

Executive Summary

TNG Limited (TNG) is proposing to develop the Mount Peake Project (the Project), 235 km north-northwest of Alice Springs and 50 km west of the Stuart Highway in the Northern Territory.

This Draft Environmental Impact Statement (EIS) has been prepared to support key Commonwealth and Territory Government approvals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Northern Territory *Environmental Assessment Act 1982* (EA Act).

Assessment Process

TNG submitted a referral for the Project under the EPBC Act to the Department of the Environment (DotE) on 14 October 2013. The Project (action) was declared “a controlled action” as there is the potential for the Project to have a significant impact on listed threatened species and communities. The Project will be assessed by accredited assessment at the level of EIS under the NT EA Act.

In June 2013, a Notice of Intent for the Project was submitted to the NT Environment Protection Authority (NT EPA). On 13 November 2013 the NT EPA determined that the Project required assessment under the EA Act at the level of EIS. Terms of Reference for the Draft EIS were issued on 7 March 2014.

This Draft EIS will be advertised for public comment and circulated to relevant government advisory bodies for review for a minimum of 28 days. TNG will be required to prepare a Supplement to the Draft EIS addressing the comments received. The Supplement will be circulated to government advisory bodies for review and comment.

Assuming no further information is requested, an Assessment Report based on the Draft EIS and the Supplement is prepared by NT EPA for the Responsible Minister within 35 days of receiving the Supplement. The NT EPA also provides a copy of the Assessment Report to the Commonwealth Minister for the Environment for a decision under the EPBC Act on MNES.

Project Description

The Mount Peake Project will comprise:

- ▶ the mining of a polymetallic ore body through an open-pit truck and shovel operation;
- ▶ processing of the ore to produce a magnetite concentrate;
- ▶ road haulage of the concentrate to a new railway siding and loadout facility on the Alice Springs to Darwin railway near Adnera; and
- ▶ rail transport of the concentrate to TNG’s proposed Darwin Refinery located at Middle Arm, Darwin.

The Project will mine at a rate of up to 8.4 million tonnes per annum (Mtpa) and, following processing, will produce up to 1.8 Mtpa of magnetite concentrate. This concentrate will be processed at TNG’s proposed Darwin Refinery to produce 19,700 tpa of vanadium pentoxide (V_2O_5) flake, 292,000 tpa of pigment grade titanium dioxide (TiO_2) and 856,000 tpa of pig iron ingots. Processing of the magnetite concentrate in Darwin does not form part of this assessment.

TNG proposes to commence construction in late 2016 with mining commencing in 2018. The life of the project is expected to be 19 years inclusive of construction (2 years), mining and production (15 years), and closure and rehabilitation (2 years).

Key characteristics of the Project are provided below.



Key Characteristics of the Project

Element	Characteristics
Project Life	
Construction period	2 years.
Operations period	15 years.
Closure and rehabilitation	2 years.
Production Estimates	
Ore mined	Up to 8.4 Mtpa, 77.84 Mt over the mine life.
Concentrate produced	Up to 1.8 Mtpa, 23.4 Mt over the mine life.
Mining	
Pit	Completed pit will be 2,000 m long and up to 600 m wide covering an area of 120 ha and with a maximum depth of 125 m.
Mining	Conventional drill, blast, shovel and haul operation.
Waste	Up to 7.9 Mtpa, 61 Mt trucked to the waste rock dump (WRD) over the mine life.
Operations	24 / 7, 365 days per annum.
Ore Processing and Product Handling	
Processing	Crushing, grinding and magnetic separation to produce a magnetite concentrate.
Haulage	Up to 50 concentrate loads per day hauled 100 km by truck to loadout facility.
Loadout	New train loadout facility at Adnera. Around one train load of concentrate per day.
Infrastructure and Facilities	
Waste rock dump	Maximum height of 40 m with a 90 ha footprint and capacity of 70 Mt.
Tailings storage facility	Maximum height of 32 m with a footprint of 457 ha and capacity of 38 Mt. Disposal by Central Thickened Discharge. Water recovery infrastructure installed.
Long-term stockpiles	Four long-term stockpiles with a 47 ha footprint and capacity of 16 Mt or ore.
Mine facilities	ROM pad, processing plant, Raw Water Dam, Process Water Dam, stockpiles, offices, workshops, water treatment plant, sewage treatment plant etc.
Water supply	Around 2,625 MLpa of make-up water will be required. 12 bores established in the Hanson River alluvial aquifer. Power supplied from diesel powered generators. Water delivery pipeline (49 km) connecting the borefield to the Raw Water Dam.
Power supply	28 x 1,400 kVA gas fired generating sets with 3 emergency diesel backup sets.
Accommodation village	Located 5 km east of the mine site.
Hydrocarbon use / storage	Up to 15 MLpa of diesel stored in 85,500 L self-bunded tanks. Lubricating oil stored in bulk containers inside a bunded area with spill protection and recovery. Waste hydrocarbons stored in a tank within a bunded area to be held for collection by a contractor for reprocessing and recycling. Up to 1.8 PJpa of gas provided from the Amadeus Gas Pipeline via a hot tap and stored in intermodal containers.
Access road	Runs 100 km between the mine site and Adnera Loadout Facility. Unsealed. Underpass of Stuart Highway constructed. At-grade intersections of the highway to allow access to the mine.

Element	Characteristics
Adnera loadout facility	Concentrate stockpile, 1.8 km rail siding, site office, ablutions, diesel storage tank.
Ti Tree airstrip	Upgrade of the airstrip to support larger aircraft. Construction of a terminal.
Closure and Rehabilitation	
Open pit	Will remain as a void with access restrictions.
Waste rock dump and ROM pad	Infrastructure removed. Outer slopes battered, water run off directed to natural systems and surface covered in top soil and rehabilitated.
Tailings storage facility	Capped with waste rock once dry. Progressive rehabilitation on the perimeter.
Processing plant and power station	All equipment removed from site. Hazardous materials confined to prevent off site environmental impact. Disturbed areas rehabilitated. Contaminated sites are remediated.
Rail siding	All infrastructures removed (unless the subject of a sequential use agreement) and disturbed areas rehabilitated.
Access road	Removed (unless the subject of a sequential use agreement), natural drainage lines re-instated and road areas stabilised and rehabilitated.
Borefield	All infrastructure removed and reused if possible (unless the subject of a sequential use agreement). Disturbed areas rehabilitated.
Pipelines and power lines	Above ground lines removed and reused if possible. Below ground lines buried at least 600 mm below the surface.
Ancillary structures, hard stand areas, site roads etc.	All infrastructure removed (unless the subject of a sequential use agreement). Mobile plant removed.
Workforce	
Construction	Early-stage construction workers housed in a temporary “fly camp”. Peak of 225 housed in an accommodation village.
Operations	Peak of 170 housed in the accommodation village.
Decommissioning	Peak of 40 housed in the accommodation village.

Stakeholder Engagement

Consultation with stakeholders and the community occurred through a variety of methods during development of this Draft EIS. Consultation provided TNG with a forum to disseminate Project information and to allow stakeholders and the public to communicate their opinions to TNG. The consultation approach included meetings with the Traditional Owners, Central Land Council, Northern Territory Government, and public information sessions at Alice Springs, Stirling Station and Ti Tree.

Potential Impacts and their Management

The following table provides a summary of the potential impacts associated with the Project and the proposed management measures.



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Socio-Economic		
<p>The Project is predominantly located on Stirling Station with a small portion of the access road potentially located on the adjacent Anningie Station. Stirling Station and Anningie Station are both cattle stations.</p> <p>Anningie Station has organic certification and Stirling Station is considering certification.</p> <p>Ti Tree is a small community located on Stuart Highway, 52 km from the mine site. It is identified as a service delivery centre. The estimated population is 143.</p> <p>Wilora is an aboriginal community located 47 km east of the mine site. The estimated population is 129.</p>	<p>Potential draw of existing workers into better paying resource jobs.</p> <p>Increased demand for accommodation.</p> <p>Increased demand for community infrastructure and services.</p> <p>Impacts on community values.</p> <p>Potential business development and employment opportunities.</p> <p>Upgrade of Ti Tree airport.</p> <p>Risk to organic certification.</p>	<p>TNG will target 15% of its workforce being indigenous.</p> <p>The Project could attract some existing workers from the local communities. Most would come from further afield. Management measures include:</p> <ul style="list-style-type: none"> • prepare and implement an Industry Participation Plan; • work with local training providers to develop local training programs to provide unskilled people with opportunities to gain employment in the Project; • adoption of recruitment policies that allow for appropriate notice periods to be served for new employees. <p>The workforces will be largely fly-in fly-out due to low population numbers in the area. Workers will fly to Ti Tree and then bus to a self-contained accommodation village. No demand on local accommodation or infrastructure and services is expected.</p> <p>Potential management measures for impact to community values include:</p> <ul style="list-style-type: none"> • establish a complaints and feedback register as part of a Grievance Management Procedure for tracking and appropriately responding to any community issues raised; • develop an overall Workforce Management Strategy including workforce sources, management, health and wellbeing and appropriate behavior. <p>The Project will bring a number of economic benefits to the local area including local employment, opportunities for local businesses and training. Upgrade of Ti Tree airport will generate some employment during construction with ongoing employment associated with running a small terminal. This will result in positive outcomes.</p> <p>Potential risk to organic certification is unlikely due to Project design features such as physical separation, the choice of chemicals to be used and the management measures proposed to handle hazardous materials.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Human Health and Safety		
<p><u>Human exposure to hazardous materials</u></p> <p>The Project will be located on pastoral lease. Use of diesel is primarily limited to fuel for station vehicles. Stirling Station has its own bulk diesel supply.</p> <p>Stuart Highway runs through the Project area with hydrocarbons regularly transported to remote towns and communities.</p> <p>The Amadeus Gas Pipeline runs adjacent to the Stuart Highway.</p>	<p>Release of hydrocarbons due to a vehicle to vehicle accident or rollover.</p> <p>Release of hydrocarbons due to a spill at the mine site.</p> <p>Explosion from the gas storage vessel at the mine site.</p> <p>Fire, formation of toxic gases or explosion of ammonium nitrate.</p>	<p>Potential impacts from human exposure to hazardous materials will be managed through the following:</p> <ul style="list-style-type: none"> hydrocarbon transport in compliance with the Dangerous Goods Code. Vehicles will be registered and carry appropriate equipment to respond to a spill, including PPE; personnel trained in the handling of hazardous materials and spill clean-up procedures; design, storage and handling of hazardous materials to Australian standards; diesel stored in self-bunded tanks; lubricating oil stored in bulk containers inside a bunded area with spill protection and recovery; waste hydrocarbons stored in a tank within a bunded area and held for reprocessing and recycling; gas stored in intermodal containers in compliance with AS 4332-2004, The storage and handling of gases in cylinders. Personnel handling gas facilities will be trained; ammonium nitrate stored in a dedicated standalone building consistent with Code of Practice for the safe storage of solid ammonium nitrate. Handling by trained personnel.
<p><u>Traffic</u></p> <p>The main public road is the Stuart Highway. It is a rural highway with a design capacity of 8,000 one-way vehicle movements per day.</p> <p>A 2014 traffic count indicated that the highway carried 190 one-way (380 two-way) vehicle movements per day.</p>	<p>Interaction of concentrate trucks with vehicles using Stuart Highway.</p> <p>Increased vehicle movements to and from the mine site.</p> <p>Potential for vehicle collisions resulting in death or injury.</p>	<p>Up to 100 two-way concentrate truck movements per day between the mine site and the loadout facility. An underpass of Stuart Highway will be constructed to separate these trucks from highway traffic.</p> <p>The Project is expected to generate 66 and 30 one-way vehicle movements per day during construction and operation respectively. Vehicle movements on Stuart Highway will increase to around 3% of the highway's design capacity. A new intersection will be constructed to allow site access from the highway.</p> <p>Management measures include:</p> <ul style="list-style-type: none"> design the intersection of the access road with Stuart Highway in consultation with the NT Department of Transport; prepare Road Transport Management Plan; use of pooled vehicles such as buses where practical; develop Emergency Response Plan.
<p><u>Sunburn, environmental exposure and heat exhaustion</u></p> <p>The climate is arid to semi-arid. Mean monthly maximum temperatures range from 22°C to 37°C, with the mean monthly minimum temperature from 8°C to 24°C.</p>	<p>Workers exposed to increased levels of ultra-violet radiation and risk of heat induced medical conditions.</p>	<p>Management measures include:</p> <ul style="list-style-type: none"> all employees provided with appropriate clothing; sunscreen made available for employee use; staff training and awareness; drinking water made available for employees. <p>It is anticipated that the health risks associated with heat exposure can be managed.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><u>Aquifer contamination (potable water)</u></p> <p>All bores in the Project area are used for stock use.</p> <p>Within the broader region, a number of bores provide permanent public water supply. These include Wilora (the closest potable bore to the borefield, approximately 50 km to the east), Barrow Creek service station and Stirling Station homestead.</p>	<p>Groundwater drawdown at the mine or borefield affecting bores supplying potable water.</p> <p>Contamination of groundwater supply at the borefield from leaks or spills of hazardous materials.</p>	<p>No potable water supplies will be impacted from groundwater drawdown.</p> <p>The Project will install diesel generators to power the borefield. Management measures for potential groundwater contamination include:</p> <ul style="list-style-type: none"> • constructing bores and installing generators on raised hardstands with the height of the hardstand sufficient to protect infrastructure from a 100 year flood event of the Hanson River; • each generator and its associated diesel tank being located within a bunded area of the hardstand; • installation of groundwater monitoring bores to monitor groundwater quality; • implementing clean-up of any spills consistent with the Emergency Response Plan.
<p><u>Mosquito breeding</u></p> <p>No specific assessment of mosquito occurrence in the Project area has been undertaken. Due to the absence to large areas of standing water, mosquito numbers are expected to be low.</p> <p>Habitat suitable for mosquito breeding would be provided following rainfall (wheel ruts, topographic lows underlain by impervious soils and tree or rock hollows). Damp areas around bores also have the potential to act as breeding sites.</p>	<p>Nuisance levels of mosquitoes for the workforce.</p> <p>Transmission of disease by mosquitoes infecting workers.</p>	<p>Management measures include:</p> <ul style="list-style-type: none"> • rectifying artificially created breeding sites; • improving drainage of floodways; • preventing potential mosquito breeding in artificial receptacles; • screening rainwater tank inlets and outlets; • avoid creating areas of temporary water; • treating artificial ponding with an undiluted bleach solution or a residual insecticide; • ensuring personnel wear long sleeved shirts, trousers and mosquito repellent; • following "Guidelines for preventing mosquito breeding sites associated with mining sites" (Medical Entomology Centre for Disease Control 2005). <p>It is not expected that mosquito's numbers will be a significant issue at the mine site.</p>
<p><u>Animal attacks / bites</u></p> <p>Several species of animal in the Project area are capable of human attack and inflicting bites (snakes, spiders, dingoes and wild dogs).</p>	<p>Injury or death of a worker.</p>	<p>Management measures include:</p> <ul style="list-style-type: none"> • staff training and awareness; • on-site medical facilities and medical personnel; • all employees provided with appropriate clothing (boots etc). <p>It is anticipated that the risk to workers can be managed.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Water Resources		
<p><u>Groundwater</u></p> <p>The Project is located within the Western Davenport Water Control District. It is estimated that a total of 50 MLpa is currently used, with 10 MLpa for Public Water Supply (licenced) and 40 MLpa for rural and domestic use (unlicensed).</p> <p>The only use of groundwater in the Project area is for stock watering.</p> <p>Groundwater levels at the mine site and borefield are around 22 m and 10 m below ground level respectively.</p>	<p>Groundwater contamination from the WRD, TSF, concentrate storage areas, liquid and solid waste disposal and hazardous materials.</p> <p>Groundwater drawdown impacts current users.</p> <p>Groundwater drawdown impacts phreatophytic vegetation or groundwater dependent ecosystems.</p>	<p>Tailings will comprise sand and silt and are benign.</p> <p>Waste rock does not contain material with significant acid forming potential.</p> <p>Concentrate is inert and benign.</p> <p>Management measures for waste management include:</p> <ul style="list-style-type: none"> • manage disposal of wastes; • waste hydrocarbons removed from site for recycling; • organic waste buried in an on-site landfill; • brine from the WTP used in the process plant; • sewage treated via onsite packaged treatment plants. <p>Management measures for hazardous materials include:</p> <ul style="list-style-type: none"> • design, storage and handling of hazardous materials to Australian standards; • maintain an inventory of chemicals, MSDS, spill kits and spill response procedures; • lubricating oil stored in bulk containers inside a bunded area with spill protection and recovery; • waste hydrocarbons stored in tank within bunded area and held for reprocessing and recycling; • diesel stored in self-bunded tanks; • regular inspections of storages, tanks and bulk containers and their bunding; • transport of dangerous goods in accordance with relevant legislation; • prepare Emergency Response Plan. <p>At the end of mining, groundwater drawdown reaches 100 m near the pit. The 1 m drawdown contour occurs around 1 km from the pit edge. Groundwater drawdown from the pit will not impact any groundwater users.</p> <p>Maximum drawdown at the borefield is up to 12 m in the centre of the borefield. The 1 m drawdown contour occurs around 6 km from the borefield. Drawdown is predicted at several stock bores with groundwater levels expected drop more than 3.0 m, which may lead to water supply problems. Management measures include:</p> <ul style="list-style-type: none"> • base line assessment of potentially impacted bores; • make good agreement developed with the owners prior to the development of the borefield (e.g. deepening the affected bores). <p>Groundwater drawdown impacts on Mud Hutt and Stirling Swamps, the Anmatyerr North Site of Conservation Significance and phreatophytic vegetation is discussed under vegetation and flora below.</p> <p>The Project is not expected to have a significant impact on groundwater.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><u>Surface water</u></p> <p>The Project is located within the Wiso Surface Management Basin. Key water courses near the site are Murray Creek, Bloodwood Creek and the Hanson River.</p> <p>Mud Hut Swamp and Stirling Swamp are floodout areas of the Bloodwood Creek and Hanson River, respectively.</p> <p>Surface water in the Wiso Basin is used primarily for stock watering and domestic supply to rural communities.</p>	<p>Contamination of surface waters from sediment runoff, overflow from retention ponds, erosion of the WRD, spills of hazardous materials, failure of the waste water treatment plant and failure of the TSF.</p> <p>Flooding of the mine pit.</p> <p>Construction of the access road across Murray Creek and the Hanson River resulting in upstream flooding.</p>	<p>Tailings will comprise sand and silt and are benign.</p> <p>Waste rock does not contain material with significant acid forming potential.</p> <p>Concentrate is inert and benign.</p> <p>Thickened tailings will be pumped to the TSF. A low perimeter embankment will control the lateral extent of the tailings so there is no significant TSF wall to fail.</p> <p>Management measures for contamination include:</p> <ul style="list-style-type: none"> • construction of retention ponds consistent with an Erosion and Sediment Control Plan; • rehabilitation of disturbed areas; • water retention ponds sized to capture an ARI Wet Season rainfall appropriate to their hazard category; • reuse of water around the mine site and for processing; • monitor and manage water levels in the retention ponds to maximise available storage capacity prior to the Wet Season; • drain design to recognise 1 in 100 year flow events and to keep velocities within acceptable design criteria; • regular checks and maintenance on all drains; • use of rip-rap protection on earthwork embankments adjacent to drainage channels; • regular inspections and maintenance; • monitoring in accordance with Surface Water Monitoring Plan; • management of hazardous materials as outlined above for groundwater; • regular checks and maintenance of the waste water treatment plant. <p>A preliminary flood risk assessment indicates that the mine site is not expected to experience any significant flooding for events up to the 50-year ARI. However, a bench of lower lying topography in the vicinity of the proposed pit may be prone to flooding during more extreme events. Management measures include:</p> <ul style="list-style-type: none"> • further surface water modelling adjacent to the pit; • bund constructed adjacent to the pit to prevent any ingress of flood waters, if necessary; • regular inspections of bunds and maintenance as necessary. <p>The access road will be provided with at-grade floodways across the Hanson River and Murray Creek. These will prevent backwater effects but will wash out in a major flood event and require reconstruction.</p> <p>Culverts will be installed where the access road crosses small defined drainages.</p> <p>The Project is not expected to have a significant impact on surface water</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Biodiversity		
<p><u>Vegetation and flora</u></p> <p>The Project is located in the Burt Plain Bioregion. Eight vegetation types occur in the study area:</p> <ul style="list-style-type: none"> • Mulga shrubland on sandy red earths; • Riparian woodland along watercourses and drainage channels; • Triodia grassland on sandy plains; • Floodplains dominated by <i>Eucalyptus victrix</i>; • Open Corymbia woodland on loamy alluvial plains; • Low Acacia shrubland on rocky slopes; • Tall Acacia shrubland on stony quartz; • Low open Eucalyptus woodland on limestone. <p>233 native and 5 introduced species were identified within the study area. One threatened species (dwarf desert spike rush), listed as vulnerable under the TPWC Act and EPBC Act, may occur. The total number of species known from the area is 571.</p> <p>A number of weed species occur in the Project area.</p>	<p>Clearing of flora and vegetation and associated loss of habitat during construction.</p> <p>Alteration of hydrological regimes associated with earthworks and construction activities and associated changes to land surface areas, and / or impediments to surface flows.</p> <p>Groundwater drawdown and / or changes to groundwater flows impacting groundwater dependent ecosystems.</p> <p>Contamination of surface and / or groundwater.</p> <p>Introduction and / or spread of invasive exotic flora species.</p> <p>Changes to fire regimes.</p>	<p>The Project will clear 1038 ha of vegetation of which 97% is mulga shrubland and triodia grassland. No communities are listed as threatened and none have regional significance. All vegetation types are well represented within the bioregion.</p> <p>The Dwarf Desert Spike-rush is known from a location in Stirling Swamp, approximately 12 km north of the access road. There is potential habitat within the study area to support this species, although none were identified.</p> <p>Clearing will remove a moderately diverse range of non-threatened native plants.</p> <p>Management measures include:</p> <ul style="list-style-type: none"> • minimise and stage vegetation clearing where practical; • use already-disturbed areas wherever possible; • develop and implement a Weed Management Plan; • develop and implement a Vegetation Clearing sub plan; • development and implement a Fire Management Plan; • conduct a preclearance survey to assist in the location of infrastructure in areas not previously surveyed (e.g. borefield, delivery pipeline and borrow pit areas); • adhere to buffer widths recommended by the Northern Territory Land Clearing Guidelines where possible, with regard to riparian vegetation in drainage lines. <p>Construction of roads has the potential to interfere with natural surface water flows by blocking or disrupting water movement. Management will include incorporating floodways and culverts to maintain surface water flows.</p> <p>Modelling indicates that Mud Hutt Swamp, Stirling Swamp and the broader Anmatyerr North Site of Conservation Significance will not be impacted by groundwater drawdown.</p> <p>Groundwater extraction from the borefield will lower existing water table levels by approximately 12 m. Management measures include:</p> <ul style="list-style-type: none"> • flora survey to identify presence and distribution of phreatophytic vegetation; • establish monitoring network for groundwater drawdown; • monitor health of phreatophytic vegetation during operations; • consider modifying extraction (the rate of extraction and distribution of operating bores) if significant impacts to vegetation occur. <p>The Project is not expected to significantly impact vegetation or flora in the area.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><u>Fauna</u></p> <p>The Project is located in the Burt Plain Bioregion.</p> <p>In total, 280 fauna species have been identified for the Project area. The Project area has the potential to support 10 threatened fauna species, including eight listed as vulnerable or endangered under the EPBC Act. These species are:</p> <ul style="list-style-type: none"> • fauna in rocky habitat - black-footed rock-wallaby; • ground-dwelling sandplain fauna with limited mobility - greater bilby, brush-tailed mulgara, great desert skink, southern marsupial mole; • arid-zone avifauna with high mobility - night parrot, red goshawk, princess parrot, grey falcon; • fauna in riparian habitat - common brushtail possum. 	<p>Clearing of vegetation and associated loss of habitat, and habitat fragmentation during construction.</p> <p>Alteration of hydrological regimes associated with earthworks and construction activities, and associated changes to land surface areas, and / or impediments to surface flows.</p> <p>Groundwater drawdown and / or changes to groundwater flows impacting groundwater dependent ecosystems.</p> <p>Contamination of surface and / or groundwater.</p> <p>Introduction and / or spread of weeds and animal pests.</p> <p>Changes to fire regimes.</p> <p>Dust emissions from construction, mining and processing activities.</p> <p>Light spill.</p> <p>Noise emissions.</p> <p>Fauna road-kill.</p>	<p>Adjusting for survey effort the mean number of fauna species by habitat type was:</p> <ul style="list-style-type: none"> • Riparian woodland – 34.0 species; • Rocky rises – 25.7 species; • Mulga woodland – 21.4 species; • Corymbia woodland – 19.5 species; • Spinifex grassland – 18.0 species. <p>The proposal would result in the removal of approximately 1038 ha of native vegetation. The clearing of the most species rich areas (riparian and rocky rises) amount to less than 2% of the Project area (~ 11 ha). These fauna habitats are well represented at the local and regional scale.</p> <p>A number of management measures are proposed to manage potential impacts to fauna. These include:</p> <ul style="list-style-type: none"> • Weed Management Plan to prevent the introduction and spread of weeds; • Erosion and Sediment Control Plan to prevent sediment mobilisation into aquatic areas; • Construction Environmental Management Plan incorporating a pre-clearance fauna survey to ensure no threatened species are present and to assist in fauna translocation, avoidance of sensitive seasons for fauna, hydrological engineering controls, clearance minimisation strategies, staged clearing, clearing demarcations, fire prevention controls and vehicle hygiene; • Operation Environmental Management Plan incorporating pest animal control and the management of water, weeds, fire, waste, noise, dust, light and traffic. <p>No aquatic fauna survey was undertaken due to the absence of surface water flows. Impacts to aquatic habitats will be managed by ensuring that there is no potential for the release of hazardous materials to aquatic environments.</p> <p>The Project is not expected to significantly impact fauna in the area.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Conservation Estate		
<p>Three Sites of Conservation Significance occur in the study area:</p> <ul style="list-style-type: none"> Mud Hut Swamp is located 7.7 km to the north of the pit. It is a large, isolated, gum-barked coolabah (<i>Eucalyptus vitrix</i>) swamp fed by Bloodwood and Murray Creeks; Anmatyerr North includes Stirling Swamp, a large wetland complex comprised of claypans, lignum swamp, semi-saline samphire and temporary open water as well as parts of the Hanson River. It encompasses the known extent of the near threatened Giant Sweet Potato (<i>Ipomoea polpha subsp. latzii</i>) as well as a population of the threatened Dwarf Desert Spike Rush (<i>Eleocharis papillosa</i>). The access road will cross Anmatyerr North 12 km to the south of Stirling Swamp; Wood Duck Swamp is located approximately 10 km south of the access road, outside of the study area. Wood Duck Swamp is an ephemeral swamp that may hold water for many months in an otherwise dry landscape. 	<p>Disturbance to significant vegetation and flora within Mud Hut or Stirling Swamp.</p> <p>Disturbance to significant vegetation and flora within Anmatyerr North SOCS.</p> <p>Introduction or spread of weeds within Anmatyerr North SOCS.</p> <p>Increased risk of fire within Anmatyerr North SOCS.</p>	<p>Modelling indicates that Mud Hutt Swamp, Stirling Swamp and the broader Anmatyerr North SOCS will not be impacted by groundwater drawdown.</p> <p>The access road will disturb up to 21 ha of vegetation within the Anmatyerr North SOCS. All vegetation types are well represented at the local scale within the bioregion. Vegetation clearing will involve removal of a moderately diverse range of non-threatened native plants. No impact to threatened flora species will occur.</p> <p>Management measures include:</p> <ul style="list-style-type: none"> minimise and stage vegetation clearing where practical; use already-disturbed areas wherever possible; develop and implement a Weed Management Plan; develop and implement a Vegetation Clearing sub plan; development and implement a Fire Management Plan; weed removal prior to vegetation clearing so that vegetative material is clean and able to be mulched and reused directly on site; adhere to buffer widths recommended by the Northern Territory Land Clearing Guidelines where possible, with regard to riparian vegetation in drainage lines. <p>Management of fire risk will be via the following management measures:</p> <ul style="list-style-type: none"> firefighting equipment available during construction and operations; maintain fire breaks around high-risk areas / activities; active fire management and the use of small-scale, cool-season control burns; all site personnel required to undertake fire control training; all vehicles required to carry a fire extinguisher and two-way radio. <p>The Project is not expected to have a significant impact on any Site of Conservation Significance.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Heritage		
<p>A site survey did not identify the presence of historic heritage structures, places or archaeological sites.</p> <p>An archaeological survey identified 16 previously unrecorded Aboriginal sites.</p> <p>A Sacred Site Clearance Certificate (SSCC) has been issued by the Central Land Council which identifies Sacred Site Exclusion Zones and Restricted Work Areas.</p>	<p>Aboriginal archaeological sites adversely impacted.</p> <p>Sacred sites are adversely impacted by mine site construction and / or operations.</p> <p>One sacred site is located close to the pit and there is potential for damage to the site if the pit wall fails.</p>	<p>Targeted surveys identified that there is no potential for impacts to Aboriginal archaeological sites or areas of archaeological sensitivity associated with construction of the mine site, accommodation village and rail loadout facilities.</p> <p>Construction of the access road will potentially directly impact two artefact scatters, and may indirectly impact one additional scatter and one isolated find. The access road has been realigned to avoid these sites.</p> <p>Construction of the pipeline and borefield may impact two artefact scatters and may impact any subsurface <i>in situ</i> artefact deposits along the Hanson River bank. The pipeline has been realigned to avoid these sites.</p> <p>Where impacts are unavoidable, artefact recording and relocation, and archaeological excavations will be undertaken to fully record the condition, extent and significance of the sites.</p> <p>A Works Approval Application Form will be lodged with the Heritage Branch to allow further archaeological works within the Project area including artefact recording and relocation, and archaeological excavations, in accordance with section 72 of the Heritage Act.</p> <p>TNG will comply with the conditions set in the SSCC and make all staff aware of the statutory obligations relating to Aboriginal cultural heritage. A section of the access road has been realigned to avoid impacting one of the Sacred Sites.</p> <p>A geotechnical stability monitoring program will be established for the sacred site situated near to the north eastern boundary of the pit.</p> <p>The Project is not expected to have a significant impact on any heritage values.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Air Quality		
<p>The Project is situated in a relatively isolated location. The closest receptor will be the mine village, 5 km from the mine. The nearest non-mining sensitive receptor is Anningie Station homestead, 30 km south-west. The access road lies 20 km to the south of the Wilora Aboriginal community.</p> <p>There are no industrial air emissions in the area. The main sources of particulate matter are smoke from seasonal bushfires and wind erosion over exposed ground.</p> <p>Australia's total greenhouse gas emissions for 2013 were estimated at 548.6 Mt CO₂-e and the NT's emissions for the same period were estimated at 13.8 Mt CO₂-e. Global greenhouse gas emissions for 2012 were 15.1 gigatonnes of CO₂-e.</p>	<p>Dust levels at sensitive receptors exceed air quality criteria.</p> <p>Reduced air quality at sensitive receptors from power station emissions.</p> <p>Contribution to Northern Territory and Australian greenhouse gas levels.</p>	<p>Predicted dust levels at receptors are all lower than assessment criteria. Highest predicted concentrations at the accommodation village range between 2.5% and 44% of assessment criteria and at non-mining receptors between 0.005% and 5% of criteria. Dust deposition levels will be undetectable.</p> <p>Standard dust minimisation measures will be applied including:</p> <ul style="list-style-type: none"> • maintenance of moisture levels in ore and concentrate; • application of water to unsealed roads; • application of water to WRD and ore stockpiles as required; • covering of loads during concentrate haulage; • hooded crushers and enclosed HPGRs; • visual monitoring of emissions. <p>Predicted concentrations of power station emissions at all receptors are below the assessment criteria for all assessed pollutants.</p> <p>Total greenhouse emissions for the life of mine are estimated at 3,212,358 t CO₂-e. Average annual emissions are estimated at 178,000 t CO₂-e. This is approximately 1%, 0.03% and 0.001% of annual NT, Australia and global emissions respectively.</p> <p>Greenhouse gas emissions will be managed and minimised through:</p> <ul style="list-style-type: none"> • maintenance of fuel-powered plant and equipment to the manufacturers specifications; • considering the potential use of biodiesel blends; • considering the potential use of solar power and storage battery systems; • energy auditing and review; • monitoring of emissions. <p>The Project is not expected to result in a significant air quality impacts.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Noise and Vibration		
<p>The Project area is situated in a relatively isolated location, with noise sources and sensitive receptors distributed sparsely. Noise sources in the area include:</p> <ul style="list-style-type: none"> • machinery noise from Anningie and Stirling stations; • traffic noise from the Stuart Highway; • rail noise from the Adelaide – Darwin rail line; • natural noise from wind, insects and other animals. <p>The closest receptor will be the mine village, 5 km from the mine. The nearest non-mining sensitive receptor is Anningie Station homestead, 30 km south-west. The access road lies 20 km to the south of the Wilora Aboriginal community.</p>	<p>Noise levels at sensitive receptors exceed noise criteria.</p> <p>Vibration impacts from blasting at sensitive receptors.</p>	<p>Predicted noise impacts at receptors are all lower than assessment criteria. Predicted noise levels under worst case conditions at the nearest noise sensitive receptor (the accommodation village) is 34 dBA, which is below the noise criterion of 35 dBA.</p> <p>Traffic noise levels due to the Project are not expected to be noticeable.</p> <p>The nature and levels of vibration emitted by the mine will vary with the activities being undertaken, however, due to the distances between the sources and receptors, vibration is unlikely to have a significant impact.</p> <p>The Project is not expected to result in significant noise and vibration impacts.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Waste		
<p>The Project will be developed on a Pastoral lease that has not been exposed to previous industrial and mining activities. No industrial waste currently occurs on the Project site.</p> <p>Existing waste disposal facilities in the region are limited to local landfills servicing small communities such as Ti Tree. Alice Springs has a number of operators that can recycle tyres, batteries, waste hydrocarbons, scrap metal, bottles and cans.</p>	<p>Release of AMD via seepage and / or run-off from WRD and TSF.</p> <p>Release of putrescible wastes to the environment and an increase in introduced pest species.</p> <p>Release of sewage to the environment.</p> <p>Soil or water contamination from the release of hazardous wastes to the environment including waste oil, waste lubricants and batteries.</p> <p>Failure of the waste rock dump resulting in environmental damage.</p> <p>Failure of the tailings storage facility resulting in release of tailings to the environment and smothering of habitat.</p>	<p>No significant potentially acid forming materials have been identified within the ore body. Management measures will include:</p> <ul style="list-style-type: none"> ongoing waste characterisation; develop AMD Management Plan if required; WRD Management Plan will be modified to include the selective handling and storage of any potentially acid forming materials if needed. <p>The management of general site waste will include:</p> <ul style="list-style-type: none"> separation of waste for recycling and recovery; removal of residual waste to landfill; landfill fenced and waste buried on a daily basis; recording waste types and volumes generated on-site and transported off-site. <p>Sewage will be treated in a sewage treatment plant. Treated water will be used for landscape purposes. Untreatable solids will be collected and disposed of offsite by a licensed waste transporter.</p> <p>The following management measures will be applied to hazardous wastes:</p> <ul style="list-style-type: none"> all hydrocarbons will be stored and handled in accordance with the bunding requirements of AS 1940:2004: The Storage and handling of combustible and flammable liquids; all hazardous materials will be transported in compliance with Dangerous Goods legislation; spill clean-up procedures developed and implemented; appropriate training for relevant employees; regular inspections of storages, tanks and bulk containers and the integrity of banded areas and containment systems; all hazardous wastes transported off-site by a licensed carrier for disposal / treatment at an appropriate facility. <p>The WRD will be designed to ensure a stable landform. The dump height will be limited to 40m.</p> <p>Tailings will be deposited as a slurry with around 65% solids content. Water recovery from the facility will recover a further 10%. Tailings will be non-mobile and comprise non-toxic silts and sands. The design of the tailings facility will be consistent with ANCOLD guidelines and a perimeter bund will be constructed to limit the extent of tailings spread.</p> <p>Overall it is expected that waste can be effectively managed.</p>



Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
Closure and Rehabilitation		
<p>No mining operations have occurred near the Project area.</p>	<p>Rehabilitation occurs at a slower rate than planned resulting in;</p> <ul style="list-style-type: none"> • increased rehabilitation costs; • loss of rehabilitated vegetation; • erosion of exposed surfaces; • potential sedimentation into waterways. <p>Ineffective mine closure resulting in:</p> <ul style="list-style-type: none"> • closure plan being ineffective; • closure costs greater than calculated; • financial impact (unplanned) to company; • third party financial impacts; • inability to achieve lease relinquishment in a timely manner. <p>Temporary closure of the Project.</p> <p>Insufficient topsoil / growth medium available.</p> <p>Rehabilitation not reaching target species diversity values.</p> <p>Inadequate infrastructure decommissioning provisions.</p>	<p>A Conceptual Mine Closure Plan has been prepared. This plan will be updated and refined throughout mining operations including life of mine closure planning, contingency planning, tailings management plan, waste rock management plan and a care and maintenance plan.</p> <p>Revegetation trials will be undertaken to determine best practice for revegetation of the site.</p> <p>Progressively rehabilitating the mine will reduce the environmental and financial risk of closure.</p> <p>The security bond will be regularly reviewed to ensure that closure liability is accurately accounted for.</p> <p>A contingency plan has prepared as a component of the Mine Closure Plan to cover early closure of the Project.</p> <p>An audit of rehabilitation materials will be regularly conducted. The Project will seek to maximise the recovery of topsoil during construction activities.</p> <p>Rehabilitation trials will be conducted to assess the viability and practicality of different rehabilitation techniques. Indices will be developed to evaluate successful establishment of keystone species. The progressive success of rehabilitation will be monitored.</p> <p>All mine infrastructure that does not have a sequential use agreement in place at the time of closure will be demolished and removed.</p>

