likely interaction between groundwater and surface water systems (such as Mud Hut Swamp) and the behaviour of the pit void and its groundwater quality post-mining.

4.6.2 East Arm Wharf

Existing Environment

Groundwater in the Darwin Harbour region generally occurs in shallow, unconfined aquifers. The aquifers discharge and drain throughout the dry season, and are recharged during the wet season by direct infiltration and rainfall. Standing water levels can range from near surface to up to 10 m below ground level (BHP, 2009).

Groundwater can be encountered within the Quaternary and Proterozoic lithologies, which are shallow. Aquifers are low yielding, with flows less than 0.5 L/s. Higher yields with low storage may be available from sand lenses with Quaternary sediments and fractures in sandstone.

Groundwater quality is typically saline to hyper saline and not suitable for drinking or irrigation unless treated. The high salinity is due to the proximity to landward salt water intrusion and dissolution of salts derived from marine sediments.

Potential Impacts

Potential impacts to groundwater include contamination from fuel spills and changes to surface water recharge if impermeable surfaces are constructed. A groundwater assessment will be completed to inform potential impacts and mitigation measures for inclusion in the construction and operation EMP's.

Mitigation Measures

Standard industry practice as well as operational requirements for fuel storage and handling will be adhered to in line with DPC's East Arm Wharf EMP (Coffey 2010). This may include double skinned storage tanks, bunded containment areas, spill kits and training/induction of personnel and surface water management measures.

4.7 Flora and Vegetation

4.7.1 Mount Peake Project Area

Existing Environment

The Mount Peake Project Area lies within the Burt Plain bioregion (DSEWPaC, 2013). As a result of desktop study and review of aerial imagery, the following key vegetation communities were identified as being within the Mount Peake Project Area:

- Bloodwood (*Corymbia terminalis*) low open woodland over Spinifex (*Triodia pungens*) hummock grassland understorey on sand plains;
- Dead Finish (*Acacia tetragonaphylla*) open shrubland on gravelly plains and low hills;
- River Red Gum (*Eucalyptus camaldulensis*) open woodland fringing major water courses;
- Mulga woodland (*Acacia aneura*) open woodland on loamy sand plains; and
- Coolibah (*Eucalyptus victrix*) woodland and wooded swamp.

The Commonwealth government's protected matters search tool (PMST) did not identify any listed flora species, although one species, the Native Sweet Potato (*Ipomoea* sp. Stirling), listed as Vulnerable both nationally and in the NT has been recorded elsewhere on Stirling Station to the east of Stuart Highway.

The Anmatyerr North site identified by NRETAS as a Site of Conservation Significance and is listed in the 'Inventory of sites of international and national significance for biodiversity values in the Northern Territory' (NRETAS 2009) is crossed by the proposed Project corridors. Within this site the following listed species listed under the *EPBC Act* 1999 and *NT Territory Parks and Wildlife Conservation Act* 2000 have been recorded:

- *Eleocharis papillosa* (Dwarf Desert Spike-rush) to the north of the conservation site; and
- *Ipomoea polpha* subsp. *Latzii* (Giant Sweet Potato) to the south-east of the conservation site.

Desktop studies identified the potential for four invasive plants to occur within 10 km of the mining area: Buffel-grass (*Cenchrus ciliaris*), Jerusalem Thorn (*Parkinsonia aculeate*), Mesquite (*Prosopis* spp.) and Athel pine (*Tamarix aphylla*).

Potential Impacts

Construction of the mine and supporting infrastructure will require vegetation clearing.

Transport and infrastructure corridors have the potential to impact upon *Ipomoea polpha* subsp. *Latzii* (Giant Sweet Potato).

Weeds have the potential to be introduced and spread via vehicle movements and topsoil stripping. Flora surveys will identify any weeds that will require future management within the Mount Peake Project Area.

Mitigation Measures

Vegetation clearing will be kept to the minimum required and site weed management will occur through a weed management plan and relevant components of the construction and operational EMPs.

Baseline flora and vegetation surveys are currently being carried out across the site and the results will inform future construction and operation EMP's and monitoring programs.

Final transport and infrastructure corridor alignments will be selected to avoid any impacts to *Ipomoea polpha subsp. Latzii* (Giant Sweet Potato) populations.

Rehabilitation will be undertaken progressively using local species.

4.7.2 East Arm Wharf

Existing Environment

East Arm Wharf lies within the Darwin Coastal Bioregion (DSEWPaC, 2013). The bioregion is reported to be in good condition, but degradation has occurred from clearing for urban and horticultural development, weed infestation, saltwater intrusion, altered fire regimes and feral animals (INPEX 2010). The area being considered for development has been completely cleared of all vegetation.

East Arm Wharf, extending to the lowest astronomical tides to the hinterland fringes is zoned for development (Development Zone D). An objective of Development Zone D is to provide areas in and around which development may occur with accepted non-reversible changes to mangrove areas.

Mangrove community mapping undertaken by Brocklehurst and Eameades (1996) identify three mangrove communities at East Arm Wharf:

- *Cerriops tagal* low closed forest;
- *Rhiophora stylosa* / *Campostemon schutzii* closed forest; and
- *Sonneratia alba* woodland in the seaward zone.

Potential Impacts

There is no potential for loss of habitat at East Arm Wharf as the Project will be developed on areas previously cleared.

There is potential for weed species to be transported to and from the port facilities.

Dust emissions from stockpiles and materials handling have the potential to impact mangroves.

Mitigation Measures

All weed management and quarantine requirements under the DPC East Arm Wharf EMS (Coffey 2010) will be adhered to and managed under construction and operational EMPs.

Dust levels will be controlled through maintaining moisture levels in product stockpiles and through capture of particulate matter during materials handling.

4.8 Fauna

4.8.1 Mount Peake Project Area

Existing Environment

The Commonwealth PMST identifies that the mine site contains habitat considered suitable for five species (four mammal and one reptile) that are listed both nationally (under the EPBC Act) and under NT legislation (under the *Territory Parks and Wildlife Conservation Act 2006*). The mine site may also provide habitat suitable for a further six migratory and one vulnerable bird species which are protected under the EPBC Act. Four bird species listed as threatened in the NT have been historically recorded within 20 km of the mining area. The listed species and a likelihood of occurrence are shown in Table 3.

Table 3 Listed Fauna Species Potentially Present within the Project Area

Common Name	Species	TPWCA ¹	EPBC Act Status ²	Likelihood of Occurrence
BIRDS				
Australian Bustard	<i>Ardeotis australis</i>	VU	-	Possible
Bush Stone-curlew	<i>Burhinus grallarius</i>	NT	-	Possible
Cattle Egret	<i>Ardea ibis</i>	-	M	Possible
Emu	<i>Dromaius novaehollandiae</i>	VU	-	Possible
Fork-tailed Swift	<i>Apus pacificus</i>	-	M	Possible
Great Egret	<i>Ardea alba</i>	-	M	Possible
Oriental Plover	<i>Charadrius veredus</i>	-	M	Possible
Oriental Pratincole	<i>Glareola maldivarum</i>	-	M	Possible
Australian Painted Snipe	<i>Rostratula australis</i>	VU	V	Possible
Rainbow Bee Eater	<i>Merops ornatus</i>	LC	M	Possible
REPTILES				
Tjakura, Great desert skink	<i>Lipholis kintorei</i> / <i>Egernia kintorei</i>	VU	V	Possible
MAMMALS				
Waru, Black Footed Rock Wallaby (MacDonnell Ranges race)	<i>Petrogale lateralis</i>	NT	V	Possible
Marsupial Mole	<i>Notoryctes</i>	VY	E	Possible
Greater Bilby	<i>Mactotis lagotis</i>	VU	V	Possible
Brush-tailed Mulgara	<i>Dasycercus blythi</i>	VU	V	Possible
Brush-tailed Ampurta	<i>Dasycercus cristicauda</i>	VU	E	Possible

¹ Territory Parks and Wildlife Conservation Act (TPWCA) Status: EX, Extinct; CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient; NE, Not Evaluated

² Environment Protection and Biodiversity Conservation Act Status: Endangered (E), Vulnerable (V), Migratory (M)

Desktop survey has shown that camels, dingoes, foxes and domestic cats and mice are likely to occur in the Mount Peake Project Area.

The Anmatyerr North site identified by NRETAS as a Site of Conservation Significance and is listed in the 'Inventory of sites of international and national significance for biodiversity values in the Northern Territory' (NRETAS 2009) is crossed by the proposed Project corridors. Within this site the following species have been recorded:

- Australian Bustard; and
- Bilby.

Potential Impacts

Construction of the mine and supporting infrastructure will require vegetation clearance. This will remove fauna habitat and has the potential to impact species of conservation significance.

Other potential impacts include:

- dust from mining, processing and transport;
- noise from mining, processing and transport;
- vehicle strikes;
- light spill from construction and operation activities;
- increase in biting insect numbers from an increase in standing water; and
- loss of habitat from lowering of the water table.

Mitigation Measures

Vegetation clearing will be kept to the minimum required.

Fauna surveys are currently being carried out and mine planning will take account of the results of these surveys in the location of infrastructure.

A fauna management plan will be developed for construction and operation of the Project which will include fauna management measures for native and introduced species, and biting insects.

4.8.2 East Arm Wharf

Existing Environment

Terrestrial

A survey undertaken by Ecological Marine Services (EMS) for the East Arm Wharf Expansion in the mangrove region to the north of the Project footprint found a total of one-hundred and forty-one (141) native terrestrial vertebrate species including seven (7) amphibian, eleven (11) reptile, one-hundred and nine (109) birds and fourteen (14) mammal species. One fauna species listed under the TPWC Act (the Bush Stone-curlew) was recorded (DPLG 2011).

The site has been previously cleared of vegetation and there is no likelihood that species of conservation significance to occur. Exotic species occurring on-site are likely to include domestic cats and rodents.

Approval to expand the East Arm Wharf was provided to the NT Department of Lands and Planning by DSEWPoC in 2012. Included in approval conditions was the requirement for the submission and implementation of a Migratory Birds Management Plan (MBMP) which included the creation and protection of 24 ha of habitat for migratory birds in, or in close proximity to East Arm.

Marine

Darwin Harbour is home to 415 species of fish, sharks and rays from 95 families. Three species of dolphin and the dugong are also commonly encountered within the harbour region, as are six species of sea turtle, and the saltwater crocodile (which is actively removed from the harbour as part of the crocodile management program) (Coffey 2009).

The Darwin Harbour also supports several endemic and migratory bird species including gulls, raptors and herons. A number of shorebirds that visit the mudflats are migratory species protected by Japan Australian Migratory Bird Agreement (JAMBA) and the China Australia Migratory Bird Agreement (CAMBA).

A survey undertaken Ecological Marine Services (EMS) for the East Arm Wharf Expansion in the mangrove region to the north of the Project footprint found thirty one species of birds listed as migratory wetland or marine species under the EPBC Act, and Fifty-nine (59) bird species classified as marine species under the EPBC Act. The survey also recorded an observation of the Indo pacific Hump-back dolphin (*Sousa chinensis*) (DPLG 2011).

Biting Insects

Intertidal mangrove environments provide ideal breeding sites for biting midges and mosquitos. Mosquitos are a serious public health issue in the NT, both as pests and as vectors of a number of human diseases (DPLG, 2011).

Potential Impacts

Potential impacts include:

- dust from product stockpiles and materials handling;
- noise from materials handling;
- increased standing water providing breeding habitat for biting insects;
- light spill from construction and operation activities; and
- increased shipping impacting on marine fauna.

Mitigation Measures

No fauna habitat will be lost as the site has been previously cleared.

A suite of management measures will be developed to minimise dust and noise emissions in line with the standards and procedures outlined in DPC East Arm Wharf EMP (Coffey, 2010). TNG or any third party acting on TNG's behalf will be required to demonstrate conformance with the DPC's Management Plan.

A surface water management plan will ensure impacts to marine water quality will be managed in line with DPC's East Arm Wharf EMP.

Standing water providing potential breeding habitat for biting insects will be managed in accordance with the construction EMP and the DPC's East Arm Wharf EMP.

The Migratory Bird Management Plan (MBMP) as required by DSEWPaC in approving the East Arm Wharf Expansion is recognised by TNG and migratory bird habitat management at the East Arm Wharf Project Area is expected to be managed in line with this document and DPC's East Arm Wharf EMP.

4.9 Air Quality

4.9.1 Mount Peake Project Area

Existing Environment

There are no existing industrial air emissions within the Mount Peake Project Area.

Dust emissions occur from wind erosion from exposed ground and station related vehicle traffic on unsealed roads, and smoke emissions from seasonal bushfires in the region.

The nearest occupied residence is Anningie Station homestead (approximately 5 permanent residents) around 30 km from the mining area. Wilora community (approximately 120 residents) is around 10 km from the infrastructure (gas and slurry pipeline) corridor and 25 km from the transport corridor.

There are also two semi-permanently occupied Indigenous outstations (Patsy's and Walkabout) on the western side of Stuart Highway between Wilora and Barrow Creek.

Potential Impacts

Project related air emissions include:

- dust from:
 - drilling and blasting;
 - materials handling – loading, unloading, haulage and handling of ore and waste rock;
 - processing of ore;
 - general site movements over unsealed surfaces; and
 - wind erosion from exposed surfaces e.g. waste dump, laydown areas and stockpiles.
- stack emissions from the power station containing NO_x, CO, particulate matter and negligible SO₂; and
- combustion emissions from equipment and vehicles.

Mitigation Measures

Emissions from the power station will meet current industry standards for NO_x, SO_x, CO and particulate matter.

Modelling will be undertaken to quantify dust and process emissions.

A dust management plan will be developed for the construction and operation of the Project, which will outline measures to reduce dust emissions to as low as practicable including:

- water spraying and / or chemical stabilisation of haul roads;
- water sprays on the WRD, stockpiles, while loading and unloading stockpiles and material transfer points; and
- application of water to the ore prior to crushing.

Given the remoteness of the Project from sensitive receptors it is unlikely that air quality will be an issue.

4.9.2 East Arm Wharf

Existing Environment

Current operations at the East Arm Wharf generate dust from conveyor use, exposed surfaces, rail and road transport, exposed stockpiles, drying sediment ponds, a bottom dump station and ship loading activities.

Potential Impacts

Project related air emissions include:

- dust from:
 - materials handling;
 - general site movements over unsealed surfaces; and
 - wind erosion from exposed surfaces such as stockpiles.
- combustion emissions from equipment and vehicles.

Mitigation Measures

Construction and operation activities will comply with the DPC's East Arm Wharf EMP (Coffey 2010), which includes a requirement to comply with the following for the management of air quality in the absence of NT guidelines:

- National Environmental Protection (Ambient Air Quality) Measure (NEPM);
- National Environmental Protection (Air Toxics) Measure (NEPM);
- State Environmental Protection Policy (Air Quality Management) (Victoria);
- NOHSC:1003 Adapted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment; and
- Other State and Territory guidelines that DPC determines are relevant.

A dust management plan will be developed for the construction and operation of the Project in accordance with the DPC East Arm Wharf EMP (Coffey 2010). Management measures considered will include:

- water spraying and / or chemical stabilisation of unsealed roads; and
- water sprays on the stockpiles, while loading and unloading stockpiles and material transfer points.

4.10 Noise and Vibration

4.10.1 Mount Peake Project Area

Existing Environment

The Mount Peake Project Area currently has few sources of noise and vibration. Noise is associated with operations on Stirling Station, traffic noise on Stuart Highway and rail noise from the Alice Springs to Darwin railway.

The nearest occupied residence is Anningie Station homestead (approximately 5 permanent residents) around 30 km from the mining area. Wilora community (approximately 120 residents) is around 10 km from the infrastructure (gas and slurry pipeline) corridor and 25 km from the transport corridor.

Potential Impacts

The following activities will increase noise and vibration:

- drilling and blasting;
- loading/unloading of ore and waste rock;
- hauling of ore and waste rock;
- processing of ore including crushing and screening;
- rail movements; and
- vehicle movement to, from and around the site.

Noise and vibration has the potential to adversely affect fauna.

Mitigation Measures

Potential noise and vibration levels will be modelled to ensure compliance with applicable guidelines and standards. If required, noise levels will be monitored during construction and operation and management measures implemented should levels prove to be excessive.

Given the remoteness of the Project from sensitive receptors it is unlikely that noise will be an issue.

4.10.2 East Arm Wharf

Existing Environment

A construction and operational terrestrial noise and vibration assessment was undertaken for the East Arm Wharf Expansion Project (Acer Vaughan), and found that as part of an operating port zoned DV (Development) under the NT Planning Scheme, the land surrounding the east Arm Wharf is unconstrained by conflicting land uses. When reviewed against available guidelines and standards, the project complied with noise criteria at identified receptors within 4 km to 6 km from the project site.

Potential Impacts

Given the scale of the East Arm Wharf Expansion Project in comparison to activities associated with this Project, it is not anticipated that there will be any impact from noise and vibration.

Mitigation Measures

Construction activities are expected to be confined to the daytime period.

Shiploading activities will be managed in accordance with the DPC's East Arm Wharf EMP (Coffey 2010).

4.11 Indigenous Heritage

4.11.1 Mount Peake Project Area

Existing Environment

In 1995, the Aboriginal Areas Protection Authority (AAPA) conducted a heritage survey over a large area to identify Significant Sites under the *Northern Territory Aboriginal Sacred Sites Act* 1989. This survey was conducted at the request of Aberfoyle Resources Limited who held a number of exploration leases in the area. A number of ridges and hills, temporary waterholes and the "Mud Hut Swamp" claypan were identified as Significant Sites.

TNG applied to the Central Land Council (CLC) for a Sacred Site Clearance Certificate in September 2008 for an area of around 43 km² surrounding the Mount Peake resource to conduct exploration drilling. Site clearance certificate (C2008-090) was issued for exploration drilling in the subject area.

Registration of Native Title determination Application – DC11/12 Stirling and Neutral Junction NTD17/2011 was registered with the National Native Title Tribunal (NNTT) on 17 August 2011. The application was accepted for registration under section 190A of the *Native title Act* 1993 and entered onto the Registrar of Native Title claims on 19 August 2011. The Mount Peake Project mining area and part of the transport corridor is covered by the application.

Potential Impacts

The Project has the potential to disturb sites of aboriginal heritage significance.

Mitigation Measures

The risk of disturbance to known or potential aboriginal cultural heritage values will be determined by surveys (archaeological and ethnographic) undertaken within the Project footprint.

Any sites of Indigenous heritage significance will be reported and the location of sites will be taken into consideration during design of the mine and location of transport and infrastructure corridors.

In consultation with traditional owners, CLC and AAPA clearances will be sought should disturbance to aboriginal sites be required.

4.11.2 East Arm Wharf

Existing Environment

Undisturbed mangrove forests and mudflats surrounding the Darwin Harbour have cultural and spiritual significance. Additionally, the AAPA have indicated that Catalina Island and the associated sandbar are of cultural significance and need to be protected (Coffey, 2010).

AECOM (2009) report that all Native Title claims over the East Arm Wharf Project Area (land and water) were extinguished (Risk vs Northern Territory of Australia, Federal Court NTD6033/01). It is unlikely that any future claims will be made over the same area and if so it is unlikely that the claim will be successful (Solicitor for the Northern Territory, 2009).

Potential Impacts

The proposed Project footprint is on reclaimed land and will not impact upon any known Indigenous heritage sites.

Mitigation Measures

No specific management measures are proposed.

4.12 Non-Indigenous Heritage

4.12.1 Mount Peake Project Area

Existing Environment

A search of the PMST of the mining area with a 10 km buffer identified:

- no registered World Heritage sites;
- no registered National Heritage sites; and
- no registered Commonwealth Heritage Places.

One NT registered site was identified within 50 km of the Project footprint, the Barrow Creek Telegraph Station – Overland Telegraph Line Site.

Potential Impacts

The Project is not expected to impact non-indigenous heritage sites.

Mitigation Measures

No specific management measures are proposed.

4.12.2 East Arm Wharf

Existing Environment

During World War II the East Arm Peninsular was occupied by the Z force (pre-cursor to the current day SAS regiment) who were located at Wickham Point (AECOM, 2009). Four sites of cultural significance were identified in the vicinity of the East Arm Wharf.

A search of the PMST and NT Heritage Register of the East Arm Wharf Project Area and 2 km buffer identified:

- no registered World Heritage sites;
- no registered National Heritage sites; and
- no registered Commonwealth Heritage Places.

Potential Impacts

The proposed Project footprint is on reclaimed land and will not impact upon any known non-indigenous heritage site.

Mitigation Measures

No specific management measures are proposed.

4.13 Socio-Economic Environment

4.13.1 Mount Peake Project Area

Existing Environment

The Mount Peake Project Area is in the vicinity of the Ti Tree community, approximately 235 km north of Alice Springs, and within the Stirling and Anningie Stations, both operating cattle stations. Predominant land use in the area is cattle grazing, with domestic and stock water supplies sourced from groundwater. The Neutral Junction Station is adjacent to the Stirling Station to the east.

There are five communities in the region of the Mount Peake Project area:

- Anningie (also known as Yanginj), population approximately 50;
- Ankweleyelengkwe, unknown population;
- Wilora, population approximately 120;
- Jemelke (adjacent to Barrow Creek), unknown population, Barrow Creek population 11; and
- Willowra, population 300.

All communities are dependent on groundwater for domestic supply.

METS (2011) report that the population of Central Australia was approximately 48,900 in 2009. The majority of this population reside in the regional centre of Alice Springs which is the commercial hub and centre for services and government agencies.

The Alice Springs Economic Profile (Northern Territory Government, 2010) indicates that the total Central Australian economy contributes approximately 17% to the Northern Territory economy, and the Central Australian Gross Regional Product (GRP) in 2009 was \$2.7 billion. This figure had increased approximately 51% since 1996, predominantly due to growth in the mining sector in the region.

Mining contributed approximately 31% toward Central Australia's GRP in 2009. Property and business services, government administration and defence, manufacturing, health and community services, construction and transport and storage are the other major contributing industries toward GRP within Alice Springs.

Potential Impacts

The construction and operations workforces associated with this Project are estimated at 350 and 250 personnel respectively at the project's peak activity. The workforce will be drawn from local and other areas via fly-in, fly-out (FIFO) and drive-in drive-out (DIDO).

Potential impacts on surrounding communities include use of groundwater resources and groundwater drawdown, increased traffic and noise, increased access to local townships and facilities, and potential for anti-social behaviour and worker fatigue associated with a FIFO and DIDO workforce. There may also be an increased demand on local infrastructure and utilities leading to local and regional shortfalls.

Potential positive impacts include employment opportunities, potential development of multi user access roads, use of regional airline charters, and flow on economic effects for businesses and service providers in the Central Australian region.

Mitigation Measures

Groundwater studies to understand impacts of the Project on groundwater resources are underway. Given the remoteness of the mine site from domestic bore users, groundwater impacts are unlikely to occur.

Transport studies will determine potential impacts on existing transport routes.

Air and noise studies will determine impacts to sensitive receivers.

Economic and social impact assessments will be undertaken and management measures proposed where impacts are likely to be significant.

4.13.2 East Arm Wharf

Existing Environment

East Arm Wharf is located in the vicinity of the Darwin CBD. Data from the 2006 Census indicated that 24% of the NT population (66,000 residents) lived in the City of Darwin.

East Arm Wharf lies within the Darwin Harbour adjacent to Bleesers Creek to the north and Hudson Creek to the east and sits at the entrance to the Elizabeth River to the southeast. The harbour and creeks are popular with recreational fishers.

Current land uses associated with the East Arm Wharf include liquid and bulk materials handling for the petroleum, mining, agricultural and construction industries. Supporting land uses include the haulage road and road corridor into the wharf (Berrimah Road), and rail corridor into the wharf.

There are no residential suburbs in close proximity to East Arm Wharf.

There are a number of aquaculture ventures within the Darwin Harbour either existing (e.g. Darwin Aquaculture Centre on Channel Island), or proposed.

Potential Impacts

The construction and operations workforces at East Arm Wharf associated with this Project are estimated at 50 and 10 personnel respectively. The workforce will be drawn from the local area.

Given the small size of the workforce the Project is not expected to result in any significant socio-economic impact.

Mitigation Measures

No specific management measures are proposed.

4.14 Greenhouse Gas Emissions

Existing Environment

The Department of Climate Change and Energy Efficiency (DCCEE) state that the NT's 2009/10 greenhouse gas emissions were approximately 14.5 Mt, excluding emissions from land use, land use change and forestry (LULUCF). When exclusions for LULUCF are included, greenhouse gas emissions were approximately 14.7 Mt. The principal source of emissions in the NT is agriculture, predominantly the burning of savannas.

Greenhouse gas emissions within the Mount Peake Project area are limited to bushfires, fuel combustion in vehicles, and livestock related emissions.

Existing greenhouse gas emissions within the East Arm Wharf Project area and surrounding areas include:

- fuel combustion for energy supply;
- waste
- fugitive emissions from industrial processes; and
- loss of vegetation through land use change.

Potential Impacts

The construction and operation of the mine and associated process plant will increase greenhouse gas emissions, predominantly from the burning of natural gas for power generation, diesel consumption for stationary and transport purposes and loss of vegetation through land use change.

The construction and operation of facilities at East Arm Wharf will increase greenhouse gas emissions through energy consumption, construction activities and emissions from vehicle emissions.

Mitigation Measures

A greenhouse gas emission study will be undertaken.

4.15 Waste Management

4.15.1 Mount Peake Project Area

Existing Environment

There are no significant activities in the Mount Peake Project Area producing process wastes.

Potential Impacts and their Mitigation

Mining and Processing Wastes

A WRD (approximately 40 ha) will be constructed at the mine site to contain waste rock.

Either a storage cell to contain dry stacked tailings from the beneficiation plant or a TSF will be constructed.

Waste streams from the hydrometallurgical plant will be:

- a non-magnetic tailings reject stream which is high in aluminium and silica that could be used as a raw material in road base or geopolymer concrete. This will be contained in a purpose built cell; and
- a crystalline salt product that could be used as a raw material in a chlor-alkali plant. This will be contained in a purpose built cell.

Waste Oils and Lubricants

Waste oils, lubricants, and associated cleaning rags will be disposed of in clearly marked bins. Waste oil will be stored appropriately and removed by a licensed company to Alice Springs or Darwin for disposal.

Landfill

An onsite landfill is proposed to contain domestic rubbish. The landfill will comprise a series of trenches, each created to cater for the ongoing waste generated on-site from offices, mess facilities and accommodation areas. Construction and operation of the landfill will adhere to the Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NTG 2013).

Sewage Treatment

An onsite Sewage Treatment Plant (STP) will treat all wastewater and sewage generated by the mine site operations. Treated water has the potential to be reused for landscaping and dust suppression.

4.15.2 East Arm Wharf

Existing Environment

Existing waste sources at the East Arm Wharf relate to hazardous materials storage and sewage management.

Potential Impacts and their Mitigation

Potential sources of waste include oils and lubricants, and domestic sewage.

Waste oils, lubricants, and associated cleaning rags will be disposed of in clearly marked bins. Waste oil will be stored appropriately and removed by a licensed company to Alice Springs or Darwin for disposal.

Toilet and washroom facilities will be provided for the construction and operations workforce.

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