Appendix H Environmental Management Plan

Tanami Gas Pipeline

Environmental Management Plan

Prepared for
AGIT

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DOCUMENT TRACKING

ITEM	DETAIL
Project Name	Tanami Gas Pipeline
Project Number	17PER_7814
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Abbreviations

ABBREVIATION	DESCRIPTION
AGIG	Australian Gas Infrastructure Group
AGIT	AGI Tanami Pty Ltd
AGN	Australian Gas Networks
AS	Australian Standard
CEMP	Construction Environment Management Plan
DBNGP	Dampier Bunbury Natural Gas Pipeline
DBP	Dampier Bunbury Pipeline
EA Act	Environmental Assessment Act
EMP	Environmental Management Plan
EPBC Act	Environment Protection Biodiversity and Conservation Act 1999
HDD	Horizontal Directional Drilling
HSE	Health, Safety and Environment
MNES	Matters of National Environmental Significance
NOI	Notice of Intent
NT	Northern Territory
OEMP	Operational Environment Management Plan
RoW	Right of Way
TND	Turkeys nest dams
TNP	Tanami-Newmont Gas Pipeline

1 Introduction

1.1 Background

AGI Tanami Pty Limited (AGIT) proposes to construct and operate the Tanami - Newmont Gas Pipeline (TNP), a 440 km buried pipeline to connect the existing Amadeus Gas Pipeline (160 km north of Alice Springs) to the Granites and Dead Bullock Soak mines (550 km north-west of Alice Springs), operated by Newmont Mining. Operation of the TNP will facilitate transition of the power to the two mines from diesel to natural gas.

The pipeline alignment ties-in to the Amadeus Gas Pipeline adjacent to the Tanami Road Scraper Station and follows a north westerly route to the two mines, for the most part following the north-eastern side of the Tanami Road. The alignment will be outside of the road reserve which is nominally 50 m from the road centreline. The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures. Most of the pipeline alignment occurs within the Central Desert Regional Council, with a small section located within the MacDonnell Regional Council (near the tie-in with the Amadeus Pipeline).

The pipeline will be buried but will have above ground facilities including: meter stations, scraper stations, and tie-in to the Amadeus Gas Pipeline. Temporary disturbance is required for a 25 m wide Right of Way (RoW) along the alignment as well as construction camps, access tracks, and temporary water storage during construction.

Construction of the TNP is expected to commence in May 2018 and be completed by March 2018 with 'first gas' to the Granites and Dead Bullock Soak mines by March 2019.

1.2 The proponent - AGIT

The proponent AGIT is part of the Australian Gas Infrastructure Group (AGIG).

AGIG came together following the acquisition in 2017 of the DUET Group by the CK Infrastructure Holdings Limited led consortium comprising CKI, CK Asset Holdings Limited and Power Asset Holdings Limited, which combined the operations of Dampier Bunbury Pipeline (DBP), Australian Gas Networks (AGN) and Multinet. AGIG's origins date back almost 150 years to the gas distribution networks of the former South Australian and Brisbane Gas Companies, and the Gas and Fuel Corporation of Victoria.

AGIG has a long history of gas pipeline ownership with about 23,000 km of natural gas distribution networks and over 3,000 km of transmission pipelines across Victoria, South Australia, Queensland, New South Wales, Western Australia and the Northern Territory. More specifically, AGIG now comprises of the following operations:

- DBP, the owner and operator of the 1600 km Dampier Bunbury Natural Gas Pipeline (DBNGP) in Western Australia
- DBP Development Group, the owner and operator of a variety of gas pipelines and gas storage infrastructure in the Pilbara region of Western Australia
- Multinet, which distributes natural gas to over 687,000 customers throughout Melbourne's inner and outer east, the Yarra Ranges and South Gippsland
- AGN, one of Australia's largest natural gas distribution companies which owns approximately 25,000 km of natural gas distribution networks and 1,100 km of natural gas pipelines, serving

over 1.2 million consumers in South Australia, Victoria, Queensland, New South Wales and the Northern Territory. Australian Gas Networks owns the Palm Valley Pipeline in the Palm Valley Gas Field in the Northern Territory.

Additionally, AGIG is an active participant in the development of significant regional pipeline opportunities. Leveraging off a large and mature infrastructure business, AGIG has engineered, constructed and now operates, under long-term agreements, critical pipelines that support major projects for its customers. Examples include the construction, commissioning and operation of the Fortescue River Gas Pipeline (270 km), the Wheatstone Ashburton West Pipeline (109 km) and the Ashburton Onslow Gas Pipeline (24 km). In addition, AGIG also owns Production License L9 (R1) containing the Tubridgi Gas Reservoir which it has commissioned as the largest gas storage facility in Western Australia.

AGIG's team boasts a depth of experience, having operated and managed high-pressured gas pipelines not only in WA, but also throughout the east coast gas markets. DBP's existing Perth-based Control Room has existing capacity and capability to effectively monitor additional transmission pipelines. Previously, it has managed the Eastern Gas Pipeline, Tasmania Gas Pipeline, Queensland Gas Pipeline, SW Queensland Gas Pipeline, Moomba to Adelaide Gas Pipeline and the Moomba to Port Bonython Condensate Pipeline.

CKI, CKAH and PAH are members of the CK Group, a large privately owned, Hong Kong public listed global group with investments in energy infrastructure in over 50 countries across the world.

The members of the CKI Consortium are all listed on the Hong Kong Stock Exchange and have a combined market capitalisation as at 31 July 2017 of approximately HKD 598 billion (approximately AUD 96.2 billion), with the relevant entities all having "A" credit ratings from Standard and Poors ratings services.

CKI

CKI is a global infrastructure company that has diversified investments in Energy Infrastructure, Transportation Infrastructure, Water Infrastructure, Waste Management, Waste-to-energy, energy management services and Infrastructure Related Businesses. CKI's investments and operations span Hong Kong, Mainland China, the United Kingdom, Continental Europe, Australia, New Zealand and Canada.

CKI is one of the biggest overseas infrastructure investors in Australia. It has investments in electricity and gas distribution, gas transmission pipelines, electricity generation, as well as renewable energy power transmission businesses in Australia. CKI owns SA Power Networks (a primary electricity distribution business for the state of South Australia), CitiPower (a company that supplies electricity to Melbourne's CBD and inner suburbs), Powercor (Victoria's largest electricity distributor), United Energy (a company that supplies electricity in Victoria), Transmission General Holdings (a renewable energy power transmission business in Victoria), Australian Gas Networks Limited (one of Australia's largest natural gas distribution companies), Multinet Gas (a gas distribution company in Victoria), Dampier to Bunbury Pipeline (a gas transmission pipeline connecting the Carnarvon/Browse Basins with Perth), and Energy Developments (an international provider of safe, clean, low greenhouse gas emissions energy and remote energy solutions).

CKI is a separately listed member of the CK Group with a market capitalisation of about USD23.0b as of 30 September 2017. It is one of Hong Kong's leading infrastructure and utilities businesses and had total assets of USD16.5b as at 31 December 2016.

CKI has a strong investment grade rating of A-/Positive by S&P.

PAH

PAH is a global investor in energy and utility-related businesses with investments in electricity generation, transmission and distribution; renewable energy; energy from waste; gas distribution and oil transmission.

Over the years, PA has adopted a strategic approach to seek growth in stable and well-structured international markets. The Company has established a strong global presence with investments in Hong Kong, the United Kingdom, Australia, New Zealand, Mainland China, the United States, Canada, Thailand, the Netherlands and Portugal, bringing reliable energy to and lighting up the lives of millions around the world.

Listed on the Stock Exchange of Hong Kong as a constituent share of the Hang Seng Index, PA is also a member of the Dow Jones Sustainability Index Asia Pacific and one of the constituents in the Hang Seng Corporate Sustainability Index.

Power Assets is a member of the CK Hutchison Group, a leading Hong Kong based multi-national conglomerate and had a market capitalisation of about USD18.5b as of 30 September 2017. Total assets were USD16.7b as at 31 December 2016.

PAH has a strong investment grade rating of A-/Stable by S&P.

CKA

CKA is a leading multinational corporation committed to achieving long-term sustainable growth through continual strengthening of its existing property businesses, and steady enhancement of its recurring income base via prudent investment strategy. It has diverse capabilities with activities encompassing property development and investment, hotel and serviced suite operation, property and project management, aircraft leasing, and investment in energy and infrastructure assets that are household equipment services related.

As one of the largest property developers in Hong Kong, CKA has a leading market share in Hong Kong, an extensive portfolio in Mainland China, and a significant presence in Singapore and the United Kingdom. With its long history of property development expertise, it has built many of Hong Kong's most notable landmark buildings and complexes, some of which form part of its core asset holdings.

In addition to the property businesses, CKA has diversified globally through quality investments with stable recurring revenue on a worldwide basis. It has extended its reach to the energy and infrastructure sector, as well as aircraft leasing, with investments and operations now spanning continental Europe, Australia, Canada and the United Kingdom.

CKA a leading Hong Kong based multi-national corporation and had a market capitalisation of about USD30.6b as of 30 September 2017. Total assets were USD51.2bn as at 31 December 2016.

CKA has a strong investment grade rating of A-/Stable by S&P.

AGIG utilises the resources of DBP under a Support Service Agreement. Under this agreement, DBP provides services and personnel to AGIG to enable it to undertake its business. The Support Services Agreement ensures that AGIG's capabilities to operate pipelines are supported by DBP's existing policies and systems. As part of AGIG, AGIT will draw from DBP's corporate environmental management systems, policies and procedures for the construction and operation of the TNP. Accordingly, reference to AGIG and DBP documentation is made in this EMP, to the extent applicable to the operations of AGIT.

1.3 Statutory role of this EMP

The TNP will be authorised under the provisions of the Northern Territory *Energy Pipelines Act* and Regulations and the Commonwealth *Environment Protection and Biodiversity Conservation Act* (the EPBC Act) and require other statutory approvals (see **Section 3**).

An Environmental Management Plan (EMP) has been prepared as a component of the Pipeline Management Plan required to fulfil the requirements of the Consent to Construct and Consent to Operate under the *Energy Pipelines Regulations*, and as a reference for other statutory approvals requiring a consolidated plan for the environmental management of the TNP Project. This is an abridged version of the EMP, provided to support the Preliminary Documentation submitted for assessment under the EPBC Act.

1.4 Objective of this EMP

Implementation of the TNP Project in accordance with the EMP will assist the AGIT in meeting all environmental obligations including legislation, regulations and conditions of approval.

AGIT provides and maintains an effective Environmental Management System (EMS) that is capable of systematically and continually identifying, assessing and managing environmental aspects arising throughout the construction of the TNP. The EMP aims to establish suitable controls to eliminate or minimise the risks to the environment to a level that is low, negligible or reduced to as low as reasonably practicable (ALARP). The EMP further seeks to provide a framework for measuring environmental performance against legislative requirements and company policies and standards.

To achieve these overarching objectives, the EMP specifically aims to:

- Inform AGIT staff and contractors of their environmental obligations
- Provide site-specific environmental control procedures
- Provide rational and practical environmental guidelines for the construction of the TNP, to ensure construction activities do not adversely affect environmental values
- Ensure that any potential environmental impacts arising from the construction of the TNP are managed in accordance with legislative requirements
- Develop environmental guidelines for conducting staff induction and training.

1.5 Scope of this EMP

This EMP addresses activities associated with the construction and operation of the TNP and should be read in conjunction with the following other key management documents:

- DBP Emergency Response Plan
- DBP Crisis Management Plan
- TNP Safety Case.

A separate decommissioning plan is contained in the EMP for completeness. The pipeline design life is 20 years, with a current operational plan of 10 years, therefore the decommissioning plan is preliminary in nature. A finalised decommissioning plan will be fully developed, consistent with the requirements of legislation, Australian Standards and industry practices at the time, and the views of landholders and regulatory authorities.

A risk assessment for the TNP Project was undertaken during the preparation of the EIS. The risk assessment identifies the potential impacts with a greater environmental risk, and consequently where environmental impact assessment and management should be focussed. The project activities (aspects) that generated pre-mitigation risk ratings as 'intermediate' or above are addressed in the EMP. The risk assessment and risk register for the TNP are described in **Section 5**.

The TNP Project was referred to the NT EPA for consideration under the Northern Territory *Environmental Assessment Act*. On 30 October 2017, the NT EPA advised that formal environmental assessment was not required. In making this determination, the NT EPA made a number of recommendations regarding the implementation of the TNP Project that are relevant to the scope of this EMP. A summary of these recommendations, how they have been addressed in the EMP and the rationale for any amended approach to that recommended by the NT EPA, is provided in **Table 1-1**. The Notice of Intent to the Northern Territory Government and corresponding Statement of Reasons are provided at Appendix A.

Table 1-1: NT EPA recommendations and EMP response

NT EPA RECOMMENDATION	HOW ADDRESSED IN EMP	RATIONALE FOR AMENDED APPROACH	LOCATION IN EMP
Restrict the permanent access track to the agreed length between KP0-3 and KP390-440. The remainder of the alignment should be rehabilitated.	Rehabilitation of alignment between KP4-389 includes entire width of RoW. Rehabilitation to be undertaken consistent with the measures contained in the Rehabilitation sub-plan, and monitored against the rehabilitation criteria	N/A	2.2.1
Appropriate rehabilitation criteria, monitoring program, reporting and corrective actions to be developed and implemented. Monitoring criteria should include weed species. Monitoring program should be sufficient to indicate that the rehabilitation program has been successful	Rehabilitation criteria, a monitoring program, and corrective actions are contained in the Rehabilitation sub-plan. Reporting arrangements to the Department of Primary Industry and Resources are presented in the EMP and include initial quarterly reporting to DPIR during construction, after which monitoring and reporting will be annual	NA	6.12
A weed management plan should be prepared in consultation with the Department of Environment and Natural Resources and implemented to the satisfaction of the Department of Primary Industry and Resources	A Weed Management sub-plan to the EMP has been prepared. Advice was sought from the Weed Management Branch of the Department of Environment and Natural Resources (Alice Springs) and the plan takes into account the comment provided by that agency on the NOI. The Weed Management sub-plan includes a monitoring program and corrective actions. Rehabilitation criteria include weed presence. Implementation activity and outcomes of the weed management plan will be captured in reporting arrangements for the EMP to the Department of Primary Industry and Resources.	NA	6.3

NT EPA RECOMMENDATION	HOW ADDRESSED IN EMP	RATIONALE FOR AMENDED APPROACH	LOCATION IN EMP
A fauna management plans should be prepared and implemented including: • Maximum length of the open trench to not exceed a length capable of being practically inspected and cleared by teams of fauna spotters/catchers • Fauna shelters at intervals not greater than 500 m • Fauna ramps and/or earth plugs at intervals not greater than 1 km • Fauna spotters/catchers to hold appropriate authorisation and be experienced. • Trench inspection and clearance conducted within five hours of sunrise. Works on trench not to commence until inspection complete. • A veterinarian to be on standby for fauna in need of treatment	The Terrestrial Fauna and Habitat sub-plan and Trench Clearing Procedure establish requirements supporting the NT EPA's recommendations with the exception that a veterinarian will not be on standby. The senior fauna handler will have the required skills to euthanase injured fauna, consistent with animal ethics guidelines.	The TNP is remotely located and a veterinarian on standby is neither practical nor cost-effective. The nearest permanent veterinarian practices in Alice Springs are approximately 300 km from the mid-point of the project area. The time required for a veterinarian to attend on-site, would potentially increase animal suffering.	6.1
Avoid sourcing water from the sandstone aquifer that supplies Yuendumu	The Surface and Groundwater sub-plan and Water Supply Strategy seeks to avoid the Yuendumu bore field area. If this is not possible further work will occur to delineate the local formations in relation to target drilling and engage with the Power and Water Corporation to ensure they have no concerns about impacting the community bore field.	NA	6.7
Consult with Power and Water Corporation in determining appropriate groundwater aquifers for supply.	As above.	NA	6.7

1.6 Structure and content of this EMP

The EMP comprises:

- Background to the TNP Project and the purpose of this EMP
- A description of the TNP Project
- A summary of the environmental management, regulatory and compliance framework within which the TNP Project will operate
- A summary of the environmental values in the project area
- A summary of the risk assessment that has guided the EMP
- A Construction Environment Management Plan containing a series of management sub-plans describing:

  - measures to be applied to avoid and minimise the environmental impacts of construction of the TNP Project
  - monitoring to track and assess management performance against targets
  - contingency measures to mitigate unavoidable or accidental impact
- An Operational Environment Management plan containing a series of management sub-plans describing:
  - Measures to be applied to avoid and minimise the environmental impacts of the operation of the TNP Project
  - Monitoring to track and assess management performance against targets
  - Contingency measures to mitigate unavoidable or accidental impact
- A description of the overarching Environmental Management System which AGIT will apply to the TNP Project and contractors including:
  - Health and Safety Policy
  - Environmental Policy
  - Induction and training
  - Job hazard analysis
  - Incident management
  - Emergency preparedness and response
  - Monitoring
  - Inspection and audit
  - Review and improvement
  - Reporting
  - Document control
  - Consultation.

2 Description of the TNP Project

2.1 Project objectives

The objectives of the TNP Project are to:

- Deliver a reliable and more energy efficient fuel source to the Granites and Dead Bullock Soak Mines, with a lower greenhouse gas emissions intensity
- Deliver an ecologically sustainable development that balances economic, ecological and social outcomes
- Comply with, and where possible exceed legislative requirements
- Avoid or reduce environmental and social impacts
- Rehabilitate the landform in disturbed areas to allow for continued use in the area traversed by the pipeline.

2.2 Project location

The 440 km TNP would traverse from tie-in with the Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines (**Figure 2-1**).

The pipeline alignment ties-in to the Amadeus Gas Pipeline adjacent to the Tanami Road Scraper Station and follows a north westerly route to the two mines, for the most part following the north-eastern side of the Tanami Road. The pipeline would be located outside of the road reserve which is nominally 50 m from the road centreline.

The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures. Most of the pipeline alignment occurs within the Central Desert Regional Council, with a small section located within the MacDonnell Regional Council (near the tie-in with the Amadeus Pipeline).

Figure 2-1: Project location

Legend

- Pipe alignment corridor
- Amadeus gas pipeline (existing)
- KP
- Above ground facility
- Temporary construction camp

0 15 30 60
Kilometres
Datum/Projection:
GDA 1994 MGA Zone 52

N

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2.3 Design

The TNP will comprise a 440 km, 8 inch class 600 buried high-pressure gas transmission pipeline designed to deliver a firm free flow capacity of 13.6 TJ per day at the lower inlet pressure of 5,500 kPa at the Amadeus Gas Pipeline.

Key design parameters for the TNP are shown in **Table 2-2**.

Table 2-1: **Design parameters**

PARAMETER	TANAMI GAS PIPELINE	LATERAL
From: To	Amadeus Gas Pipeline's Tanami Road Scraper Station to Newmont's Dead Bullock Soak Mine	Tanami Gas Pipeline KP395 Offtake to Newmont's Granites Mine
Pipeline length (km)	440	1
Nominal Size (mm)	200	200
Nominal Wall Thickness (mm)	5.6	5.6
Critical defect length (mm)	85	85
Measurement length (m)	267	267
Pipe steel grade (API 5L)	X52	X52
Minimum yield strength (MPa)	358.5	358.5
Pipe specification	ERW	ERW
Fittings and valves	Class 600	Class 600
MAOP (MPag)	10.2	10.2
Operating temperature range (°C)	0-60	0-60
Nominal earth cover (mm)	750	750
External corrosion coating	3LPE	3LPE
Cathodic protection	IC	IC

The TNP design would enable additional future capacity to be efficiently and effectively delivered by:

- Installation of a compressor at the inlet of the pipeline and at the scraper stations (up to 39.3 TJ additional capacity per day)
- Sizing of pipeline diameter to meet current capacity requirements while allowing for future capacity expansion
- Pipeline rating to Class 600, 10.2 MPa for higher capacity throughput
- Scraper stations spaced at approximately 150 km intervals with remote operable shutdown valve and pig launching and receiving facilities for the efficient operation and maintenance of the pipeline.

The pipeline design would include a tie in at Yuendumu, should a future lateral pipeline be constructed to supply gas to the Yuendumu power station.

2.4 Schedule

Construction of the pipeline is scheduled to begin in May 2018 and to be completed by March 2019 with 'first gas' to the Granites and Dead Bullock Soak mines by March 2019.

The construction strategy allows for two spreads or work fronts operating concurrently to effectively manage the construction schedule, weather and environmental conditions. One spread would commence at the Amadeus Gas Pipeline, working westwards to the mid-point of the pipeline alignment, and the second crew would commence from the midpoint of the alignment and work westwards to the mine site.

Depending on construction requirements this may change and include additional work fronts to complete work if delays occur (i.e. wet weather, delivery of materials). No additional risks are foreseeable from this acceleration of work and all controls outlined in this EMP shall be implemented as required.

2.1 Project components

The project components include clearing of a 25 m pipeline RoW within which the pipeline will be buried, construction of temporary access tracks to the RoW, establishment of temporary construction camps for the workforce, additional clearing for ancillary activities such as turn-around points, and above ground facilities for the operation of the pipeline (meter stations, scraper stations and tie-in to the Amadeus Gas Pipeline stations) (**Figure 2-2**).

Five above ground facilities are proposed:

- Tanami meter station (at tie in with the Amadeus Gas Pipeline)
- Two scraper stations located along the pipeline
- Granites Mine meter station
- Dead Bullock Soak Mine meter station.

2.1.1 Tanami meter station (Tie in)

The Tanami meter station would be located adjacent to the Amadeus Gas Pipeline (KP0) and include the following:

- Coalescing filters
- Metering
- Flow control
- Solar power with battery backup
- Flow computers
- Satellite communication
- Remote operable shutdown valve
- Pig launcher and valves
- Offtake for future compression.

2.1.2 Scraper station 1 and 2

Scraper station 1 would be located near Yuendumu (KP130). Scraper station 2 would be located at Chilla Well (KP278). Both facilities would include the following:

- Remote operable shutdown valve
- Pig receiver
- Pig launcher
- Provision for future compression
- Solar power with battery back up
- Communications via satellite.

2.1.3 Granites Mine meter station

The Granites Mine tie-in station would be located at Granites Mine site (KP395) and include the following:

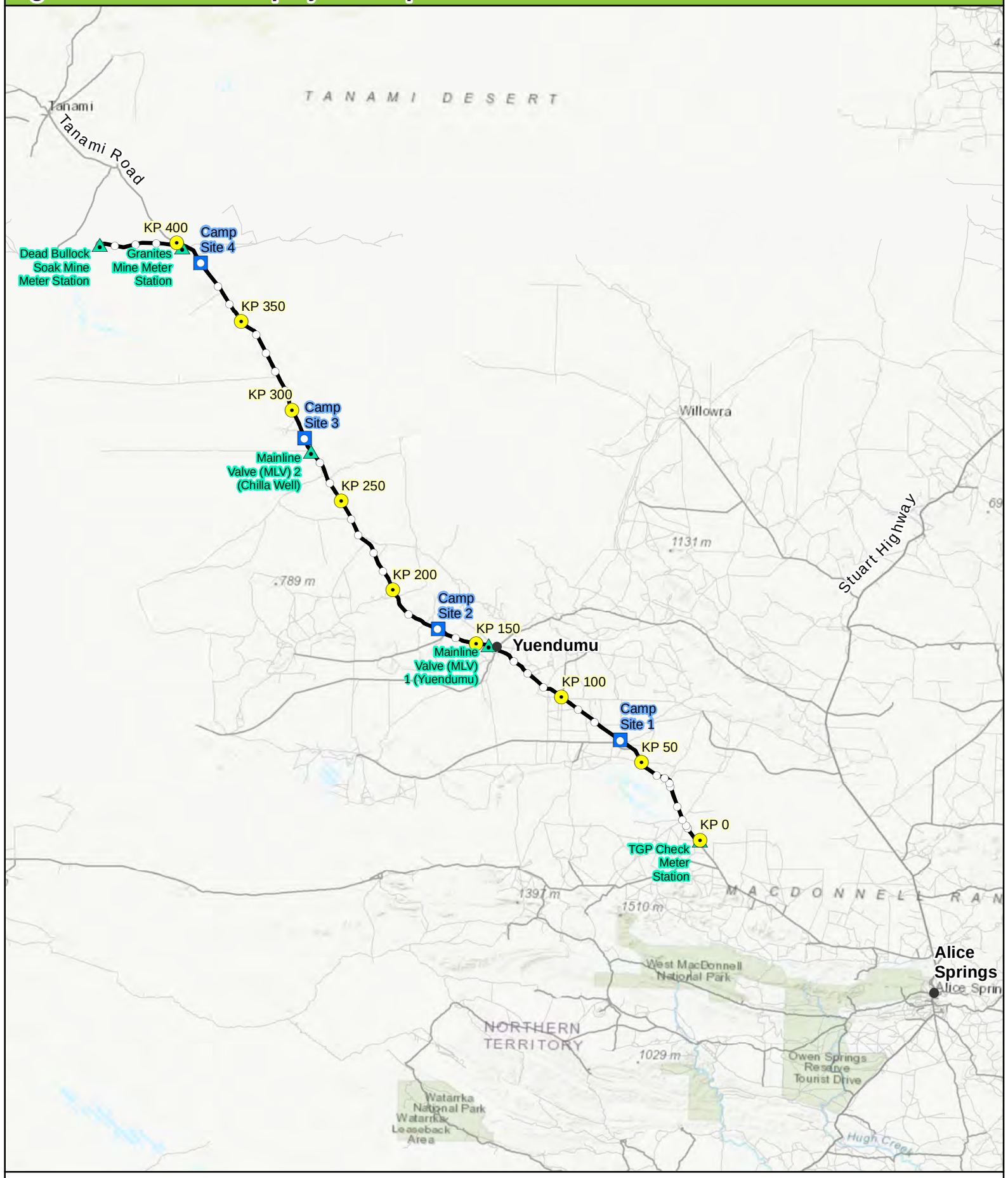
- Remote operable shutdown valve
- Filtration
- Electric Immersion heater
- Dual runs with single run meter skid
- Spec break and pressure reduction skid
- Communications via satellite or wireless
- AC power from mine site, with battery back up.

2.1.4 Dead Bullock Soak meter station

The Dead Bullock Soak Mine tie-in station would be located at the Dead Bullock Soak Mine (KP440) and include the following:

- Pig Receiver and remote operable shutdown valve
- Filtration
- Electric Immersion heater
- Single run meter skid
- Spec break and pressure reduction skid
- Communications via satellite or wireless
- AC power from mine site, with battery back up.

Figure 2-2: Location of project components



Legend

- Pipe alignment corridor
- KP
- Access road point to ROW
- Above ground facility
- Temporary construction camp
- Main road
- Access track

0 15 30 60
Kilometres
Datum/Projection:
GDA 1994 MGA Zone 52

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2.1.5 Disturbance footprint

The project components and the associated temporary and permanent footprints are set out in **Table 2-1**. Construction of the Tanami Gas Pipeline will require land disturbance for the construction corridor of 1100 ha, plus 35.48 ha for access tracks, camps and other components, totalling 1136 ha. The majority (1108 ha) of the land disturbance will be rehabilitated and allowed to return to native vegetation over time. The total permanent disturbance footprint will be up to 28 ha, which is required predominantly for a 5 m wide permanent access track between KP0-3 and KP390-440 to enable ongoing access for maintenance of the pipeline, for the permanent above ground facilities, and for permanent access tracks from the Tanami Road to the pipeline.

As part of minimising environmental impacts, AGIT has worked with the construction contractor to reduce the construction corridor from an originally proposed (NOI) 30 m down to 25 m. This eliminates approximately 220 ha of clearing.

Table 2-2: Disturbance footprint Tanami Gas Pipeline

PROJECT COMPONENT	AREA DISTURBED (HA)	AREA REHABILITATED (HA)	PERMANENT DISTURBANCE (HA)
Construction Corridor 440 km (pipeline length) x 25 m (construction RoW)	1100	1074	26
Construction access tracks (Tanami Road to construction corridor (40 tracks at approximately 120 m x 6 m)	2.88	Approximately 50% will be rehabilitated 1.44	1.44
Camps (7.5 ha x 4) Includes laydown and pipeyard	30	30	0
Borrow pits	Already existing	NA	NA
Permanent facilities (facility and anode bed construction)	1	0.8	0.2
Turkeys nest dams	1.5	1.5	0
Telecommunications 10 sites at 10 m x 10m	0.1	0.1	0
TOTAL	**1135.48 (1136 ha)**	**1107.84 (1108 ha)**	**27.64 (28 ha)**

2.2 Pipeline construction

The pipeline would be constructed and operated in accordance with the requirements of AS 2885 Pipelines - Gas and Liquid Petroleum. The Australian Pipelines and Gas Association: Code of Environmental Practice Onshore Pipelines (2013) (the Code) has been established to define the minimum acceptable standard and encourage the adoption and integration of practical and effective

environmental management systems and procedures to be applied to onshore pipeline construction, operation and decommissioning. AGIT reflects the objectives, intent and advice contained within the Code into the project controls contained within the CEMP and OEMP.

Construction of the pipeline would be carried out within a 25 m wide RoW using a production line approach. For the purposes of environmental context for management, the location of the RoW is considered to be established within the currently defined 300 m wide pipeline corridor. The exact location of the RoW within the pipeline corridor will be determined prior to the time of survey and pegging to take into consideration sacred sites and to minimise clearing of habitat trees.

Construction of the pipeline would be undertaken by a number of specialised teams that will install the pipeline along the RoW. The works require the excavation of a trench which will be open for 15 days at each work site, to a total maximum of 60 km at any time. The construction RoW would be progressively rehabilitated as construction activity moves along the alignment.

A description of the sequence of pipeline construction activities is summarised in **Table 2-3** and specific activities are described in more detail in the sections below.

Table 2-3: Summary of construction activities

PROJECT ACTIVITY	DESCRIPTION
Access	Access tracks from the Tanami Road to the RoW would be constructed for transport of workforce and machinery to the worksite.
Clear and grade	Graders and bulldozers would be used to remove vegetation and topsoil within a 25 m wide area to provide for construction activities.
Trenching and pipeline installation	As the RoW is progressively cleared, a trench would be dug for installation of the pipeline to a nominal depth of 1.2 m.
Stringing	Steel pipe would be trucked to the construction site and sections laid end-to-end next to the trench as the excavation progresses at each spread. The sections would be placed on sandbags and raised on blocks of wood (timber skids) to protect the pipe from corrosion and coating damage.
Bending	Where required, pipe sections would be bent to match changes in either elevation or direction of the route.
Welding	After stringing and, if required, bending, pipe sections would be welded together.
Non-destructive weld testing	The pipe welds would be inspected using x-ray or ultrasonic equipment as per AS2885.2.
Joint coating	The area around the weld would be grit blasted and then coated with a tape coating to prevent corrosion.
Padding	Where required, padding machines would be used to sift the excavated subsoil to remove coarse materials to prevent damage to the pipe coating. The remaining fine material would be used to pad beneath and on top of the buried pipe. In some instances (e.g. rocky soils), imported sand may be used for padding.
Lowering in	Side booms or excavators would be used to lower the welded pipe into the trench.

PROJECT ACTIVITY	DESCRIPTION
Backfilling	Trench spoil would be returned to the trench and material compacted to minimise the likelihood of subsidence of material over the pipe.
Pressure testing	Pipeline integrity will be verified using hydrostatic testing in accordance with Australian Standard (AS) 2885.5 or the American Society of Mechanical Engineers (ASME) Code for Pressure Piping (B31.3) as required.
Signage	Information signs on the presence of the buried pipeline will be erected in line of sight along the pipeline RoW as per AS 2885.1.
Restoration and rehabilitation	The RoW will be re-contoured and erosion controls constructed to ensure a stable landform. Rehabilitation and return of areas of temporary disturbance to native vegetation will be facilitated by re-spreading stockpiled vegetation, re-seeding if appropriate, monitoring against the rehabilitation criteria and corrective actions as per the Rehabilitation sub-plan of the EMP.

2.2.1 Access tracks

The positioning of the TNP alignment close to, and parallel with, the existing Tanami Road significantly reduces the requirement for additional constructed site access for the TNP Project. Construction access from the Tanami Road would require construction of 40 access tracks (50-120 m in length and 6 m wide) to link to the construction RoW. The location of these access tracks is shown in **Figure 2-2**. Clearing of up to 2.88 ha of native vegetation is estimated to be required for construction of these access tracks. A proportion (approximately half in total area) of the tracks would be required for permanent access to the RoW from the Tanami Road and the remainder would be rehabilitated after the construction phase.

Post construction, a 5 m wide permanent access track within the RoW is required to be maintained between KP0 and 3 as well as between KP390 and 440 for ongoing access and maintenance over the period of pipeline operation. Operational access to the remainder of the length of pipeline alignment would be achieved through the construction access tracks remaining post construction as well as potential use of existing pastoral station tracks in consultation with pastoral landholders.

Operationally, access to the RoW would only be required for cathodic protection surveys, repairs of washouts and access to above ground facilities (apart from in an emergency). The OEMP will require all vehicles to stay within designated access tracks only.

2.2.2 Clear and grade

Graders and bulldozers would be used to remove vegetation and topsoil within the 25 m wide RoW, to provide the worksite for construction activities. Vegetation would be pushed aside and residual vegetative material stockpiled in windrows for final respreading out over the reinstated ground following trench backfill.

Topsoil would be graded to a depth of 100 to 150 mm and stockpiled separately from overburden, for return to the source area during rehabilitation.

2.2.3 Trenching

As the RoW is progressively cleared, a trench would be dug for installation of the pipeline in accordance with pre-defined depths of burial. Typically, the trench would be 1.2 m deep however this may increase where necessary to protect the pipe. Geotechnical assessment of possible ground conditions indicates that trenching techniques would be suitable for most of the length of the pipeline alignment. The need for rocksaw and/or drill techniques is expected to be very low.

Trench spoil would be stockpiled in the construction RoW, usually on the non-working side, and separately to topsoil. The period that any part of the trench is left open would be minimised by, where possible, delaying trenching until completion of welding and joint coating. Measures to reduce risks of fauna entrapment would be employed as detailed in the EMP (Terrestrial Fauna and Habitat sub-plan; and Trench Clearing Procedure).

2.2.4 Crossings

The proposed alignment would require the TNP to cross watercourses, roads and infrastructure corridors. Specialised techniques for installing the pipeline would be employed at crossing locations.

Watercourse crossings

Watercourses in the Tanami region are ephemeral, flowing infrequently and unpredictably. Under the most likely conditions during construction, watercourses would be dry and the preference would be to install the pipeline at dry or no-flow, using open cut (trenching) methods.

Clear and grade would be conducted within a reduced RoW working width and significant riparian vegetation avoided where possible. The pipeline trench would be excavated to achieve a minimum cover above the pipeline of 1.5 – 2 m. Pipe bends required to profile the pipeline into and out of the river would generally be formed on site, and the welded pipe placed in the trench. The excavated material would be returned into the trench and the disturbed area reinstated.

Erosion and sediment control measures including 'rip-rap' and seed mats would be implemented and the cross-sectional profile of the watercourse would be reinstated to preconstruction condition.

In the unlikely event that the ephemeral watercourses are in flow during the construction phase:

- Flow would be temporarily diverted around the work area using flume pipes or partial weirs and the open trench techniques would then be implemented. Silt fencing at the temporarily dry work area would be installed to reduce silt movement beyond the excavation and to contain stockpiled spoil.

At watercourse crossings that have high environmental or cultural values, or other significant construction constraints, horizontal direct drilling (HDD) techniques would be used. There are 15 anticipated HDD crossings as indicated in **Table 2-4**, the number of which will be finalised following completion of Aboriginal Sacred Site consultations and the determination of restricted work areas.

A hole would be drilled into the ground at one side of the crossing at a 10–15º angle, curving underneath the watercourse and surfacing on the other side of the crossing. The pipeline would then be 'threaded' through the resultant tunnel. HDD is a specialised technique using a drill rig designed for purpose and operated by a specialist contractor.

The setback distances of the entry and exit pits for HDD crossings would be assessed on-site and established to avoid riparian vegetation, account for the profile of the watercourse and reduce risks of damage from flooding. Additional working areas at distance from the crossing may be required to maintain a straight path for the pipe string, where the RoW approaches or leaves the crossing at an angle. Saturated cuttings and drilling mud would be displaced from the drilled hole and spread across the pipeline RoW to dry and form part of the reinstatement.

Road Crossings

Unsealed roads would be crossed using open-cut method methods, subject to approval. Standard trenching would be employed, the welded pipe placed in the trench, excavated material returned, and the disturbed area then reinstated. By-passes or steel plates would be employed to maintain vehicle access. Appropriate signage and other traffic control measures would be employed to ensure safety. The road surface would be returned to pre-construction condition.

Bored installation (similar to HDD) using an auger would be employed to minimise traffic disruption at a number of road crossings.

Table 2-4: Anticipated crossings proposed for Horizontal Direct Drilling or Bored Installation

CROSSING	KP	REASONS
Tilmouth Well	34	To avoid Tilmouth Service Station, facilities and communication tower. Minimise disturbance to Napperby Creek.
Mission Creek	152	Environmental sensitivity at crossing of watercourse
Keridi Creek	154	Environmental sensitivity at crossing of watercourse
Yaloogarrie Creek (multiple tributary crossings)	180, 181, 183, 188, 227	Environmental sensitivity at crossing of watercourse
Chilla Well	265	Environmental sensitivity at crossing of watercourse
Tanami Road crossing	396	Avoid road and traffic disruption from pipeline lateral
Granite Mine termination	Lateral	Avoid road and traffic disruption from pipeline lateral
Tanami Road crossing	400	Avoid road and traffic disruption from mainline
Dead Bullock Soak Mine Road	435	Avoid road and traffic disruption from mainline
Dead Bullock Soak Mine Road at final termination	437	Avoid road and traffic disruption from mainline

2.2.5 Hydrostatic testing

During hydrostatic testing, the pipeline would be capped with test manifolds, filled with water and pressurised to at least 125% of design maximum operating pressure for a minimum of two hours. A minimum 24-hour duration leak test would then be conducted. Post each section of the pipeline being

tested, the hydrotest water would generally be pumped forward in the pipeline for re-use in the next section with temporary storage in turkey nest dams if required.

In general, it is expected that no chemicals will be added to the hydrotest water as the pipeline is internally coated. However, in some locations a corrosion inhibitor (Cortron IRU-163) may need to be added if there is danger of corrosive water affecting the integrity of the internal coating. In these cases, and where necessary, the water will be treated to neutralise alkaline elements to an appropriate standard before discharge. Depending on the initial quality of water used, a biocide (Bactron AUK-550) may need to be added to the hydrotest water, although this is considered unlikely.

Disposal of the hydrotest water will be disposed of to the land, and undertaken consistent with the requirements of the Surface and Groundwater sub-plan of the CEMP. Total volume of hydrotest water requiring disposal will depend on the achievable re-use. Rate of hydrotest discharge would be at a maximum of 32 L/s. Discharge to ground would include use of diffusers to reduce discharge stream energy and prevent erosion, and filters to remove sediment particles, if present. Disposal would occur in a manner that ensures that standing water does not remain present for a period of more than three days. Disposal of hydrotest water would not occur within 200 m of a watercourse or bore. Disposal of hydrotest water in which corrosion inhibitor or biocide has been added would not occur without additional risk assessment.

2.3 Reinstatement and rehabilitation

The construction RoW will be re-contoured to match the surrounding landforms, and erosion controls constructed where necessary. Separately stockpiled topsoil will then be respread evenly across the RoW and any stockpiled vegetation placed across the RoW to assist in soil retention, provision of seed stock and fauna shelter.

Active reseeding or revegetation (using appropriate species) of temporary disturbance areas of the RoW will be undertaken to restore vegetation cover if and where areas do not respond to the initial rehabilitation treatment, as evaluated by monitoring. Rehabilitation criteria and corrective actions are set out in the Rehabilitation sub-plan of the CEMP.

A permanent access track within the RoW is considered necessary only for the alignment between KP0 and 3 and KP390 to 440. The remainder of the alignment would not need a permanent access track along its length and these areas would be rehabilitated. As a result, over the majority of the length of the pipeline alignment, the entire width of the construction RoW would be rehabilitated and over time allowed to return to native vegetation.

2.4 Pipeline commissioning

Commissioning of the TNP would involve:

- Instrument checking to ensure correct calibration
- Performance testing to ensure all valves and
- Introduction of nitrogen blanket and purging of air from the pipeline before gas is introduced. There will minor venting of gas/nitrogen mix until 100% of gas is achieved.

A commissioning team of approximately four would coordinate and undertake the above activities and at completion, hand over responsibility to the pipeline operator. Commissioning is expected to take three weeks.

2.5 Pipeline operation

The TNP would transport gas from the tie-in with the Amadeus Gas Pipeline to power stations at the Granites and Dead Bullock Soak mines. The pipeline and above ground facilities would be operated and maintained in accordance with the Australian Standard and AGIG's Asset Management and Operational guidelines.

All pipeline operation of the TNP will be unmanned and the facilities will be remotely monitored and controlled from the AGIG Control Centre in Perth. Field maintenance services and specialist support based in Perth would operate and maintain the TNP on a fly in fly out basis, with local employment and service providers used for routine tasks in the field.

The TNP Asset Management Plan will document all the maintenance requirements of the TNP.

Greenhouse gas and other atmospheric emissions (Co(x), NO(x), SO(x) and hydrocarbons) that arise from planned venting activities, fugitive losses, and maintenance requirements will be recorded.

As the pipeline is unmanned, but will have targeted scheduled maintenance campaign, no waste generation and water-use would occur during the operational phase.

Solar power would be utilised at the Tanami meter station and scraper stations. Power to the mine meter stations would be provided from the respective mines.

2.6 Pipeline decommissioning

The Tanami Gas Pipeline will be designed with an operational life of 20 years and will be designed fit for purpose. With an approved AMP, EMP and PMP, the TNP will be resourced for opex and capex and operated in accordance with its Licence obligations, the pipeline and associated facilities are expected to have an operational life that can be matched to gas supply availability and consumer demand.

When supply and demand of gas is exhausted, areas disturbed as part of the permanent footprint will be rehabilitated and the pipeline decommissioned consistent with the requirements of legislation, Australian Standards and industry practices at the time. At the appropriate time, a detailed decommissioning and rehabilitation plan will be prepared to guide these activities.

3 Environment management framework

3.1 Policy

AGIT adopts all DBP policies and procedures across the operation of its business.

DBP has a corporate culture that strives for Health, Safety and Environment (HSE) excellence driven by a corporate commitment to protect people and the environment. This is supported by a statement of commitment signed by the DBP Executive Team, and a set of core principles, called Zero Harm Principles which are aimed at establishing principles for undertaking activities that have been assessed as having the highest risk to DBP and its workforce.

A copy of the AGIG Health, Safety and Environment Policy and Statement of Commitment is provided in Appendix B.

The DBP HSE Policy is reviewed annually, or when there is a significant change to the organisation or its activities, to ensure that the policy remains comprehensive and current. Employees are consulted during the review process through a number of mechanisms including HSE Committees.

3.2 Structure and responsibility

AGIT will hold overall responsibility for environmental management and ensure adequate resources are provided for the implementation of the EMP. All staff are responsible for the environmental performance of their activities and for reporting any environmental hazards and incidents. Environmental responsibilities for staff are contained within position descriptions, relevant procedures and work instructions. Overarching environmental roles are described in **Table 3-1** below.

AGIT also intends to engage a Construction Contractor to build the TNP and individual contractors will be engaged for specific components of the build. Ensuring that the contractors understand and adhere to the environmental controls established for the TNP Project will be critical to achieving the performance objectives and targets established in the EMP. AGIT will achieve this by:

- Clearly identifying the respective responsibilities of AGIT and the Construction Contractor for the controls within each sub-plan included in the EMP
- Requiring, reviewing and approving the Construction Contractor's CEMP to ensure that the controls implemented by the Constructor through the CEMP are consistent with and support the overarching EMP for the TNP Project
- Ensuring clear line responsibility and supervision between AGIT and the Construction Contractor
- Clearly identifying the environmental responsibilities for AGIT staff and the Construction Contractor within position descriptions, relevant procedures and work instructions. The overarching roles of the Construction Contractor are set out in **Table 3-1.**
- Requiring the Construction Contractor to conduct regular inspections and record keeping against compliance with the EMP, coupled with AGIT auditing of these arrangements.

Table 3-1: Key environmental responsibilities

POSITION TITLE	ENVIRONMENTAL RESPONSIBILITIES
Executive Management Team / Project Steering Committee	• Hold overall responsibility for environmental management • Review, understand, approve and support implementation of the EMP

POSITION TITLE	ENVIRONMENTAL RESPONSIBILITIES
	• Ensure adequate resources are provided for the implementation of the EMP
General Manager Transmission Asset Management	• Ensure that environmental obligations of this EMP are embedded into design, construction and operation systems and processes for satisfying compliance and due diligence requirements • Ensure that proposed project additions and alterations obtain all necessary environmental approvals • Management of environmental emergencies • Coordinate Emergency response in accordance with the DBP Emergency Response Plan (TEB-003-0021-01) • Oversee completion of emergency response exercises • Assess emergency response capabilities • Ensure all necessary environmental approvals relevant to the project are obtained • Develop and monitor key performance targets for the project and report to the EMT/Project Steering Committee
Construction Manager	• Conduct adequate project planning to ensure the construction meets all requirements specified within this plan • Ensure that the relevant environmental requirements of the Master Obligations Register are implemented and complied with • Ensure that environmental approval processes are embedded within project construction systems • Ensure that project specific obligations/commitments are captured within the EMP and/ or the Contractor's Environmental Management Interface Plan, and effectively implemented • Ensure that any ongoing obligations/commitments upon the completion of construction are identified, documented and handed over via the project handover process into operations and directly to the HSE Manager • Ensure incident reporting protocols are followed and that the construction personnel report Events/Hazards and near misses • Respond to environmental incidents as required
Construction Contractor	• Facilitate day to day compliance with this plan • Ensure all construction personnel are aware of their obligations under this plan • Conduct regular inspections against compliance with this plan • Report on and respond to environmental non-compliances and events • Conduct environmental emergency drills during the project •
HSE Manager	• Monitor implementation of and compliance with this EMP and environmental risk assessment recommendations • Facilitate and monitor EMP Reviews • Review audits reports and monitor completion of required corrective actions • Report significant environmental non-compliances with EMP and legislation internally to the AGIG Executive Management Team and externally to regulatory authorities, as required • Ensure all environmental obligations are added to the Master Obligations Register and are kept current in that register
Senior HSE Advisor	• Identify changes during construction and update the EMP to address and manage any new environmental risks

POSITION TITLE	ENVIRONMENTAL RESPONSIBILITIES
	• Provide assistance and/or advice regarding implementation of the EMP and any other environmental management concern • Liaise with government agencies regarding environmental issues • Assess environmental incidents to determine regulatory reporting requirements • Report on, and address as required, existing and emerging Native Title and Cultural Heritage issues • Undertake planned external reporting
Land Manager	• Liaise with landholders, traditional owners, community representatives, contractors, councils, planning and local government authorities as well as utilities and infrastructure owners on land management and environmental matters as required
Training and Development Manager	• Facilitate the maintenance, implementation and ongoing improvement of training and induction programs
All personnel	• Read, understand and implement the control measures detailed within the CEMP and OEMP, as appropriate • Report all observed non-compliances to a supervisor • Report all observed incidents, hazards and near misses • Continually seek to identify areas for improvement of environmental management and report these to the Site Environmental Advisor

3.3 Legislation and environmental approvals

3.3.1 Northern Territory environmental approvals

The *Energy Pipelines Act* and *Energy Pipeline Regulations* authorise the survey, construction, testing and operational activities of the TNP Project. A pipeline licence under the *Energy Pipelines Act* is required and gives a right to construct and operate along a route. Consent to construct and consent to operate will then be required under the *Energy Pipeline Regulations*. Before applying for consent to construct, AGIT will need to agree with the Minister for Primary Industry and Resources on the matters to be included in the Pipeline Management Plan for the TNP, prepare the plan and submit it for acceptance by the Minister. The Pipeline Management Plan incorporates management of environmental risks. This Environmental Management Plan constitutes the environmental component of the Pipeline Management Plan.

The key secondary approvals and regulatory requirements for construction and operation of the TNP Project are set out in **Table 3-2**.

3.3.2 Commonwealth environmental approval

The Commonwealth Government has determined that the TNP Project is a 'Controlled Action,' that is an action that is likely to have a significant impact on a Matter of National Environmental Significance (MNES). requiring approval under the EPBC Act (reference: 2017/7997). The controlling provisions cited in the decision are:

- Listed threatened species and communities (sections 18 and 18A).

The TNP Project is being assessed by the Commonwealth Government at the level of Preliminary Documentation. Approval of the TNP Project under the EPBC Act is under consideration and the conditions of that approval may form additional important controls for the Project.

Other Commonwealth legislative requirements relevant to the TNP Project are set out in **Table 3-2**.

3.4 Regulatory framework and industry standards

In addition to the primary environmental approvals, the TNP Project will be constructed and operated in accordance with a range of Northern Territory and Commonwealth laws requiring approval of specific activities (such as native vegetation clearing) or obligations with respect to cultural heritage management, and protection of public and worker health and safety (**Table 3-2**). Clarification on the application of particular secondary approval requirement to the TNP Project is provided in Sections 3.4.1 to 3.4.4.

Table 3-2: Secondary environmental approvals and regulation

LEGISLATION	RELEVANCE TO TANAMI GAS PIPELINE
Commonwealth laws	
National Greenhouse and Energy Reporting Act 2007	Reporting is required if annual greenhouse gas emissions, energy production or energy consumption are above threshold. The TNP will trigger the reporting requirement during the operational phase
Northern Territory laws	
Control of Roads Act and *Regulations*	Establishes that roads are under the control and management of the Minister and provides for licensing of activities on roads, and authorisation of temporary roads.
Dangerous Goods Act and *Regulations*	Handling and storage of hazardous and explosive materials will need to conform to the requirements of the Act
Food Act and *Regulations*	Regulates supply and handling of food, compliance with the Food Standards Code and registration as a food business in respect of construction camp operation.
Heritage Act	All Aboriginal archaeological sites and objects are protected and will require survey and Works Approval if sites are to be disturbed. Declared heritage places are protected and will need to be avoided or Works Approval obtained if place is to be disturbed.
Northern Territory Aboriginal Sacred Sites Act	Provides for the identification and protection of Aboriginal sacred sites. An Authority Certificate is required to ensure sacred sites and appropriate working constraints are identified.
Planning Act	Requires development consent for clearing native vegetation on zoned and unzoned freehold land
Public and Environmental Health Act	Operation of construction camps, particularly on-site disposal of sewage will need to comply with the provisions and codes called up in the Act.
Soil Conservation and Land Utilisation Act	Addresses soils conservation, erosion and land capability. Reinstatement, rehabilitation and erosion control measures prepared for the project will need to be consistent with objects of the Act.
Territory Parks and Wildlife Conservation Act	Protects native wildlife (flora and fauna) and establishes the Northern Territory listing of threatened species. Surveys and any removal or relocation of threatened species arising from the project will require a permit to interfere with wildlife.
Traffic Act and *Regulations*	Establishes the traffic laws relevant to the project.

LEGISLATION	RELEVANCE TO TANAMI GAS PIPELINE
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act and *Regulations*	Road or rail transport of dangerous goods required for the project will be regulated including provisions for packaging, consignment and safety standards for vehicles and equipment.
Waste Management and Pollution Control Act	Establishes general environmental duty and regulates offsite solid and hazardous waste disposal, licenses some landfill operations and applies the National Environment Protection Measure for Air Quality.
Water Act	Requires extraction of surface and ground waters, and discharge of waste into waterways to be licensed. Construction of surface water storage and interference with a waterway requires consent. Bore construction requires a permit.
Weeds Management Act	Declares weeds, specifies management requirements and adopts management plans providing detailed management measures. The Weed Management Plan prepared for the project will need to be consistent with the management objectives and measures specified in the Act for weeds present along the alignment.
Work Health and Safety (National Uniform Legislation) Act and *Regulations*	Provides for authorisation of workplace, plant or substances including licensing of high risk work and management of risk for pipeline activities

3.4.1 Clearing of native vegetation

Clearing of native vegetation on freehold land (Aboriginal freehold and Crown land) for the TNP Project is 'development' for the purposes of the *Planning Act*, and therefore requires development consent under that Act.

Consent for clearing of native vegetation on pastoral leasehold land is not required, as the conveying of gas across the land is a prescribed purpose under regulation 31(b) of the *Pastoral Lands Regulation*s, allowing for the Minister to consent to the sub-letting of the land required for the TNP Project under s68(5) of the *Pastoral Lands Act*.

3.4.2 Surface and ground water

The *Water Act* requires consent or licensing for the extraction of surface or groundwater, interference with a watercourse, construction of a bore or dam, and discharge of waste where it may prejudice declared beneficial uses. Actual consent requirements for the TNP Project under these provisions are dependent on the context and details of construction in relation to the specific permitting and licensing triggers within the legislation. Of relevance to the TNP Project are exemptions gazetted on 6 July 2016 in respect of bore construction and use. These exemptions define a 'special purpose bore' to include a bore that is more than 3 m deep and used for the purposes of laying of pipes associated with gas supplies.

Constructing a bore

Exemptions gazetted on 6 July 2016 have the effect of exempting the requirements for a bore construction permit and use of a licenced driller for any new or refurbished bores constructed as part of the TNP Project.

Licence to extract water

Extraction of water for the TNP Project will occur outside of a Water Control District. The gazetted emptions mean that water extracted from bores with a depth of greater than 3 m for the TNP Project will not require a licence to extract ground water. All bores used to source water for the project are expected to be greater than 3 m in depth.

No surface waters are proposed for extraction and a licence will therefore not be required.

Obstruct or interfere with a waterway

The *Water Act* provides that obstruction or interference with a waterway requires authorisation. A number of watercourses along the TNP alignment would be disturbed by clearing and trenching activities and if there is flow, temporary obstruction and redirection may be required. In the event that this is required, a risk assessment will be undertaken; however, such activities are considered unlikely and temporary and preliminary advice from DENR indicates that requirement for authorisation would be based on risk.

Permit to construct a dam

The *Water Act* requires a permit to construct a dam or water storage structure, if the flow or likely flow of water in a waterway is affected. 'Turkey nest' dams (TNDs) would be required to store water (sourced from bores) for the TNP Project. All existing TNDs are located away from waterways and would not obstruct flow and any newly constructed turkey nest dams will also be located away from waterways.

Licence to discharge waste to water

A waste discharge licence is required under the *Water Act* if an action prejudices a declared beneficial use, quality, standard, criteria or objective for the area. No such declarations have been made for the project area and it is not anticipated that a waste discharge licence will be required for disposal of hydrotest water to land. This is consistent with the advice of the Department of Environment and Natural Resources and NT EPA on previous pipeline proposals.

3.4.3 Cultural heritage

Sacred Sites

The *Northern Territory Aboriginal Sacred Sites Act* (NTASS Act) protects all sacred sites and makes it an offence to desecrate a site or enter, remain on or carry out work on a sacred site except with the appropriate authorisation (an Authority Certificate).

The NTASS Act sets up a system for the registration and protection of sacred sites together with a procedure for proponents wishing to perform work on land in the Northern Territory to obtain an Authority Certificate from the Aboriginal Areas Protection Authority (AAPA) to allow that work to proceed. Restricted Work Areas may be defined to constrain activities to avoid damage sacred sites.

Through the Central Land Council, AGIT has commenced consultation with Aboriginal traditional owners to identify sacred sites within and surrounding the project area with a view to obtaining an Authority Certificate and identifying Restricted Work Areas for all phases of the Project.

Aboriginal archaeological sites and objects

All Aboriginal archaeological sites and objects are protected under the *Heritage Act*. Where disturbance is unavoidable the *Heritage Act* provides that a Works Approval may be granted. Key considerations are the extent and significance of the archaeological material. Archaeological survey of the disturbance footprint will be undertaken and it is probable that an application for Works Approval would be required, given the high potential for archaeological material to be present and that ground disturbance (including

subsurface) is proposed. If granted, conditions of a Works Approval are likely to include requirements for recording and salvage of archaeological material and reporting on mitigation measures applied.

3.4.4 Roads and traffic

The TNP Project will utilise the Stuart Highway and Tanami Road, both of which are managed by the Northern Territory Government. Construction activities such as movement of heavy machinery and construction of access tracks impacting on these roads and the road reserve will require approval through the Department of Infrastructure, Planning and Logistics (DIPL), consistent with the requirements of the *Control of Roads Act*, *Traffic Act* and 'Development Guidelines for Northern Territory Government Controlled Roads'. Key requirements include:

- Preparation of a Traffic Management Plan and Traffic Impact Assessment, in accordance with AUSTROADS Guide to Traffic Management
- Road Agency Approval
- A Permit to Work within an NT Government Road Reserve.

3.4.5 Technical standards and codes of practice

The primary technical standards and codes of practice relevant to the TNP Project are detailed below.

Australian Standards (AS 2885)

The pipeline will be designed, constructed, operated and maintained in accordance with AS 2885 Pipelines – Gas and Liquid Petroleum. The relevant components of this standard are listed below:

- AS 2566.1 Buried flexible pipelines – Structural Design
- AS 2885.1-2012: Gas and Liquid Petroleum: Design and Construction
- AS 2885.2-2007: Gas and Liquid Petroleum: Welding
- AS 2885.3-2012: Operation and Maintenance
- AS 2885.5-2012: Field Pressure Testing.

Code of Environmental Practice Onshore Pipelines

The Australian Pipelines and Gas Association: Code of Environmental Practice Onshore Pipelines (2013) (the Code) has been established to define the minimum acceptable standard and encourage the adoption and integration of practical and effective environmental management systems and procedures to be applied to onshore pipeline construction, operation and decommissioning. AGIT reflects the objectives, intent and advice contained within the Code into the project controls contained within the CEMP and OEMP.

4 Summary of environmental values

4.1 Physical Environment Setting

4.1.1 Climate

The region is classified as arid, and arid to subtropical for areas further north along the alignment near Tanami. The arid climate is characterised by hot to extreme temperatures and very dry conditions during summer. Mean annual rainfall is higher in the north-west (approximately 484 mm/year at Rabbit Flat), and reduces to the south-east to 320 mm/year in Alice Springs. IGS (2017) reported annual rainfall variation ranging from 1,064 mm (Rabbit Flat) and 783 mm (Alice Springs) during the wet months (November to March), to 219 mm (Rabbit Flat) and 77 mm (Alice Springs) during the dry months (April to October) (**Figure 4-1**).

Evaporation is high and largely exceeds rainfall (3,000 mm/year evaporation) (MWH 2017; Domahid 1990).

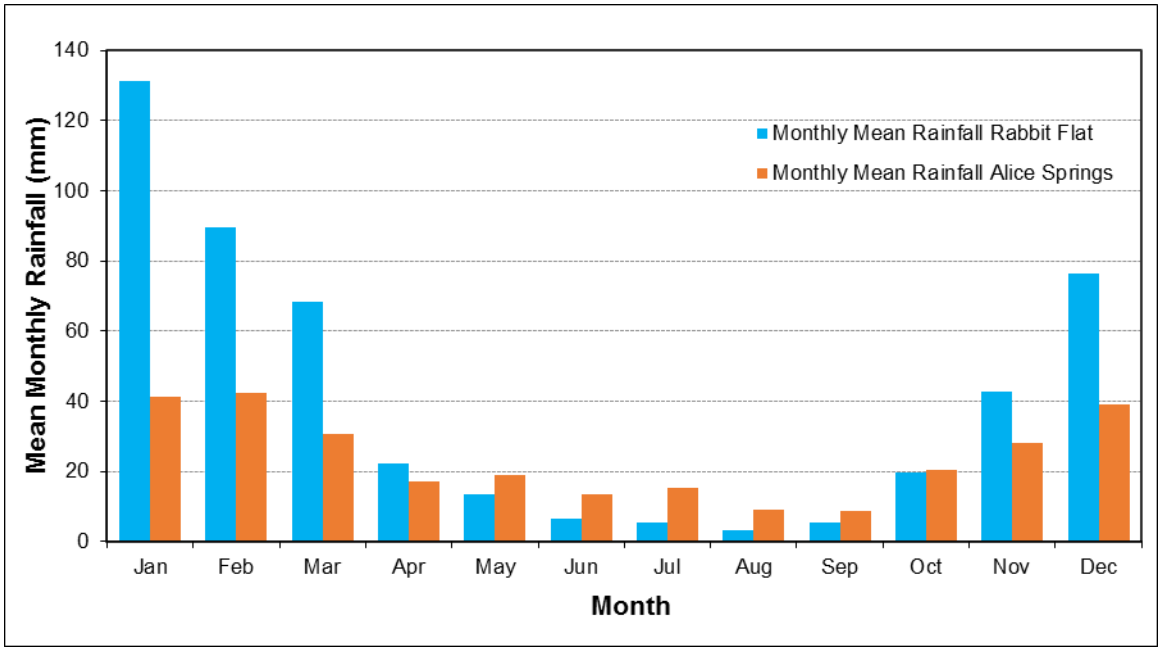


Figure 4-1: Mean annual rainfall at Rabbit Flat & Alice Springs (from IGS 2017)

4.1.2 Land systems

Land systems traversed by the Pipeline corridor are shown in **Figure 4-2** and set out in **Table 4-1.**

Table 4-1: Land systems traversed by the Tanami Gas Pipeline

LAND SYSTEM	DESCRIPTION
Alluvial floodplains	Alluvial floodplains, swamps, drainage depressions and alluvial fans; sandy, silty and clay soils on Quaternary alluvium
Desert dunefields	Dunefields with parallel linear dunes, reticulate dunes and irregular or aligned short dunes; red sands
Desert sandplains	Level to undulating sandplains with red sands
Granite hills	Low hills and hills mostly on granite, gneiss, rhyolite and some schist; common rock outcrop and surface stone with shallow gritty or stony soils
Granite plains and rises	Gently undulating to undulating plains with rises and low hills on granite, schist, gneiss (deeply weathered in places); coarse grained sandy, earthy and texture contrast soils
Granite ranges	Rugged mountain ranges on gneiss, schist and granite; outcrop with shallow, gritty and stony soils
Lateritic plains and rises	Plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils
Limestone plains and rises	Plains, rises and plateaux on weathered and unweathered Cambrian limestone, dolomite, chalcedony, shale, sandstone and siltstone with associated sand sheets; sandy and earth soils
Salt pans	Salt pans with waterlogged saline clays and fringing dunes
Sandstone hills	Low hills, hills and stony plateaux on sandstone, siltstone, quartzite and conglomerate (deeply weathered in places); outcrop with shallow stony soils
Sandstone plains and rises	Rugged ranges on quartzite, sandstone and conglomerate; outcrop with shallow, stony sandy soils
Sandstone ranges	Plains, rises and plateaux on mostly on sandstone, siltstone, claystone, shale and some limestone; commonly shallow soils with surface stone and rock outcrop

4.1.3 Hydrology

Most watercourses in the Project area are ephemeral or seasonal creeks and ephemeral lakes which can hold surface water for up to several months following large rainfall events (Domahidy 1990). These ephemeral systems are mostly associated with the paleochannel systems within the region, hence flow direction is generally the same for surface and groundwater (drains towards the south and west). Following large rainfall events, areas of low elevation can form floodways along low lying drainage channels, which drain towards ephemeral lacustrine systems. In all other areas, surface water either evaporates or forms recharge to groundwater.

Napperby Creek is a well-developed watercourse located within the southern portion of the alignment near Tilmouth Well. This creek drains to the south-west towards Lake Lewis; a large, ephemeral, saline lake located approximately 10 km to the east of Tanami road. In addition to receiving surface water flows,

Lake Lewis also acts as a groundwater discharge feature. Large flows to the lake may cause inundation for a duration of up to six months (IGS 2017).

Well defined watercourses or tributaries in close proximity to the pipeline alignment are summarised in **Table 4-2** and watercourses in the broader region are presented in **Figure 4-3**. Stream orders start at 1 (minor watercourse) and increase as the streams join other streams. For streams crossing this pipeline, the stream orders ranged from 1 to 4 (minor to moderate watercourse). A complete list of watercourses identified through desktop and field survey is provided in ELA (2017).

Table 4-2: Known drainage lines and ephemeral lakes within Project area

WATERCOURSE	STREAM ORDER CLASSIFICATION
Watercourse at Chilla Well	1
Yaloogarrie Creek	1 & 2
Keridi Creek	1
Mission Creek	1 & 2
Napperby Creek (Tilmouth Well)	4
Lake Lewis	Ephemeral lake, surface water & groundwater discharge point

4.1.4 Hydrogeology

MWH (2017) identified the following aquifer types are predominantly present within the pipeline alignment region (further summarised in ELA 2017):

- Alluvial aquifer
- Paleochannel aquifer
- Fractured rock aquifer.

The paleochannel areas are reported as the major source of groundwater supply within the region, with likely high yields of groundwater specifically found within calcrete deposits present within the centre of the paleochannel (~10 L/s).

Groundwater level varies from 20 m below ground level (m bgl) to less than 5 m bgl with the shallower depths to water level largely occurring in the southern areas of the proposed pipeline alignment and in the vicinity of surface water features (creeks and rivers). Groundwater within the paleochannel system generally drains towards the south.

While groundwater is predominantly saline, fresh to brackish water supplies are available within the shallow alluvial gravels and sands, and calcrete formations of the paleochannel aquifer margins and tributaries (mostly fresh) which are directly recharged by rainfall.

Groundwater recharge occurs by infiltration of rainfall and surface water runoff to drainages during large rainfall events. Little to no recharge occurs following low intensity rainfall as most water is lost in temporary wetting of the soil or via evapotranspiration (MWH 2017; IGS 2017; Domahidy 1990).

4.1.5 Watercourse crossings

Desktop assessment has identified 39 locations where the proposed alignment will potentially intercept watercourses and their tributaries. A representative proportion of these crossings have been assessed

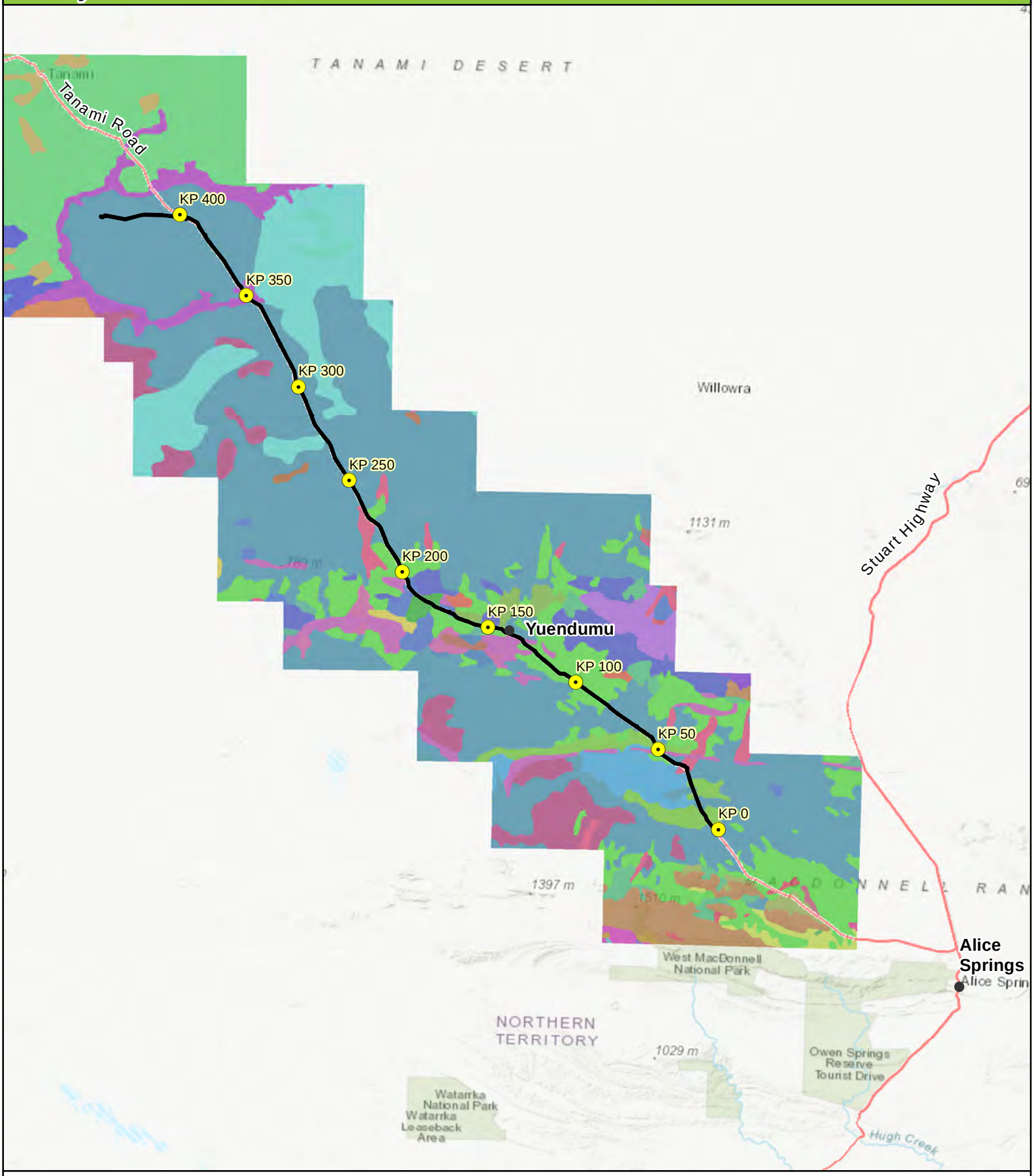
in the field, with bed sediments consisting of red, loose gravelly sand. Full site descriptions are provided in ELA (2017).

The Napperby Creek crossing near Tilmouth Well is a well-defined and significant watercourse (KP228.54) observed within the Project area. This watercourse is likely to receive high flow volumes and rates due to its size (estimated at approximately 50 m width and 2 m depth in areas), and discharges to Lake Lewis on the western side of the alignment and Tanami Road. While bed and bank profiles of all the watercourse crossings has not been undertaken, field assessment of a representative proportion indicate that most consist of a sandy, shallow depression (less than 0.5 m deep and slightly above ground elevation in most areas) within the floodplain and without a defined stream bank.

Evidence of cattle/wildlife has been observed at most watercourses and included degradation of the stream bed and bank areas and soil compaction. Potential groundwater dependent vegetation has been identified.

It is unlikely that the watercourses hold permanent pools at the sites of pipeline crossing. As rainfall is unpredictable in the region, ephemeral pools might occur in these water courses at the time of construction, following large rainfall events.

Figure 4-2: Location of the Pipeline corridor and surrounding region in relation to land systems



Legend

- Pipe alignment corridor
- KP

Land system

- Aileron
- Alcoota
- Amadeus
- Atlas_AB53
- Atlas_AB55
- Atlas_BA24
- Atlas_BA5
- Atlas_SV10
- Boen
- Bond Springs
- Bushy Park
- Coolindie
- Davenport
- Finke
- Gillen
- Hamilton
- Hann
- Harts
- Ilbumric
- Kanandra
- McGrath
- Middleton
- Napperby
- Pularoo
- Reynolds
- Ryan
- Sandover
- Simpson
- Singleton
- Sonder
- Stokes
- Table Hill
- Tennant Creek
- Titra
- Undippa
- Warburton
- Wonorah
- Woodduck
- Woolla

0 15 30 60
Kilometres
Datum/Projection:
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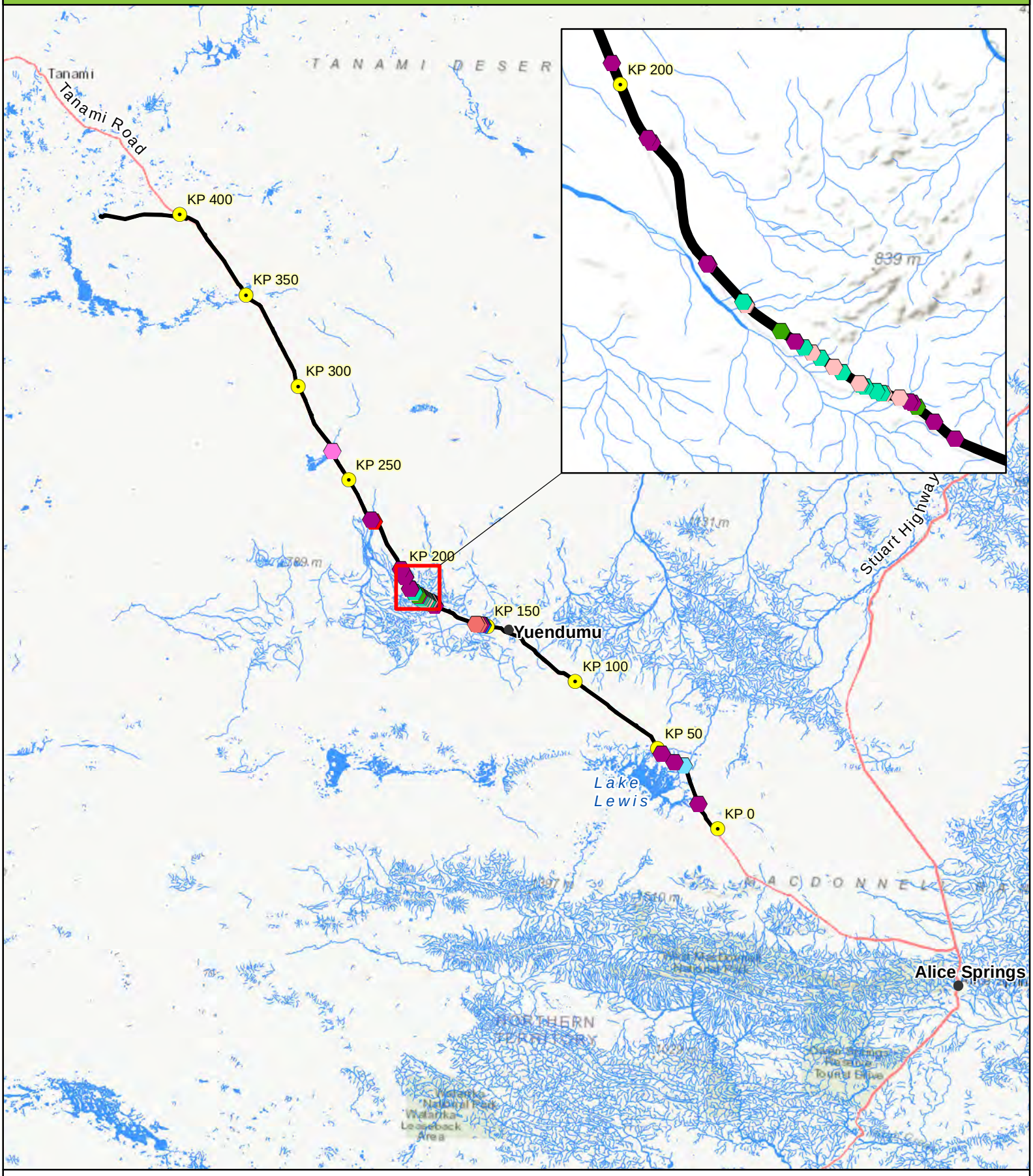
Figure 4-3: Location of the Pipeline corridor and surrounding region in relation to surface water features



Legend

- Pipe alignment corridor
- KP
- Water course

Major water crossings

- Keridi Creek T2
- Mission Creek T2
- Mission Creek T3
- Tilmouth Crossing T1
- Watercourse T2
- Watercourse T2 Wet Chilla Well
- Watercourse T3
- Yaloogarrie Creek T2
- Yaloogarrie Creek Tributary T2
- Yaloogarrie Creek Tributary T3

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4.2 Biological Environment Setting

4.2.1 Sites of Conservation Significance

The Northern Territory Government has identified Sites of Conservation Significance across the NT. These sites represent some of the most important areas for biodiversity conservation. The TNP would pass through the following sites of conservation significance (**Figure 4-4**).

Lake Lewis and surrounds (site number 54): Lake Lewis is a large ephemeral saline lake that is periodically an important site for waterbirds, and probably also for shorebirds. The Site supports endemic and restricted range plant species and has an unusual geomorphological setting in arid Australia (DNRETAS SoCS Factsheet).

South-west Tanami Desert (site number 43): The South-west Tanami Desert provides habitat for 11 threatened species, and is considered a stronghold for some as well as other rare or declining species in the Northern Territory. One plant species is known only from the site and other species endemic either to the Tanami bioregion or to the NT are also found at the Site (DNRETAS SoCS factsheet).

4.2.2 Sites of Botanical Significance

The Northern Territory Government has identified Sites of Botanical Significance across the NT. These sites are considered important for plant conservation generally and specifically for conserving significant plant taxa both nationally and within the NT.

The TNP would pass through four sites of botanical significance: Lake Lewis, Yuendumu South, Dead Bullock Soak, and Western Tanami Paleodrainage Systems (**Figure 4-5**).

Figure 4-4: Sites of Conservation Significance

Legend

- Pipe alignment corridor
- KP
- Sites of conservation significance

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Kilometres
Datum/Projection:
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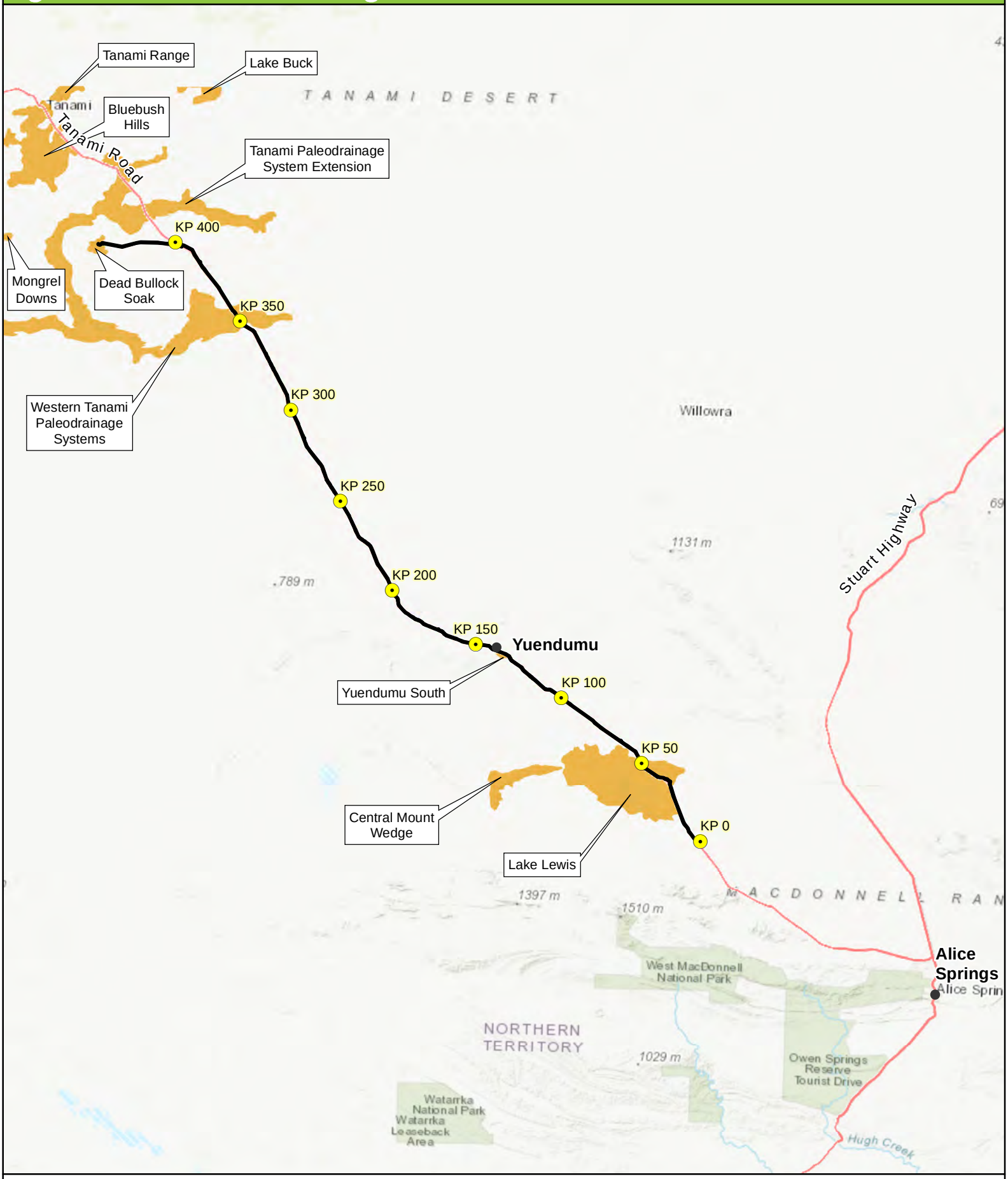
Figure 4-5: Sites of Botanical Significance



Legend

- Pipe alignment corridor
- KP
- Sites of botanical significance

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Kilometres
Datum/Projection:
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4.2.3 Vegetation

Vegetation communities in the project area include woodland, open woodland, hummock grassland, open hummock grassland, and open shrubland communities and have been mapped and described in detail by Mattiske (2017).

4.2.4 Threatened flora

Desktop and field assessment of threatened flora species in the Project area and surrounds have been undertaken (BAAM 2016, Mattiske 2017). Location of threatened flora records are provided in the detailed vegetation maps (Mattiske 2017).

From desktop assessment two threatened flora species were assessed as potentially occurring in the Project Area: Dwarf Desert Spike-rush *Eleocharis papillosa* (EPBC and TPWC – Vulnerable) and Bog-rush *Schoenus centralis* (TPWC – Vulnerable).

During survey, no threatened flora species were recorded. Field assessment has confirmed there is no suitable habitat exists for the Dwarf Desert Spike-rush. The Bog-rush occurs on gravelly and skeletal soils of sheltered seepage zones or springs associated with quartzite dominant range systems. Potential habitat for this species exists in the project area (Mattiske 2017).

Seven significant flora species (status less than threatened under TPWC Act) were recorded during survey and the locations recorded in the detailed vegetation maps (Mattiske 2017).

4.2.5 Weeds

Weed distribution in the Project area and surrounds is generally related to environmental disturbance caused by the construction of roads, tracks, cattle grazing and feral animals. Weeds tend to be most prevalent on land under pastoral lease or freehold properties.

Desk top and field assessment of weed occurrence in the Project area and surrounds have been undertaken (Matiske 2017). Declared weeds, with the potential to occur in the area listed in **Table 4-3** and further details on distribution and abundance are provided in Mattiske (2017). No declared weeds were recorded during survey, although four species of weeds were recorded. Of these, Buffel Grass (*Cenchrus ciliaris*) in particular is a species of concern and is more prevalent in the southern section of the pipeline alignment, in association with pastoral land use.

Table 4-3: Declared weeds

FLORA SPECIES	WONS[1]	NT CLASSIFICATION[2]
Khaki weed (*Alternanthera pungens*)		Class B and C
Rubber bush (*Calotropis procera*)		Class B and C
Mossman river grass (*Cenchrus echinatus*)		Class B and C
Fountain grass (*Cenchrus setaceus*)		Class B and C
Parkinsonia (*Parkinsonia aculeate*)	Yes	Class B and C
Mesquite (*Prosopis pallida*)	Yes	Class A and C
Castor Oil Plant (*Ricinus communis*)		Class B and C
Senna – Coffee (*Senna occidentalis*)		Class B and C
Athel Pine (*Tamarix aphylla*)	Yes	Class A, B and C

FLORA SPECIES	WONS[1]	NT CLASSIFICATION[2]
Caltrop – terrestris (*Tribulus terrestris*)		Class B and C
Burr – Bathurst (*Xanthium spinosum*)		Class B and C

1: Weed of National Significance

2: Class A: To be eradicated, Class B: Growth and spread to be controlled, Class C: Not to be introduced to the Territory

4.2.6 Terrestrial fauna

Desktop and field assessment of fauna habitats and threatened species in the Project area and surrounds have been undertaken (BAAM, 2016, Mattiske 2017, Biostat 2017). Fauna habitats are described in the Preliminary Documentation and full EMP. The six threatened fauna species assessed as potentially, likely or recorded are provided in **Table 4-4,** three of which are listed under the EPBC Act. The TNP Project is being assessed by the Commonwealth Government at the level of Preliminary Documentation on the basis of the likelihood for significant impact to the Great Desert Skink (*Liopholis kintorei*), Greater Bilby (*Macrotis lagotis*), Night Parrot (*Pezoporus occidentalis*) and Princess Parrot (*Polytelis alexandrae*). The Australian Painted Snipe (*Rostratula australis*) is considered unlikely to occur in the Project area.

Table 4-4: Threatened fauna likelihood assessment

SPECIES	CONSERVATION STATUS	LIKELIHOOD OF OCCURRENCE
Grey Falcon (*Falco hypoleucos*)	Vulnerable: TPWC	Recorded
Brush-tailed Mulgara (*Dasycercus blythi*)	Vulnerable: TPWC	Likely
Southern Marsupial Mole (*Notoryctes typhlops*)	Vulnerable: TPWC	Likely
Greater Bilby (*Macrotis lagotis*)	Vulnerable: TPWC Vulnerable: EPBC	Recorded
Great Desert Skink (*Liopholis kintorei*)	Vulnerable: TPWC Vulnerable: EPBC	Likely
Night Parrot (*Pezoporus occidentalis*)	Endangered: EPBC	Potentially
Princess Parrot (*Polytelis alexandrae*)	Vulnerable: EPBC	Potentially

4.2.7 Introduced fauna

The following introduced fauna species are expected to occur within the Project area and surrounds:

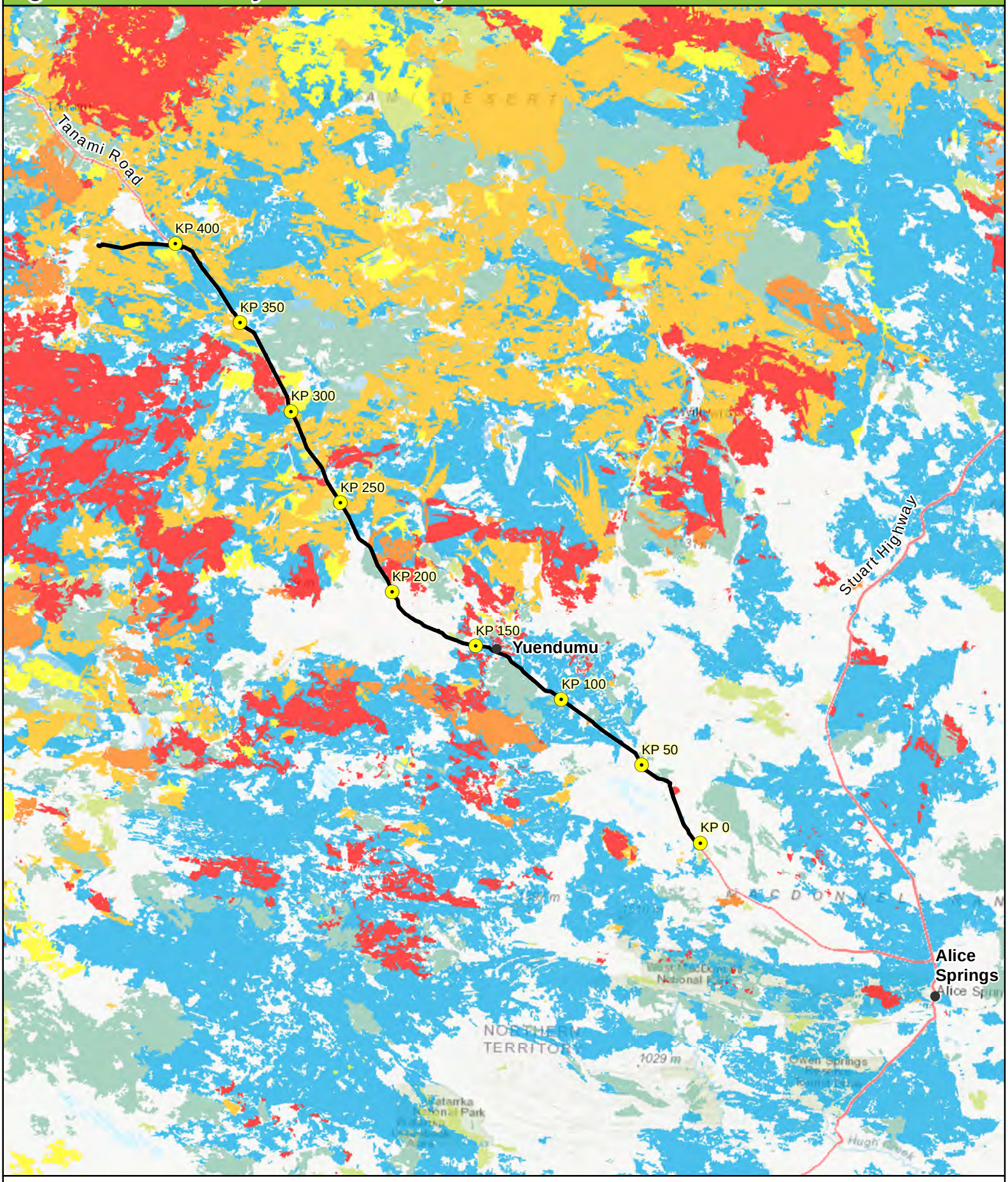
- Camel (*Camelus dromedaruis*)
- Cat (*Felis catus*)
- Cattle (*Bos taurus*)
- Donkey (*Equus asinus*)
- Fox (*Vulpes vulpes*)
- Horse (*Equus caballus*)
- House Mouse (*Mus musculus*)
- House Sparrow (*Passer domesticus*)
- Rabbit (*Oryctolagus cuniculus*)
- Swamp Buffalo (*Babalus bubalis*).

Most of the species are subject to little specific control activity due to remoteness and limited resourcing although indigenous ranger groups in the regions participate in management activities where resources permit. It is likely that these feral animals will cause land degradation through trampling, soil compaction, erosion, weed spread and decreases in water quality.

4.2.8 Bushfires

Fire is an essential part of ecosystems within arid and semi-arid Australia (Kershaw *et al*. 2002). The Tanami bioregion has had variable a variable fire history (**Figure 4-6**). Most fires in the Tanami bioregion occur in the cooler months during April to November (DotEE 2008).

Figure 4-6: Fire history across the Project area



Legend

- Pipe alignment corridor
- KP

Years since burnt

- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017

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Kilometres
Datum/Projection:
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4.2.9 National Parks and protected areas

National Parks and other conservation areas comprise an important land use in the region. The closest national park is the West MacDonnell National Park, approximately 50 km to the south of the tie-in with the Amadeus Gas Pipeline.

The northern half of the TNP alignments passes through the Southern Tanami Indigenous Protected Area (IPA) which is managed by the Warlpiri Ranger group (**Figure 4-7**). IPAs are areas of Aboriginal-owned land or sea where traditional owners have entered into an agreement with the Australian Government to protect the biodiversity and associated cultural values of a region.

Figure 4-7: National Parks and Indigenous Protected Areas

Legend

- Pipe alignment corridor
- KP
- National Parks
- South Tanami Indigenous Protected Area

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Kilometres
Datum/Projection:
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4.3 Cultural heritage environment

AGIT has initiated the processes under the NTASS Act to identify Aboriginal sacred sites within and near the project area. The location of restricted areas limiting access or activities to be conducted near Aboriginal sacred sites will be recorded on the line list for the project.

A desk top assessment of archaeological records and areas likely to hold archaeological sites or objects has been undertaken (**Figure 4-8**). An on-ground survey is to be conducted and the locations of archaeological sites will be recorded on the line list for the project.

No declared heritage places (national or Northern Territory) are located within the Project area. Declared place (Iron Building No. 1) is located in Yuendumu (**Figure 4-9).**

4.4 Social environment

4.4.1 Landholders

The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures (**Figure 4-10**).

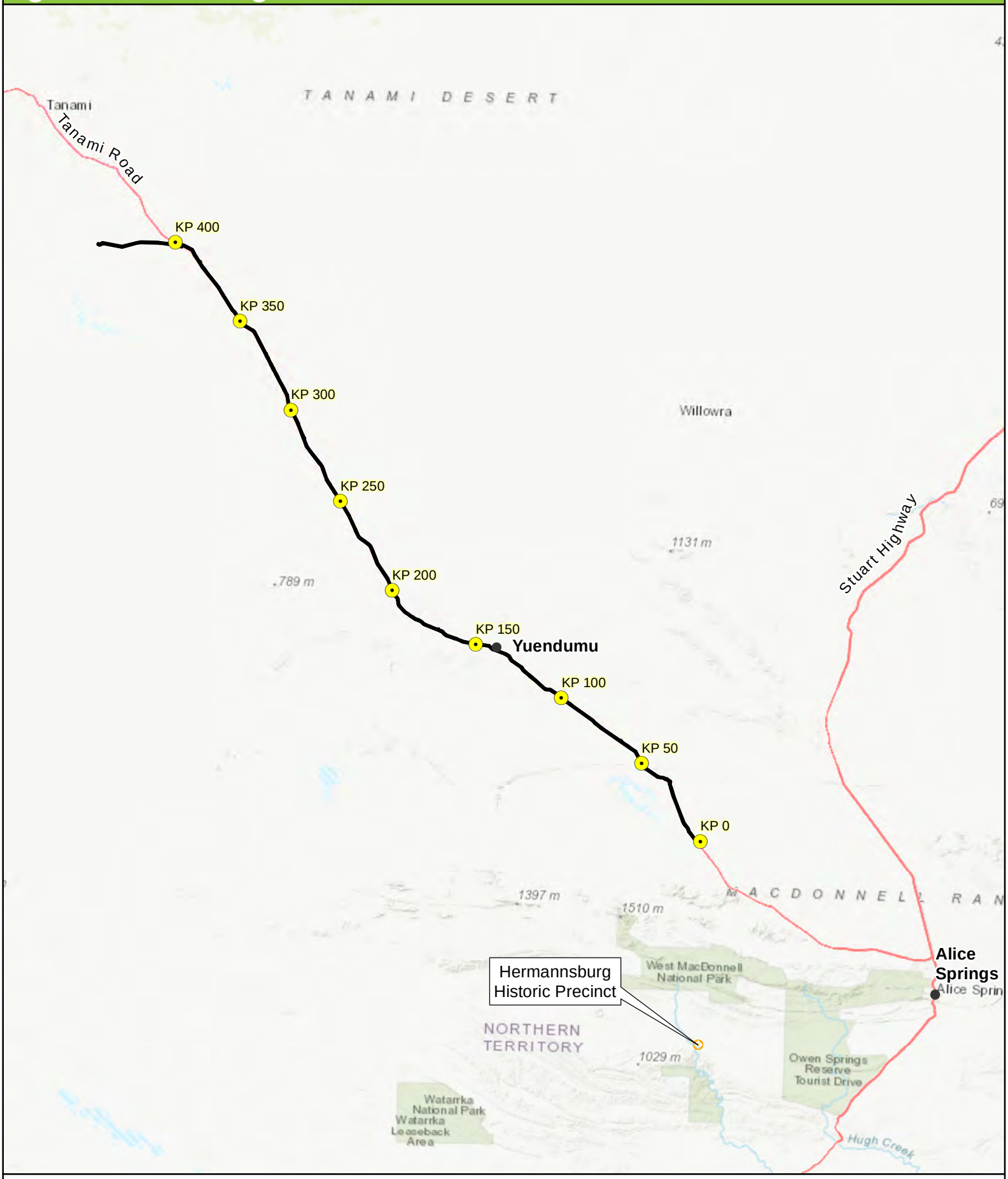
4.4.2 Communities

The Tanami region is remote and sparsely populated. Yuendumu (population approximately 780) is the closest community to the TNP and is located on the Tanami Road approximately 290 km north west from Alice Springs. At its closest point, the TNP will come within 5 km to the south west of Yuendumu. Some 85% of the population of Yuendumu is Aboriginal (Warlpiri and Anmatyerre Aboriginal people) (ABS 2017). Traditional Aboriginal law and custom remains strong, with over three quarters of the residents speaking an Australian Indigenous language and English at home (ABS 2017).

Yuendumu serves as a service and administrative hub for its residents and those residents of nearby family outstations and other small communities. The economy of Yuendumu is largely based around a small number of retail shops, community organisations and the provision of government and community services.

Alice Springs, located approximately 130 km from the TNP tie-in with the Amadeus Gas Pipeline is the main centre with a variety of services (government, medical, community), businesses and a diverse population. The Local Government Area of Alice Springs has a population of 24,753 with 18% of people identifying as Aboriginal. Unemployment levels in Alice Springs are low at 1.5%, compared to 7% for the NT. Alice Springs will be a logistics and service hub for the Project, with project personnel either drawn from or transiting through the town.

Figure 4-8: Archaeological records and likelihood



Legend

- Pipe alignment corridor
- KP
- Indigenous heritage listed site (national)

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Kilometres
Datum/Projection:
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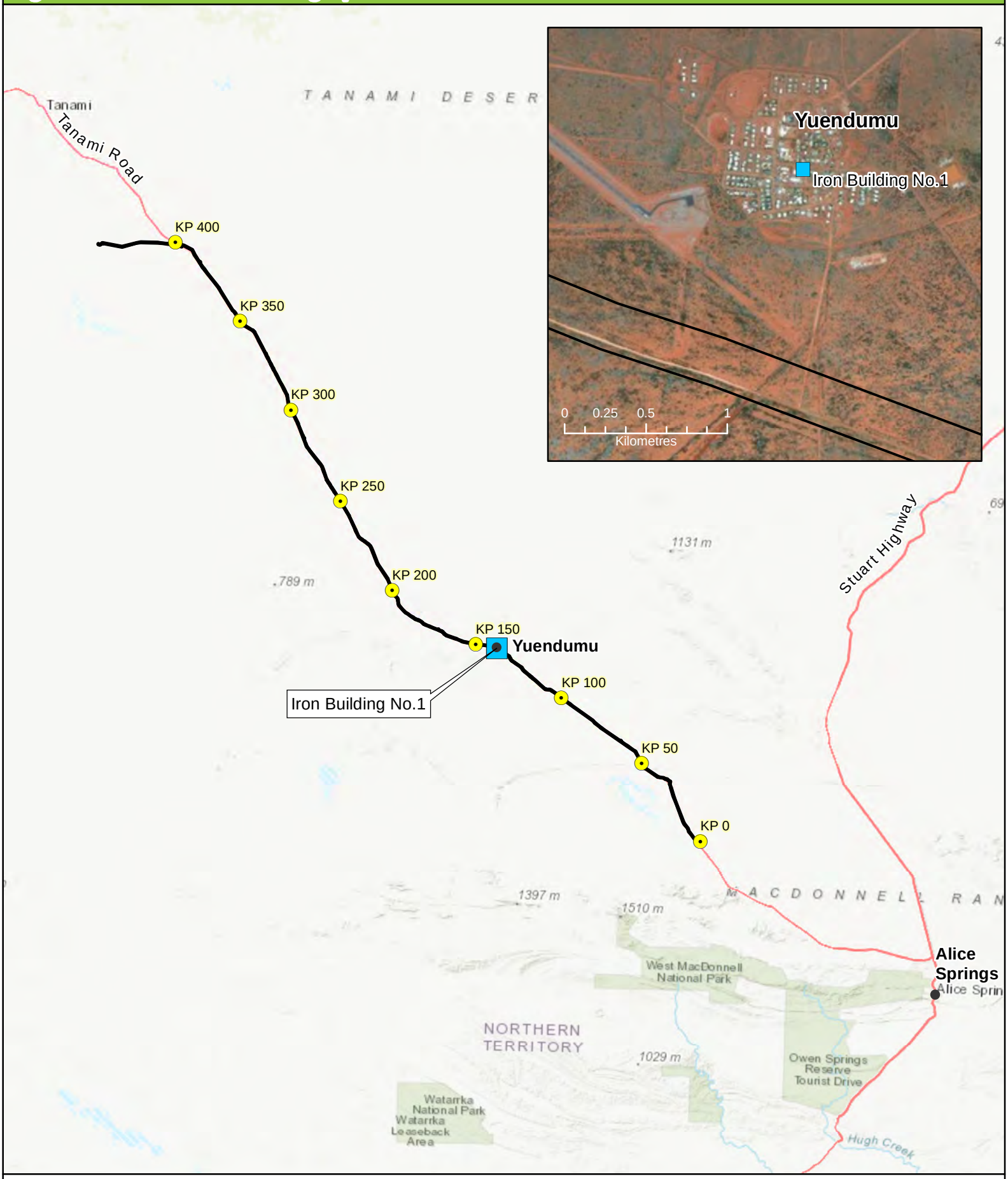
Figure 4-9: Declared heritage places



Legend

- Pipe alignment corridor
- KP
- Declared heritage place

0 15 30 60
Kilometres
Datum/Projection:
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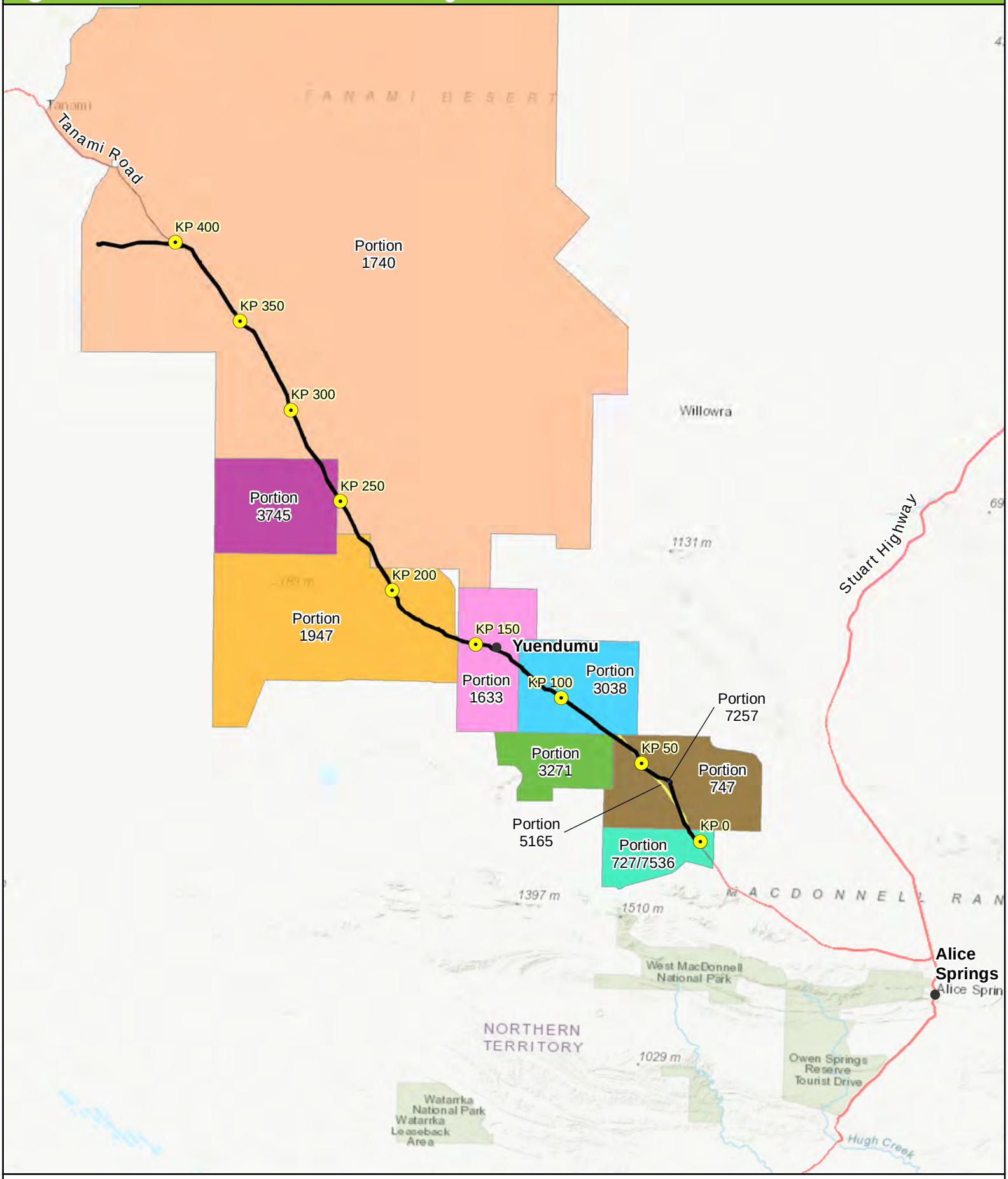
Figure 4-10: Land tenure within the Project area



Legend

- Pipe alignment corridor
- KP

Land owner

- Central Desert Aboriginal Land Trust - Portion 1740
- Crown - Portion 5165
- Mala Aboriginal Land Trust - Portion 3745
- Mount Doreen Station (Braitling) - Portion 1947
- Napperby Freehold - Tilmouth Crossing (Chisholm) - Portion 7257
- Napperby Station (Edmunds) - Portion 747
- Narwietooma Station (Davis) - Portion 727/7536
- Ngalurrtju Aboriginal Land Trust - Portion 3271
- Yalpirakinu Aboriginal Land Trust - Portion 3038
- Yuendumu Aboriginal Land Trust - Portion 1633

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5 Risk assessment

A risk assessment for the TNP Project was undertaken to identify the potential impacts with a greater environmental risk and where assessment and management controls should be focussed.

The risk assessment was undertaken using a systematic risk-based approach based on international best practice standards, including:

- AS/NZS ISO 31000:2009: Risk management - Principles and Guidelines (Standard).
- HB 158:2010: Delivering assurance based on ISO 31000:2009 Risk management – Principles and Guidelines (Handbook).
- HB 203:2012: Managing environment-related risk (Handbook).
- HB 436:2004: Risk Management Guidelines Companion to AS/NZS 4360:2004 (Handbook).

The risk assessment is depicted conceptually in **Figure 5-1.**

The risk assessments were conducted collaboratively between the consultants (Eco Logical Australia, Circle Advisory) and DBP (on behalf of AGIT) to identify the objectives, scope and risk criteria for the TNP Project. The risk assessment for the biophysical factors and socio-economic factors required different specialist expertise and were conducted separately.

The scope of the risk assessment included all activities directly related to the construction and operation of the TNP Project. Environmental aspects relevant to the project and considered in the risk assessment were:

- Vegetation clearing
- Excavation
- Water use/ groundwater extraction
- Energy/ electricity use
- Physical presence of infrastructure
- Vehicle movements
- Fire ignition
- Liquid (including septic) and solid waste disposal
- Spills and leaks
- Atmospheric emissions (excluding dust)
- Dust emissions
- Light emission
- Noise and vibration emissions

The risk ratings were determined for each combination of aspect and factor, using the definitions of consequence and likelihood detailed in Appendix C and applying the risk matrix (**Figure 5-2**).

Inherent risk ratings were determined with the assumption that minimum standards would be met without the implementation of additional management controls or risk assessment. Minimum standards would include compliance with legislative and corporate requirements or with operating practices commonly used for construction, operation and decommissioning of gas pipelines in the NT. Knowledge of the likely occurrence of flora and fauna species (particularly threatened species and ecological communities) was addressed in the initial (pre-mitigation) risk assessment.

Management controls relevant to each inherent risk were identified, applying the management response criteria (**Figure 5-3**) and particularly focussing on those inherent risks rated as 'intermediate' and above. Standard controls employed by the proponent in their pipeline operations were applied initially to determine initial residual risk ratings. These ratings were further informed by impact analysis and specific project controls developed within the EMP. The ratings were revised iteratively to reduce the residual risks to as low as reasonably possible.

Further details of the risk assessment methodology, and the mitigated and unmitigated risk rankings are provided in a risk register at Appendix C. A socio-economic risk assessment was also undertaken, identifying positive impacts or opportunities of development as well as adverse risks and the risk register is therefore reported separately (Appendix D).

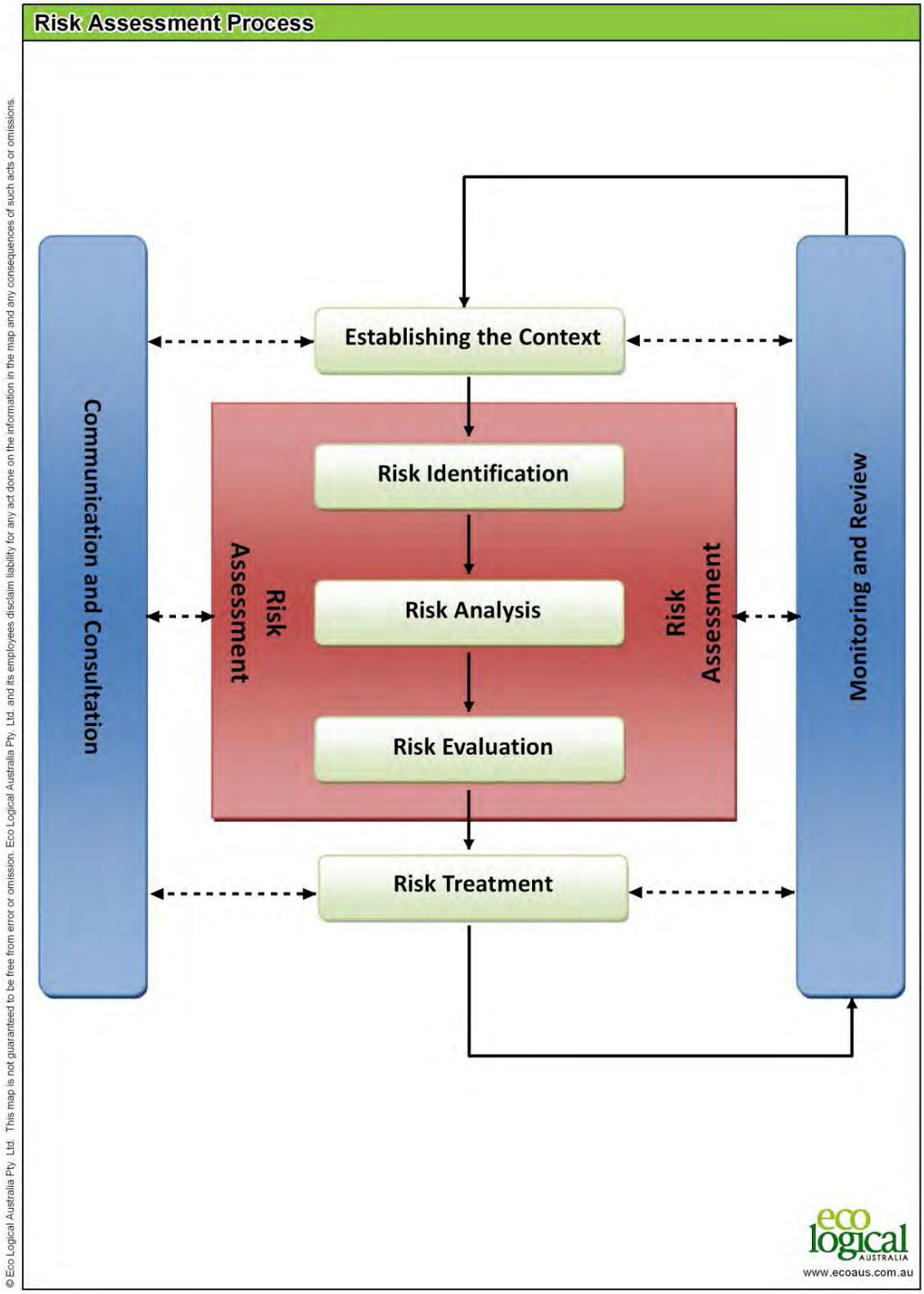

Figure 5-1: Risk assessment process

Figure 5-2: Risk matrix

		Consequence	1	2	3	4	5
			Trivial	Minor	Severe	Major	Catastrophic
Likelihood	A	Almost Certain	**Low**	**Intermediate**	**High**	**Extreme**	**Extreme**
	B	Likely	**Low**	**Low**	**Intermediate**	**High**	**Extreme**
	C	Possible	**Negligible**	**Low**	**Intermediate**	**High**	**High**
	D	Unlikely	**Negligible**	**Negligible**	**Low**	**Intermediate**	**High**
	E	Rare	**Negligible**	**Negligible**	**Negligible**	**Low**	**Intermediate**

Figure 5-3: Risk rating, risk class and associated risk management response

RATING	RISK MANAGEMENT RESPONSE
Extreme	Risks that significantly exceed the risk acceptance threshold and need urgent and immediate attention. Modify the threat, likelihood or consequence so that the risk is reduced to 'Intermediate' or lower.
High	Risks that exceed the risk acceptance threshold and require proactive management. Modify the threat, likelihood or consequence so that the risk is reduced to 'Intermediate' or lower.
Intermediate	Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of additional measures could be used to reduce the risk further. Modify the threat, the likelihood or consequence to reduce the risk to 'Low' or 'Negligible' if practicable
Low	Determine the management plan for the threat to prevent occurrence and monitor changes that could affect the classification.
Negligible	Review at the next review interval Manage by routine procedures – reassess at the next review

5.1.1 Summary- biophysical environment

The following project activities (aspects) generated pre-mitigation risk ratings as intermediate or above:

- Vegetation clearing
- Excavation
- Physical presence of infrastructure
- Vehicle movements
- Fire ignition

- Liquid and solid waste disposal
- Spills and leaks
- Dust emissions
- Noise emissions and vibration.

After mitigation, all risks were reduced with most risk rated as negligible or low. A number of residual risks were rated intermediate or higher. These are summarised below.

Risks to human health and safety from project activities such as vegetation clearing, excavation, vehicle movements and dust emissions were rated 'high'. For these risks, controls could successfully reduce the likelihood of impacts, however due to potential consequences of loss of life, the residual risk remained high.

Residual risks to subsurface archaeology and skeletal remains from construction activities were rated 'intermediate' because discovery (through excavation) would inevitably cause damage. Consistent with obligations under the *Heritage Act* and the Cultural Heritage sub-plan of the CEMP any discovery of subsurface archaeological or skeletal material would result in excavation ceasing in that locality, site assessment of the significance of the material, and consultation with Aboriginal traditional owners.

Residual risks of vehicle movements and project traffic from construction activities, resulting in annoyance for nearby communities were rated 'intermediate'. This was a function of the unavoidable use by the project of the only road into and out of the region and would be dealt with through the Traffic Management Plan (not included in this EMP), required separately by the Department of Infrastructure, Planning and Logistics to fulfil statutory requirements for use of NTG roads.

Residual risks of fire to fauna, habitats and air quality were rated 'intermediate' because of the regional scale of potential impacts. These risks however would arise from accidental rather than planned project activities and are dealt with in the Bushfire Sub-Plan of the CEMP and emergency response procedures.

5.1.2 Socio-economic environment

Pre-mitigation socio-economic risks rated 'significant' (equivalent to intermediate for biophysical risks) and higher included:

- Damage and unauthorised entry to Aboriginal sacred sites and archaeological sites
- Inter/intra family conflict about the distribution of monetary components of land agreements and the actual expenditure of payments
- Increased risk of road trauma caused by workers using own vehicles traveling between Alice Springs, Yuendumu and the work site.

Uncontrolled interactions and un-considered policy surrounding the interactions between construction camps and local communities, resulting in the creation of undesirable and potentially conflicting relations such as expectations regarding the availability of fuel, food and other services; and the development of potentially unhealthy or illegal relationships;

After mitigation, all risks rated 'significant' or higher were reduced to 'low' or 'moderate'.

6 Construction Environmental Management Plan

The following is a series of management sub-plans to be implemented during the construction phase of the TNP Project. Operational management measures are identified separately in **Section 7**.

6.1 Terrestrial fauna and habitat sub-plan

6.1.1 Environmental values

The following threatened fauna species have been recorded or are considered likely to occur in the Project area:

Table 6-1 Threatened fauna species recorded or likely to occur in the Project area

SPECIES	TPWC ACT (NT)	EPBC ACT (FEDERAL)
Great Desert Skink (*Liopholis kintorei*)	Vulnerable	Vulnerable
Greater Bilby (*Macrotis lagotis*)	Vulnerable	Vulnerable
Grey Falcon (*Falco hypoleucos*)	Vulnerable	Not listed
Brush-tailed Mulgara (*Dasycercus blythi*)	Vulnerable	Not listed
Southern Marsupial Mole (*Notoryctes typhlops*)	Vulnerable	Not listed

The following threatened fauna species have the potential to occur due to the presence of suitable habitat.

Table 6-2 Threatened fauna with potential to occur in Project area

SPECIES	TPWC ACT (NT)	EPBC ACT (FEDERAL)
Night Parrot (*Pezoporus occidentalis*)	Critically Endangered	Endangered
Princess Parrot (*Polytelis alexandrae*)	Vulnerable	Vulnerable

6.1.2 Environmental aspects to be managed

Construction activities have the potential to impact on terrestrial fauna through:

- Clearing and earthworks for construction, including in sensitive habitats (e.g. potential nesting habitats, riparian habitats)
- Open trench excavations
- Increased access and vehicle movement associated with construction
- Water storage in turkeys' nests
- Fire ignition
- Vehicle movements and personnel introducing and/or spreading weed and pest species
- Spills of hydrocarbons, hazardous materials or wastewater discharges.

6.1.3 Potential environmental impacts

Construction of the TNP may result in the following impacts:

- Direct loss of, degradation or fragmentation of fauna habitat
- Direct injury to or mortality of individuals
- Introduction or spread of pest species.

This sub-plan addresses management of issues relating to impacts to significant species, including those listed under the EPBC Act potentially affected by the TNP. The management approach for rehabilitation of disturbed habitat is described in the Rehabilitation sub-plan.

6.1.4 Performance management

Environmental targets and performance indicators have been prescribed in line with fauna and habitat management objectives for the TNP Project and are identified in **Table 6-3**.

Table 6-3Terrestrial fauna performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Direct fauna impacts	To minimise the direct impacts on fauna through impacts with vehicles, entrapment in excavation works, or extraordinary exposure to predators.	▪ TPWC Act and associated regulations ▪ Trench Clearing Procedure for the TNP ▪ MPC Fauna (Wildlife) Management	▪ No deaths of conservation significant fauna as a consequence of construction activities.	▪ Environmental Incident Reports for fauna encounters. ▪ Daily fauna trench clearance reports. ▪ No. incidents of vehicle speeds exceeded on ROW and access roads.
Fauna habitat decline	To minimise the temporary and permanent reduction or fragmentation of existing fauna habitat.	▪ Vegetation Clearing Permit (*Planning Act*) ▪ EPBC approval ▪ NT Land Clearing Guidelines ▪ MPC Vegetation Management ▪ Flora and vegetation control measures (Section sub-plan 6.2)	▪ All activities undertaken within the boundaries of the approved corridor and limits of the native vegetation clearing permits and EPBC approval.	▪ Conformance with the conditions of the native vegetation clearing permit and EPBC approval. ▪ Conformance to Fauna Licence requirements

6.1.5 Control measures

Specific actions have been identified to assist in achieving terrestrial fauna and habitat management objectives for the TNP Project and are identified in **Table 6-4.**

Table 6-4 Terrestrial fauna control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Timing of construction	Construction activities involving excavations shall be timed to occur in dry conditions as much as possible.	Construction Contractor
Induction	All personnel shall complete induction prior to mobilisation to site.	Construction Manager
Timing of construction	Clearing shall be undertaken in stages to allow for the progressive movement of fauna into areas outside the proposed disturbance area.	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Pre-clearance	A pre-clearing survey at pegging, prior to ground disturbance and vegetation clearing to identify key habitat elements for Matters of National Environmental Significance including Greater Bilby, Great Desert Skink, Night Parrot or Princess Parrot, and their habitat.	Construction Contractor
Greater Bilby	Pre-clearance survey to search for burrows in areas of hummock grassland, particularly in paleodrainage channels.	Construction Contractor/Licensed Fauna spotter/handler
Great Desert Skink	Pre-clearance survey to search for burrows in hummock grasslands in areas of red sandy soils, which may include in association with paelodrainage lines with Melaleuca, Triodia and termite mounds.	Construction Contractor/Licensed Fauna spotter/handler
Greater Bilby/ Great Desert Skink	Where identified and practicable, direct disturbance to burrows will be avoided by micrositing of the pipeline route. If burrows are encountered, fauna will be flushed from burrows and allowed the opportunity to move on. If individuals do not move on, a licensed wildlife handler shall be engaged to translocate individuals to pre-approved areas outside of the RoW, which contains suitable habitat for the species.	Construction Contractor/Licensed Fauna spotter/handler
Vegetation Clearing	Clearing to avoid known occurrences and habitat of threatened fauna, as far as practicable, including the retention of habitat trees.	Construction Contractor
Trenches	The maximum length of the open trench should not exceed the length capable of being practically inspected and cleared by teams of fauna spotters/catchers.	Construction Contractor
Trenches	Fauna shelters to be placed at intervals of not greater than 500 m.	Construction Contractor
Trenches	Fauna ramps and/or earth plugs to be placed at both ends of trenches, at intervals not exceeding 1 km.	Construction Contractor
Trenches	Trench inspections for fauna and clearance to be carried out within five hours of sunrise and before sunset, unless backfilled, in which case inspection shall precede backfilling, as identified below.	Construction Contractor
Trenches	Works on the trench shall not commence until trench inspections have been completed for the section or area intended for works.	Construction Contractor
Trenches	Trenches shall be inspected by construction crews half an hour prior to backfilling and if trapped fauna are present, a fauna handler will be notified and engaged to assist, prior to backfilling.	Construction Contractor
Trenches	Trench inspections shall be conducted on rostered days off and in any other scheduled breaks in construction.	Construction Contractor
Fauna	All fauna handling shall only be conducted by a licensed fauna handler	Construction Contractor
Pipes	Pipes to be inspected and cleared to ensure no fauna entrapment prior to welding.	Construction Contractor
Pipes	Welded pipeline sections to be capped at the end of each day to prevent fauna entry.	Construction Contractor
Vehicle movement	Vehicle speed limits shall be imposed on construction vehicles to minimise the risk of fauna strike and driving at dawn and dusk shall be limited.	Construction Contractor

6.1.6 Monitoring and recording

The monitoring program for terrestrial fauna and habitats has been designed to ensure that construction of the TNP is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as identified in **Table 6-5**.

Table 6-5 Terrestrial fauna monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Open trench length and location	Observe and record the open trench KP start and end points to demonstrate compliance with time limits on trench open times.	To ensure compliance with approval conditions.	Daily	Construction Contractor	▪ Fauna Interaction Report
Trench inspections	To ensure fauna shelters, ramps and/or earth plugs are in place.	To enable fauna egress from trenches.	Daily	Construction Contractor	▪ Fauna Interaction Report
Trench inspections	To identify and rescue trapped fauna.	To prevent injury to or loss of fauna.	At least once daily, within 5 hours of sunrise, and prior to any lowering into the trench or backfilling	Construction Contractor	▪ Trench Inspection Records
Pipe inspection	Inspect pipes prior to welding to ensure no fauna entrapment. Inspect capping of welded sections to ensure no fauna entry.	To prevent fauna entrapment.	Daily	Construction Contractor	▪ Fauna Interaction Report
Vehicle speed limits	Random visual inspection of vehicle movements to monitor compliance with speed limits	To prevent fauna strike.	Ongoing	Construction Contractor	▪ Event Report
Analysis of Incident Trends	Analyse incidents reported for identification of vehicle and entrapment related fauna injuries and fatalities.		Monthly	HSE Manager	▪ InControl
Vegetation Clearing	Area of threatened fauna habitat cleared	Threatened fauna clearing area	Ongoing	Construction Contractor	▪ Clearing records

6.1.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for terrestrial fauna and fauna habitat are not being achieved, contingency actions will be enacted, as identified in **Table 6-6**.

Table 6-6 Terrestrial fauna contingencies and corrective action

TRIGGER	ACTION
Injury or death of conservation significant vertebrate fauna as a result of vehicle collision, trench fall or other Project activity.	1. Undertake appropriate remedial action (e.g. contacting a nominated carer to assess possible rescue and rehabilitation of the animal) as required. 2. Report as an Incident.

TRIGGER	ACTION
	3. Investigate cause 4. Revise procedures and education / induction programs as required to prevent reoccurrence. 5. Collate reports of any such incidents for reporting as per **Section 7**.
A new Threatened species not previously recorded, is found within the project area.	1. Stop work in immediate area if animal is still in construction area. 2. Allow opportunity for animal to leave construction area or where appropriate qualified fauna handler to relocate to adjacent or suitable habitat. 3. Review working widths in ROW to avoid potential species occurrence. 4. Assess likely extent of habitat for Threatened species. 5. Investigate opportunities to prevent or minimise the impact to recorded fauna such as evaluating potential to relocate temporary construction areas, access roads, camps or any other infrastructure that there is potential to shift at this stage of construction. 6. Report finding and management approach to DENR (Biodiversity). Include in reporting as per Section 7. 7. Indicate ‘no-go’ areas to be avoided through flagging/re-pegging.

6.2 Flora and vegetation sub-plan

6.2.1 Environmental values

Vegetation communities recorded in the project area are considered common and widespread. Riparian vegetation is considered a sensitive vegetation community under the NT Land Clearing Guidelines and disturbance should be minimised.

During survey, no threatened flora species were recorded. The threatened Bog-rush *Schoenus centralis* (TPWC – Vulnerable) has been assessed as potentially occurring in the Project area as suitable habitat exists for this species although it was not recorded in the survey.

Field assessment has confirmed there is no suitable habitat for the threatened species Dwarf Desert Spike-rush *Eleocharis papillosa* (EPBC and TPWC – Vulnerable) potentially affected by the project. Regardless, it remains a species of interest given it is listed for consideration by the Commonwealth Government in its assessment of the project under the EPBC Act.

The project area is known to support seven flora species listed as significant (status less than threatened under TPWC Act) under the TPWC Act. These are:

- Calotis cuneifolia
- Peplidium sp. Tanami
- Einadia nutans subsp. eremaea
- Enchylaena tomentosa
- Ptilotus obovatus
- Tecticornia indica subsp. leiostachya
- Trichodesma zeylanicaum var. zeylanicum.

6.2.2 Environmental aspects to be managed

Construction activities have the potential to impact on flora and vegetation through:

- Vegetation clearing
- Excavation for construction, including in sensitive communities (e.g. riparian habitats)
- Vehicle movements and personnel introducing and/or spreading weed species, trampling vegetation and causing dust lift-off
- The physical presence of infrastructure, additional access roads and RoW
- Increased ignition sources from machinery and vehicle movements
- Spills of hydrocarbons, hazardous materials or liquid (including septic) and solid waste This sub-plan addresses management of impacts to significant flora species and communities, including those listed under the EPBC Act potentially affected by the TNP.
- Water use and groundwater extraction.

6.2.3 Potential environmental impacts

Construction of the Project may result in the following impacts:

- Direct loss of flora and vegetation including threatened or significant species
- Disturbance or loss of sensitive communities (e.g. riparian vegetation)

- Degradation of vegetation condition
- Sedimentation and physical modification of watercourses
- Increased presence of weed species
- Increased fire frequency or intensity.

This sub-plan addresses the impacts of flora and vegetation. The management approach to rehabilitation, weeds, fire, soils and sediment, dust (air emissions), surface and groundwater, hazardous materials and spill response is described in the appropriate sub-plans.

6.2.4 Performance management

Environmental targets and performance indicators have been prescribed in line with flora and vegetation management objectives for the TNP Project, identified in **Table 6-7**.

Table 6-7 Flora and vegetation performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Disturbance to native vegetation	Minimise and manage disturbance to native vegetation particularly sensitive vegetation communities (riparian vegetation)	▪ Vegetation Clearing Permit (*Planning Act*) – for freehold and Crown lease ▪ EPBC approval ▪ NT Land Clearing Guidelines ▪ MPC Vegetation Management	▪ All activities undertaken within the boundaries of the approved corridor and limits of the native vegetation clearing permits and EPBC approval. ▪ No contravention of vegetation clearing permits or EPBC approval specifying spatial limits to vegetation clearing	▪ Conformance with spatial delineation of approved vegetation clearance
Conservation of threatened flora species	Minimise the disturbance to or removal of threatened flora species and communities	▪ *Territory Parks and Wildlife Conservation Act* ▪ *EPBC Act* ▪ DBP Native Vegetation Clearing Procedure	▪ No disturbance to or removal of threatened flora species or communities other than that approved.	▪ Conformance with requirements for approval to interfere with threatened flora species or approved translocation plans

6.2.5 Control measures

Specific actions have been identified to assist in achieving flora and vegetation management objectives for the TNP Project, as described in **Table 6-8**.

Table 6-8 Flora and vegetation control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Induction	All staff shall be inducted regarding the appearance and conservation significance of threatened flora species.	Construction Contractor
Bog-rush	Pre-clearing assessment to identify presence of threatened Bog-rush *Schoenus centralis*	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Dwarf Desert Spike-rush	Pre-clearance surveys at pegging at watercourse crossings to detect previously unrecorded populations of Dwarf Desert Spike-rush, following rainfall, where practicable	Construction Contractor
Clearing	Where threatened flora species are identified in pre-clearance surveys, impacts will be avoided where practicable through micro-siting.	Senior HSE Advisor / Construction Contractor
Clearing	A GIS Environmental Database shall be maintained to identify the location of any identified Threatened flora, significant flora and sensitive vegetation communities (riparian).	Senior HSE Advisor/ Construction Contractor
Clearing	Approved areas for native vegetation clearing to be clearly marked within Environmental Line List (ELL) and on-ground.	Senior HSE Advisor
Clearing	Threatened or significant flora identified proximal to but outside (within 10 m of) the construction footprint shall be demarcated in the field, identified on the ELL, and disturbance avoided where possible	Construction Contractor
Clearing	Vegetation clearing shall be kept to the minimum amount necessary to allow access or approved works.	All personnel
Clearing	Avoid clearing tall trees along the edges of the pipeline RoW where possible and/or prune branches (where feasible) rather than felling.	Construction contractor
Clearing	Trimming overhanging branches shall be undertaken using the 'three-cut method' to prevent bark stripping	Construction Contractor
Clearing	Previously cleared areas shall be utilised where possible for laydown and turn around points.	All personnel
Clearing	Vegetation shall not be burned.	All personnel
Stockpiles	Cleared vegetation shall be stockpiled separately to soils.	Construction Contractor
Stockpiles	Vegetation stockpiles shall be managed in accordance with the MPC Environmental Management Plan.	Construction Contractor
Reinstatement	Following respreading of topsoil (completed in accordance with Soils and Sediment sub-plan), stockpiled cleared vegetation shall be respread over the disturbed area.	Construction Contractor
Records	Records shall be kept to document the details of clearing conducted in order to facilitate reporting in accordance with relevant approvals.	Senior Advisor – Environment and Heritage/ Construction Contractor

6.2.6 Monitoring and recording

The monitoring program for flora and vegetation has been designed to ensure that construction of the TNP are consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, identified in **Table 6-9**.

Table 6-9 Flora and vegetation monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Vegetation clearing	Record the location, date of clearing and total hectares of all vegetation clearing	Clearance of approved vegetation only	Ongoing	Construction Contractor	• Field Inspection Checklist • Event Report

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Vegetation boundary demarcation review	Inspection of adequacy of demarcation of all approved boundaries in respect of threatened and significant flora required to be avoided.	Clearance of approved vegetation only	Weekly	Construction Contractor	• Event Report • Weekly Environment Inspection records

6.2.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for flora and vegetation are not being achieved, contingency actions will be enacted, as indicated in **Table 6-10**.

Table 6-10 Flora and vegetation contingencies and corrective action

TRIGGER	ACTION
Marked clearing boundary not in accordance with approvals.	1. Stop work in relevant area. 2. Investigate and complete an incident report. 3. Implement corrective actions, including a review of marked clearing boundaries.
Clearing outside the approved area is identified.	1. Stop work in relevant area. 2. Investigate and complete an incident report. 3. Report to regulators as required (with notice of proposed corrective action). 4. Implement corrective actions, including rehabilitation where required.
Population(s) of threatened flora species not previously recorded, are found within the project area.	1. Implement interim protection of newly recorded species such as flagging area as a 'no-go' area 2. Report the occurrence(s) to relevant authorities. 3. Investigate opportunities to avoid or minimise impacts. 4. If avoidance is not possible, obtain approval to disturb from Parks and Wildlife Commission 5. Investigate options for mitigating impact and follow appropriate regulatory procedures.

6.3 Weed sub-plan

6.3.1 Environmental values

The *Weeds Management Act* enables the following weed declarations: Class A (to be eradicated); Class B (growth and spread to be controlled); Class C (not to be introduced into the NT). All Class A and B weeds are also Class C.

An assessment of the NT weed database for the Project area and adjacent areas discovered the following declared weed records:

- Athel pine (*Tamarix aphylla*) – Class A
- Mesquite (*Prospis pallida*) – Class A
- Bathurst burr *(Xanthium spinosum*) – Class B
- Caltrop (*Tribulus terrestris*) – Class B
- Castor Oil Plant (*Ricinus communis*) – Class B
- Coffee senna (*Senna occidentalis*) - Class B
- Fountain grass (*Cenchrus setaceus*) – Class B
- Khaki weed (*Alternanthera pungens*) – Class B
- Mossman River grass (*Cenchrus echinatus*) – Class B
- Parkinsonia (*Parkinsonia aculeate*) – Class B
- Rubberbush (*Calotropis procera*) – Class B
- Saffron thistle (*Carthamus lantus*) – Class B.

None of these species were recorded during the flora and vegetation survey; however, they have the potential to occur.

During the flora and vegetation survey, four weed species were recorded in the Project area (**Table 6-11)**. None of these are Weeds of National Significance (WONS) or declared weeds; however, one species, Buffel grass is listed in the Alice Springs Regional Weed Management Plan as a Significant threat.

All WONS, declared weeds and Buffel grass that occur (recorded, or with potential to occur) are considered weeds of concern to this sub-plan.

Table 6-11 Distribution of weed species in the Project area

WEED SPECIES	DISTRIBUTION IN PROJECT AREA
Buffel grass (*Cenchrus ciliaris*)	▪ Most prevalent weed species in Project area. ▪ Dominates ground cover between Yuendumu and the southern limit of the Project area, inclusive of Napperby Creek.
Spiked Malvastrum (*Malvastrum americanum*)	▪ Southern portion of Project area.
Couch grass (*Cynodon dactylon*)	▪ Napperby Creek on banks, depositional sands and flood out areas associated with the creekline.
Mimosa bush (*Vachelia farnesiana*).	▪ Napperby Creek on banks, depositional sands and flood out areas associated with the creekline.

Additional weeds may occur in unsurveyed areas of the Project area, including creeklines, where increased moisture retention is conducive to weed proliferation.

6.3.2 Environmental aspects to be managed

Construction activities have the potential to introduce or disperse weeds through the following aspects of the TNP:

- Vegetation clearing
- Excavation and earthworks for construction
- Vehicle and personnel movements
- Fire ignition
- Physical presence of infrastructure.

6.3.3 Potential environmental impacts

Construction of the Project has the potential to result in the following impacts:

- Increased infestations of existing weed species in the Project area
- Introduction of new weed species in the Project area
- Degradation of vegetation communities
- Degradation of fauna habitat
- Increased fire fuel load and more intense fires.

This sub-plan addresses management of impacts from weeds. The management approach for vegetation is outlined in the Flora and Vegetation sub-plan and fire is outlined in the Bushfire sub-plan.

6.3.4 Performance management

Environmental targets and performance indicators have been prescribed in line with weed management objectives for the TNP Project, as indicated in **Table 6-12.**

Table 6-12 Weeds performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Introduction of new weeds	Minimise the potential for new weeds of concern to be introduced into previously uninfested areas of the Project area.	▪ *Weeds Management Act* ▪ MPC Pest and Weed Management Procedure ▪ DBP or equivalent Clean on Entry Procedure	▪ No new species of weeds of concern recorded in the Project area within 2 years of completion of construction ▪ Compliance with the *Weeds Management Act.*	Species of weed recorded in the Project area. No non-compliance with *Weeds Management Act* and internal weed hygiene procedures.
Spread of existing weeds	Minimise the risk of spreading existing weeds within the Project area and to adjacent areas.	▪ *Weeds Management Act* ▪ MPC Pest and Weed Management ▪ DBP or equivalent Clean on Entry Procedure	▪ No significant change to the extent and distribution of existing weeds of concern within 2 years of completion of construction.	Number of recorded locations of weed infestation in GIS database. Extent of weed cover at recorded locations.

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
			▪ Compliance with the *Weeds Management Act.*	

6.3.5 Control measures

Specific actions have been identified to assist in achieving weed management objectives for the TNP Project, as indicated in **Table 6-13.** The control measures apply to all weeds of concern as described in **Section 6.3.1,** that being WONS, declared weeds and Buffel grass.

Table 6-13 Weed control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Inductions	All staff shall be inducted regarding the appearance and significance of weeds of concern to the sub-plan, with potential to occur in the Project area.	All personnel
Pre-clearance	A pre-disturbance inspection shall be undertaken at pegging, to validate existing presence of Class A WONS prior to construction.	Construction Contractor
Existing weeds	Establish and maintain a GIS Environmental Database of existing weed presence in the pipeline corridor.	Senior HSE Advisor / GIS Manager
Access restriction	Access of vehicles and personnel to areas of known weed infestation shall be restricted.	Construction Contractor
Inspections	Regular inspections of the pipeline corridor and construction camps shall occur to identify and assess weed prevalence.	Construction Contractor
Inspections	Inspection of creeklines for weeds of concern including Couch Grass and Mimosa in the vicinity of watercourse crossing.	Construction Contractor
New weeds	New weeds infestations shall be removed and destroyed as soon as practicable.	Senior HSE Advisor / Construction Contractor
Operational procedures	All soil, topsoil, rehabilitation materials and vehicle movements into the Project area shall comply with Clean on Entry procedures.	Construction Contractor
Operational procedures	Construction activities shall be undertaken in dry conditions, where practicable.	Construction Contractor
Vehicle washdown/Hygiene station	Hygiene stations shall be established at intervals along the Project area, in proximity to areas of known weed infestations and/or weed risk, including the southern half of the Project area and in proximity to wetlands and creeklines including Napperby Creek.	Construction Contractor
Vehicle washdown/Hygiene stations	The requirement for hygiene stations shall apply at all times throughout construction where topsoil movement is occurring	Construction Contractor
Topsoil management	Topsoil shall be stockpiled in areas with similar weed risk and not with topsoil from lower weed risk areas.	Construction Contractor
Watercourse crossings	HDD will be utilised in a number of watercourse crossings tominimise disturbance to creek beds, including through weed dispersal.	Construction Contractor

6.3.6 Monitoring and recording

The monitoring program for weeds has been designed to ensure that construction of the Project is consistent with the control measures, management objectives and targets. Monitoring measures are identified in **Table 6-14** below.

Table 6-14 Weed monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Vehicle and equipment inspections	Opportunistic observation for evidence of appropriate wash-down practices	Ensure compliance with wash-down procedures	Ongoing	Construction Contractor	▪ Event Report ▪ Weekly Environment Inspection
Transport of soil and organic material (fill)	Ensure soils and organic matters are sourced from area with same weed risk or free of weed seeds, where practicable	Ensure compliance with clean on entry procedure or MPC procedure	Ongoing	Construction contractor	▪ Event Report ▪ Weekly Environment Inspection
Weed presence	Monitor for the presence of new weed species or new infestations of existing weeds of concern in Project areas	To ensure adequacy of controls	Ongoing throughout construction	Senior HSE Advisor / all personnel	▪ Event Report
Rehabilitation	Monitor for presence of weeds of concern in rehabilitated areas	To ensure effective rehabilitation	Annually during early wet season at 12 and 24 months post-construction	Construction contractor	▪ Rehabilitation monitoring report
Rehabilitation	Monitoring for new weed species or new infestations of existing weed species in adjacent control areas	Detect new weeds and the spread of existing weeds.	Annually during early wet season at 12 and 24 months post-construction	Construction contractor	▪ Rehabilitation monitoring report

6.3.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for weeds are not being achieved, contingency actions will be enacted, as indicated in **Table 6-15.**

Table 6-15 Weed contingencies and corrective actions

TRIGGER	ACTION
Presence of new weed species in the Project area, or the spread of existing weed species of concern to previously uninfested areas.	1. New weed infestations or new weed species identified by construction staff during construction should be reported to the Site Environmental Advisor to ensure appropriate management. 2. Identified WONS within the Project area shall be destroyed through targeted weed management efforts. 3. Actively control weed outbreaks in previously uninfested areas within the Project area, in consultation with the relevant authorities. 4. Actively control infestations of new weed species in the Project area 5. Review weed control program and relevant procedures (e.g. vehicle hygiene procedures) and modify as required to prevent further incursions or spread of weeds.

6.4 Bushfire sub-plan

6.4.1 Environmental values

The Project area is in a predominantly arid region characterised by hot, dry summers, mild winters and low rainfall. The northern part of the Project area is characterised by wet summers and dry winters. Bushfires occur predominantly during summer and spring, when conditions are driest.

6.4.2 Environmental aspects to be managed

Construction activities have the potential to increase the risk of fire, causing injury or loss of human life, loss of flora and vegetation and loss of fauna and habitat, through the following aspects of the TNP:

- Introduction of ignition sources including vehicles and machinery and equipment such as generators
- Welding, grinding and other hot works
- Introduction or spread of weed species which can increase fuel load.

6.4.3 Potential environmental impacts

Construction of the Project may result in the following impacts:

- Injury or loss of life to the public and project workforce
- Disruption to utility supply as a result of damage
- Generation of smoke, dust and ash
- Disturbance and /or loss of terrestrial flora species
- Degradation vegetation communities caused by sediment deposition, physical modification of watercourse
- Degradation or loss of sensitive communities (e.g. riparian vegetation)
- Mortality of fauna
- Loss, degradation and fragmentation of fauna habitat
- Damage to Aboriginal sacred site and other infrastructure outside the Project area.

This sub-plan addresses management of issues relating to bushfire. The management approach to flora and vegetation, terrestrial fauna and habitat, and surface and groundwater is described in the appropriate sub-plans.

6.4.4 Performance management

Environmental targets and performance indicators have been prescribed in line with bushfire management objectives for the TNP Project and identified in **Table 6-16.**

Table 6-16 Bushfire performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Bushfire	To prevent bushfires occurring as a result of Project activities	• *Fire and Emergency Act* and *Regulations* ▪ *Bushfires Management Act.* ▪ MPC Bushfire Management Procedure.	No bushfires caused by Project activities.	Number of bushfires caused by Project activities

6.4.5 Control measures

Specific actions have been identified to assist in achieving bushfire management objectives for the TNP Project as identified in **Table 6-17.**

Table 6-17 Bushfire control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Inductions and training	Relevant personnel shall be trained in the use of fire fighting equipment.	Construction Contractor
Fire control equipment	Appropriate fire control equipment (including fire extinguishers, dry chemical, foam extinguisher, water carts as required) will be provided in all vehicles, construction camps, at construction sites, and when and where hot works are undertaken, and will be regularly replenished and maintained.	Construction Contractor
Ignition sources	Open fires and ignition sources such as cigarettes, lighters and matches are prohibited in the Project area except for construction camps and designated smoking areas	All personnel
Ignition sources	Designated smoking areas shall have butt receptacles and a fire extinguisher.	Construction Contractor
Consultation	All construction activities shall be conducted in accordance with and in liaison with relevant fire authorities. Work may continue during fire ban times on approval from the relevant authority only.	Construction Contractor
Weather	Fire weather warnings will monitored daily and communicated to construction teams.	Construction Contractor
Equipment maintenance	All machinery and vehicles will be inspected and maintained in accordance with manafacturer's specifications and to comply with fire safety standards.	Construction Contractor
Equipment maintenance	Defective machinery shall be shut down until the defect is rectified and the machine made safe for operations.	Construction Contractor
Vehicles	Vehicles shall be regularly inspected for build up of combustible materials including grass and debris, to ensure fire risk is low.	All personnel
Hot works	During hot works, including welding, grinding and other hot works, dedicated spotters will be engaged to detect evidence of spot fires.	Construction Contractor
Hot works	Exclusion zones will be maintained around hot works to maintain safe distance from much, vegetation, and any unused veihcles or machinery.	Construction Contractor
Chemical storage	Combustible chemicals will be stored in accordance with regulatory requirements and standards, and incompatible chemicals shall not be stored together.	Construction Contractor
Fire prevention	Firebreaks shall be maintained around temporary buildings and facilities.	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Reporting	All fires must be immediately reported to a supervisor.	All personnel

6.4.6 Monitoring and recording

The bushfire monitoring program has been designed to ensure that construction of the TNP is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets and identified in **Table 6-18.**

Table 6-18 Bushfire monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Weather conditions	Monitor weather conditions and fire rating to assess fire risk	To prevent and minimise risk of fire	Daily	Construction Contractor	• Weekly Environmental Inspections • Prestart records
Hot works	Spotters to be engaged during hot works to identify evidence of hot spots or fire activity	To identify fire risk early	During hot works	Construction Contractor	• Environmental Inspections
Site Inspections	Opportunistic observation for evidence of ignition sources or fire hazards.	Reduce the risk of fires	Weekly	Construction Contractor	• Environmental Inspections
Fire control equipment	Monitor fire control equipment to ensure in good working order and sufficient supply	To ensure preparedness for fire event	Weekly	Construction Contractor	• Environmental Inspections
Fire events	Maintain records of fires and near misses including cause, date/time, location, response, outcome	Maintain records and modify activities to reduce fire risk in the future	Ongoing, as required	Construction Contractor	• Fire Incident Report

6.4.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for bushfire management are not being achieved, contingency actions will be enacted, as identified in **Table 6-19.**

Table 6-19 Bushfire contingencies and corrective action

TRIGGER	ACTION
Project-induced fire activity	1. In the event of a project-induced fire activity (including hot spots or fire), activate and implement fire control (including on-site response and notification of emergency response authorities, as required). 2. Investigate and complete an incident report. 3. Implement appropriate measures to avoid re-occurrence. 4. Remediate vegetation in the affected area, as required

6.5 Soils and sediment sub-plan

6.5.1 Environmental values

The Project area is underlain by soil formations including aeolian sands, alluvial deposits of clay, silt and sands and red earth comprising clay, silt and sands. Bedrock is present in some sections and includes sedimentary, igneous and metamorphic rocks (Worley Parsons 2016). Although the region experiences low rainfall, significant monsoonal events can lead to sheetflow run off and stream flow. Disturbance to dispersive soils have the potential to cause erosion and mobilisation of sediments. These are likely to be present in parts of the Project area (WANT Geotechnics 2017).

The Project area intercepts 39 ephemeral or seasonal watercourses which hold water after large rainfall events, including two major crossings at Napperby Creek near Tilmouth Well and 'KP 228.54' crossing, a northern tributary to Yaloogarrie Creek.

The risk of acid sulphate soils (ASS) or potential acid sulfate soils (PASS) occurring in the Project area is extremely low (WANT Geotechnics 2017).

6.5.2 Environmental aspects to be managed

Construction activities have the potential to impact on soils and sediment through the following aspects of the TNP:

- Vegetation clearing
- Excavation
- Vehicle movements outside of designated areas and on unstable ground
- Spills and leaks of hydrocarbons, hazardous materials or liquid (including septic).

6.5.3 Potential environmental impacts

Construction of the Project has the potential to result in the following impacts:

- Accelerated soil erosion and sedimentation of watercourses
- Landform instability particularly watercourse crossings
- Soil compaction
- Exposure of acid sulphate soils causing soil contamination
- Contamination of soil and sediment.

This sub-plan addresses management of issues relating to impacts to soils and sediment. The management approach to rehabilitation, weeds, fire, dust (air emissions), surface and groundwater, hazardous materials and spill response is described in the appropriate sub-plans. In addition, a Primary Erosion and Sediment Control Plan (ESCP) has been prepared by a Certified professional in erosion and sediment. The Primary ESCP will be supported by progressive ESCPs to provide specific details on location and installation of required control measures as the Project proceeds through the construction phase. Taken together, the Soils and Sediment sub-plan, Rehabilitation sub-plan, Primary ESCP and progressive ESCPs represent the Proponent's response to managing landform stability and erosion issues.

6.5.4 Performance management

Environmental targets and performance indicators have been prescribed in line with soils and sediment management objectives for the TNP Project and identified in **Table 6-20.**

Table 6-20 Soils and sediment performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Topsoil	Minimise change to soil profile from excavation activities	▪ *Soil Conservation and Land Utilisation Act* ▪ MPC Soils Management sub-plan	▪ No evidence of subsoil on surface within excavated areas following rehabilitation ▪ No visual evidence of soil compaction following backfill and rehabilitation	▪ Subsoil on surface (as detected by colour and texture) within excavated areas following rehabilitation ▪ Presence of soil compaction following backfill and rehabilitation (e.g. hard soil, local water pooling)
Erosion and sediment control	Prevent occurrence of soil erosion during and following construction	▪ *Soil Conservation and Land Utilisation Act* ▪ NT Erosion and Sediment Control Guidelines (DLRM) ▪ Best Practice Erosion & Sediment Control - Appendix P: Land-based Pipeline Construction (IECA 2008) ▪ MPC Erosion, Sediment and Drainage Management sub-plan	▪ No soil erosion inconsistent with that of the surrounding land ▪ Implementation of Primary ESCP controls	▪ Presence of soil erosion inconsistent with that of the surrounding land ▪ ESCP controls implemented
ASS	Minimise the potential for exposure of ASS	▪ National Guidance for the Management of Acid Sulfate Soils in Inland Aquatic Ecosystems 2011 (EPHC & NRMMC 2011)	▪ No exposure of ASS as a result of the project.	▪ Exposure of ASS as a result of the project

6.5.5 Control measures

Specific actions have been identified to assist in achieving soils and sediment management objectives for the TNP Project, and identified in **Table 6-21.**

Table 6-21 Soils and sediment control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Planning	All waterway crossings shall be planned to be constructed during the dry season	Construction Manager
Erosion	Vehicles access to potentially unstable ground (i.e. scree slopes, riparian zones, creeks, drainage lines, etc.) shall be restricted except where crossing is unavoidable.	All personnel
Erosion	If erosion is identified, erosion and sediment control structures shall be constructed, such as sediment traps or drainage controls. NT Erosion and Sediment Control Guidelines to be used	Construction Contractor
Erosion	Stockpiles shall be strategically located so as not to impede surface water flows or stock movements.	Construction Contractor
Erosion	HDD to be used at sensitive watercourse crossings	Construction Manager

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Erosion	The beds of watercourses to be restored to the original gradient and the bank to the natural contours post disturbance	Construction Contractor
Erosion	Backfill crown to be graded and shaped as closely as practicable to pre-existing contours and flow patterns of riverbed and riparian zone.	Construction Contractor
Erosion	Banks to be reinstated in a manner that minimises erosion potential and does not alter natural streamflow - this may include the installation of rock gabions, rip rap, cement/s and hessian bags.	Construction Contractor
Soil quality	Topsoil, subsoil and trench spoil disturbed during earthworks shall be stockpiled separately such that the soil profile may be maintained during backfilling.	Construction Contractor
Soil quality	Topsoil and subsoil excavated from the bed of a watercourse shall be stockpiled separately and returned to the bed of the watercourse.	Construction Contractor
Soil quality	Stockpiles shall be stored within the approved construction footprint as close as practicable to the source location	Construction Contractor
Soil quality	Stockpiles shall be at a maximum height of 2 m unless otherwise agreed in consultation with DPIR.	Construction Contractor
Soil quality	Stockpiles shall be located to avoid creek and drainage line banks and associated vegetation.	Construction Contractor
Soil quality	Soil shall not be stockpiled where it has the potential to result in sedimentation of land or surface water (e.g. on slopes that drain immediately to a creek or drainage line). Topsoil containment measures e.g. berms and sediment fencing shall be used as necessary	Construction Contractor
Soil quality	Topsoil and subsoil shall be stockpiled where it can be easily recovered and shall not be lost by wind/water erosion.	Construction Contractor
Induction	All staff shall be inducted regarding the appearance and significance of ASS.	Construction Contractor
ASS	Where potential ASS is identified by construction staff during trenching it shall be immediately backfilled and reported to the Site Environmental Advisor.	Construction Contractor
ASS	A 50 m exclusion zone shall be established around the identified risk area and a specialist consultant engaged to ascertain an appropriate testing and treatment regime for trenching within this area. Proposed management would be agreed in consultation with DENR and DPIR.	Construction Contractor
Hazardous material	Hazardous materials shall be managed in accordance with the Hazardous Materials and Spill Response Management sub-plan.	Construction Contractor
Rehabilitation	Within the disturbance footprint, topsoil shall be graded to a depth of 100 mm to 150 mm and stockpiled separately.	Construction Contractor
Rehabilitation	Following the completion of earthworks, trench spoil subsoil and topsoil shall be returned in that order such that the soil profile is reinstated.	Construction Contractor
Rehabilitation	Following back fill and respreading, topsoil shall be ripped to prevent compaction.	Construction Contractor

6.5.6 Monitoring and recording

The monitoring program for soils and sediment has been designed to ensure that construction of the TNP is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets and identified in **Table 6-22.**

Table 6-22 Soils and sediment monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Topsoil stockpile inspection	Visual inspection of topsoil stockpiles for evidence of erosion	Identification of erosion	Weekly	Construction Contractor	• Event Report • Weekly Environmental Inspection
Watercourse bed and banks and areas of sloping topography	Visual inspection at site of watercourse crossings for evidence of instability, compaction or erosion	Identification of instability, compaction or erosion	Weekly	Construction Contractor	• Event Report • Weekly Environmental Inspection
ASS	Visual inspection at site of watercourse crossings for evidence of ASS	Identification and avoidance of ASS	At time of watercourse crossing construction	Construction Contractor	• Event Report • Weekly Environmental Inspection

6.5.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for soils and sediment are not being achieved, contingency actions will be enacted, as indicated in **Table 6-23.**

Table 6-23 Soils and sediment contingencies and corrective action

TRIGGER	ACTION
Evidence of erosion of topsoil stockpiles	1. Apply erosion control measures such as stabilisers, or other, as appropriate to prevent further loss
Formation of gullies	1. Investigate cause. 2. Undertake maintenance as required. 3. Monitor
Instability or compaction of watercourse beds and banks	1. Investigate cause (e.g. vehicle movements) 2. Remediate through stabilisation or ripping, as required) 3. Maintain remediated area 4. Review vehicle access to beds and banks, if required 5. Monitor bed and banks and maintain remediated area
Potential ASS is identified during trenching by construction staff	1. Immediately backfill trench. 2. Report to the Site Environmental Advisor. 3. Establish a 50 m exclusion zone around the identified risk area 4. Undertake an appropriate testing program, develop an ASS Management Plan, and treatment regime. 5. Monitor. 6. Maintain mitigation measures until desired outcome is achieved.
Increased run-off leading to erosion of soil and subsequent deposition	1. Investigate cause (e.g. construction, wind and/or soil erosion, feral animals, inappropriate soil and/or sediment controls). 2. Undertake a risk assessment (risk of remediation options vs do nothing options). 3. Review effectiveness of current controls 4. Remediate cause if possible. 5. Maintenance of rehabilitated areas until the required outcome is achieved.

6.6 Land users sub-plan

6.6.1 Environmental values

The Project area passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures and is located close to the Tanami Road. Pastoral activities occur in the region include Mt Doreen and Napperby pastoral stations.

The project area is predominantly within the Central Desert Regional Council Local Government Area which supports a number of remote Indigenous communities including Atitjere, Engawala, Lajamanu, Laramba, Nyirripi, Anmatjere, Willowra, Yuelamu and Yuendumu and approximately 36 Aboriginal family outstations. Yuendumu, located approximately 5 km north-west of the project area, is the largest community in the CDRC and is a service and administrative hub for residents and other small communities. The population of Yuendumu is approximately 759, comprising predominantly Warlpiri and Anmatyeer Aboriginal people.

The project area also intersects the MacDonnell Regional Council near the tie-in with the Amadeus Pipeline.

6.6.2 Environmental aspects to be managed

Construction activities have the potential to impact other land users through the following aspects of the TNP:

- Groundwater abstraction
- Vehicle movements
- Fire ignition
- Liquid (including septic) and solid waste disposal
- Noise and vibration.

6.6.3 Potential environmental impacts

Construction of the Project has the potential to result in the following impacts:

- Strain on public water supply and/or decline in water availability to other users
- Deterioration of road integrity
- Disruption to utility supply from fire ignition or other project related damage
- Damage to sites outside of project area due to wildfire caused or exacerbated by Project activities
- Strain on existing waste disposal facilities
- Damage to sites outside of project area due to discharge of hydrotest water and sewage effluent
- Excessive noise at nearby public or sensitive receptors.

This sub-plan addresses management of issues relating to impacts to land users. The management approach to rehabilitation, fire, air emissions, noise, surface and groundwater, waste management, hazardous materials and spill response is described in the appropriate sub-plans.

6.6.4 Performance management

Environmental targets and performance indicators have been prescribed in line with land user management objectives for the TNP Project, as indicated in **Table 6-28.**

Table 6-24 Land user performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Disturbance of residents, landowners and third parties	Minimise disturbance to residents, landowners and third parties	▪ DBP Procedure: Driving S-PRO-024	▪ No reasonable substantiated complaints from residents, landowners or third parties	▪ Number of reasonable substantiated complaints from residents, landowners or third parties

6.6.5 Control measures

Specific actions have been identified to assist in achieving land user objectives for the Project (Table 6-29).

Table 6-25 Land user control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Access	Infrastructure (roads, railways) in the Project area that requires access to be maintained or managed during construction shall be identified and negotiated with relevant stakeholders and authorities.	Construction Manager/Land Manager
Vehicle movement	Times of highest potential to significantly impact on access shall be identified and communicated to adjacent landholders and/ or relevant authorities.	Land Manager/ Construction Manager
Vehicle movement	All landholders or relevant authorities shall be notified prior to arrival of Project construction teams on their land.	Land Manager/ Construction Manager
Vehicle movement	Appropriate signage shall be installed to clearly indicate active construction locations, construction camps, and the pipeline route.	Construction Contractor
Vehicle movement	Crossing points for stock and vehicle access shall be maintained as agreed with landowner.	Construction Contractor
Vehicle movement	Gates shall be left as they were found so as not to alter stock movements.	All personnel
Groundwater	Potable water shall be sourced from Alice springs and/or potable water bores.	Construction Contractor
Groundwater	Groundwater abstraction for construction supply shall target the Yuendumu Sandstone or Walibri Dolomite to avoid impacts to the Yuendumu community water supply. If this is not possible, then consultation with PWC is required.	Construction Contractor

6.6.6 Monitoring and recording

The monitoring program for land users has been designed to ensure that construction of the TNP is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 6-30.**

Table 6-26 Land user monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Analysis of Incident Trends	Analyse incidents reported for	Determine number of substantiated land	Quarterly during construction	Construction Contractor / Land Use Manager	• Environmental Incident Report

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
	identification of land user complaints.	user complaints to inform review of management measures, as required.			

6.6.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for land users are not being achieved, contingency actions will be enacted, as indicated in **Table 6-31.**

Table 6-27 Land user contingencies and corrective action

TRIGGER	ACTION
Land user complaint is received	All complaints and incidents will be dealt with promptly and efficiently by suitably trained and qualified personnel. 1. Record the complaint including 2. Investigate cause of complaint. 3. Determine if complaint is reasonably substantiated. 4. Implement corrective actions where required.

6.8 Surface and groundwater sub-plan

6.8.1 Environmental values

The Project area intersects a number of watercourses ranging in size and extent, the majority of which are ephemeral or seasonal creeks and ephemeral lakes. Given the low topographic relief of the area, sheet flow occurs after large rainfall events and the creeks and lakes hold water following these events. A number of watercourses in the south-east section of the Project area drain into Lake Lewis, a large ephemeral saline lake fed by Napperby Creek and other ephemeral creeks.

The watercourses and ephemeral lakes in the Project area are identified in **Table 6-40**.

Table 6-28 Well-defined watercourses and ephemeral lakes in the Project area

WATERCOURSE	STREAM ORDER CLASSIFICATION	KP
Watercourse at Chilla Well	1	265.96
Yaloogarrie Creek	1 & 2	227.55
Keridi Creek	1	155.735
Mission Creek	1 & 2	152.55
Napperby Creek (Tilmouth Well)	4	34.74
Lake Lewis	Ephemeral lake, surface water & groundwater discharge point	NA

Three aquifer types occur in the Project area including:

- Alluvial Aquifer – generally these aquifers occur in the central section of the Project area and are associated with alluvial deposits. Alluvial aquifers have higher aquifer storage with moderate hydraulic conductivity and exhibits drawdown to groundwater abstraction (MWH 2017).
- Palaeochannel Aquifer – this system comprises large, broad trunk drainages fed by narrower tributaries. The drainage complexes consist of alluvial, colluvial and lacustrine sediments with several chemical precipitates. Palaeotributaries consist mainly of alluvial and colluvial sediments, covered broadly by colluvium and aeolian sand (MWH 2017).
- Fracture Rock and Saprolite Aquifer: Fractured rock aquifers are associated with fractured zones and igneous intrusions but have lower aquifer storage (MWH 2017).

6.8.2 Environmental aspects to be managed

Construction activities have the potential to impact on surface and groundwater through the following aspects of the TNP:

- Groundwater abstraction
- Vegetation clearing and vehicle movements
- Modifications to watercourses by construction of crossings
- Trenching and excavation exposing acid sulfate soils
- Fire ignition and subsequent use of water for fire control generating silt and ash

- Liquid and solid waste disposal may result in contamination of surface waters including drinking water supplies
- Spills and leaks of hydrocarbons, hazardous materials resulting in contamination of surface and groundwater.

This sub-plan addresses management of issues relating to impacts to surface and groundwater. The management approach for erosion and sedimentation, hazardous materials and spill response is described in the appropriate sub-plans.

6.8.3 Potential environmental impacts

Construction of the Project has the potential to result in the following impacts:

- Reduction in groundwater table
- Degradation of groundwater quality
- Reduction in surface water availability
- Degradation of surface water quality
- Physical modification of watercourses, including instability or erosion of watercourse beds and banks.

6.8.4 Performance management

Environmental targets and performance indicators have been prescribed in line with surface and groundwater management objectives for the Project, as indicated in **Table 6-41.**

Table 6-29 Surface water and groundwater performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Surface Water	To ensure that natural surface water flow patterns or quality are not detrimentally impacted by Project activities	▪ MPC Water Management sub-plan ▪ MPC Erosion, Sediment and Drainage Management Procedure ▪ MPC Riverine/Waterways Management ▪ ESCP Primary Plan	▪ No permanent deviation from natural per-construction surface water flow patterns. ▪ No visibly detectable increase in erosion and sedimentation along watercourses due to the TNP Project.	▪ Visible evidence of surface water flow paths post-construction ▪ Surface water discharge quality parameters, in particular turbidity ▪ Effectiveness of ESCP controls
Groundwater	To ensure that land user groundwater availability is not impacted by abstraction or dewatering activities	▪ MPC Water Management sub-plan	▪ No substantiated land user complaints regarding groundwater availability	▪ Number of land user reports/complaints regarding groundwater availability

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Water quality	To prevent contamination of surface and groundwater	▪ *Water Act* ▪ DBP Spill Response sub-plan ▪ MPC Fuel, Chemical and Dangerous Goods Management Plan	▪ No fuel and chemical spills. ▪ No Project attributed surface or groundwater contamination	▪ No evidence or reports of spills in Weekly Environment Reports ▪ Dewatering records ▪ Sampling records of hydrotest / dewatering water

6.8.5 Control measures

Specific actions have been identified to assist in achieving surface and groundwater management objectives for the TNP Project, as indicated in **Table 6-42.**

Table 6-30 Surface water and groundwater control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Water quality	Implement water quality monitoring of drinking water, construction water and hydrostatic water, to detect changes in quality and ensure compliance with regulatory requirements	Construction Contractor
Vehicle access	Vehicle access to riparian zones and creekline banks will be limited.	Construction Contractor
Fuel and maintenance	No storage of fuel or hydrocarbons, refuelling or vehicle or machinery maintenance shall occur within 200 m of a watercourse.	Construction Contractor
Scheduling of construction	Weather forecasts will be monitored to avoid construction of watercourse crossings during wet conditions	Construction Contractor
Surface water diversions	If construction in wet conditions cannot be avoided, temporary diversion berms or drains will be installed. Restoration of natural surface water flows will be carried out as soon as possible after completion of pipe laying and backfilling.	Construction Contractor
Erosion control	Erosion control measures will be implemented as required as per Primary ESCP	Construction Contractor
Physical disturbance of watercourses	Drilling methods will be selected to minimise disturbance to banks, riparian vegetation and surface water, and to ensure compliance with regulatory requirements and guidance. HDD will be utilised at a number of watercourse crossings (Section 2.6.4).	Construction Contractor
Restoration	The bed of any watercourse intersected shall be restored to the original gradient and the bank to the natural contours, post-construction	Construction Contractor
Dewatering	If required, dewatering shall be undertaken using a method that minimises the area of impact including to surrounding water bodies.	Construction Contractor
Discharge	Disposal or reuse of dewater product or hydrostatic test water shall be subject to testing as required, and comply with DoW and other regulatory requirements and advice.	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Records	Records shall be kept of all dewatering and disposal activities, including date, location (KP), volumes of water abstracted and methods of groundwater treatment.	Construction Contractor

6.8.6 Monitoring and recording

The monitoring program for surface and groundwater has been designed to ensure that construction and operation of the Project are consistent with control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 6-43.**

Table 6-31 Surface water and groundwater monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Rehabilitation effectiveness at water crossings	As per Rehabilitation sub-plan	Assess rehabilitation success at water crossings	12 and 24 month rehab surveys Monthly aerial surveillance	Construction Contractor Operator	• Surface Water Crossing Report • Environmental Report • Aerial Surveillance reports
Groundwater abstraction rates	Monitoring and estimation of groundwater abstraction.	To ensure abstraction is only sufficient to meet demand.	Daily during groundwater abstraction	Construction Contractor	• Environmental Report • Water truck records
Dewatering discharge rates	Monitoring and estimation of dewatering effluent discharge during dewatering.	To ensure no impacts to surrounding area	Daily during dewatering	Construction Contractor	• Dewatering Report • Environmental Report • Enironmental Inspections
Discharged water quality	Relevant physical and chemical parameters (after treatment), including pH, electrical conductivity, dissolved oxygen and turbidity	Ensure discharged water will not adversely affect water quality	Weekly during discharge	Construction Contractor	• Dewatering Report • Environmental Report • Sampling results / records

6.8.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for surface and groundwater are not being achieved, contingency actions will be enacted, as indicated in **Table 6-44.**

Table 6-32 Surface water and groundwater contingencies and corrective actions

TRIGGER	ACTION
Groundwater abstraction in excess of approved amount/ or rate	1. Immediately cease or reduce rate of groundwater abstraction (as appropriate). 2. Adaptive management arrangements for groundwater sources where extraction may approach sustainable yield.
Impact on natural surface water flow patterns	1. Investigate cause

TRIGGER	ACTION
Integrity of on-site drainage management system compromised. Increased sediment load in watercourses	2. Undertake maintenance and remediation as required (e.g. remove accumulated material) 3. Modify/re-engineer on-site drainage management system as required
Water quality appears adversely affected by groundwater discharge	1. Assess if water quality affected 2. Evaluate cause 3. Investigate why contaminated dewatering discharge was released if attributable to change 4. Undertake remediation actions

6.9 Hazardous Materials and Spill Response sub-plan

6.9.1 Environmental values

The Project area is remote with few potential sources of contamination. A number of remote Indigenous communities and pastoral stations occur in proximity to the Project area.

A number of threatened flora and fauna species are known or likely to occur in the Project area, as defined in **Section 4.2.4** and **Section 4.2.6**. The Project also intersects a number of watercourses including seasonal creeks and ephemeral lakes.

6.9.2 Environmental aspects to be managed

Construction activities have the potential to result in the uncontrolled release of hazardous materials through the following aspects of the TNP:

- Storage, handling and disposal of hydrocarbons and hazardous materials
- Refuelling activities
- Leaks and spills from plant and equipment while in use
- Vehicle and equipment maintenance.

6.9.3 Potential environmental impacts

Construction of the Project has the potential to result in the following impacts:

- Contamination of soils, surface water and groundwater
- Exposure of workforce to hazardous materials causing injury or loss of life
- Exposure of the public to hazardous materials causing injury or loss of life
- Degradation or loss of vegetation
- Degradation or loss of fauna habitat
- Injury to or loss of fauna

This sub-plan addresses management of issues relating to impacts from the storage and handling of hazardous materials.

6.9.4 Performance management

Environmental targets and performance indicators have been prescribed in line with hazardous material management objectives for the TNP Project, as indicated in **Table 6-45.**

Table 6-33 Hazardous materials performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Contamination	Prevent the contamination of groundwater, surface water and soil, and injury or mortality of fauna due to accidental spills of hazardous materials.	▪ *Soil Conservation and Land Utilisation Act* ▪ DBP Spill Response Procedure ▪ MPC Contaminated Land Management sub-plan and Fuel, Chemical and Dangerous Goods Management sub-plan	▪ No spills or leaks of hazardous materials in excess of 80 l ▪ No spills or leaks in or within 100 m of watercourses.	▪ Evidence or reports of spills.

6.9.5 Control measures

Specific actions have been identified to assist in achieving hazardous material management objectives for the TNP Project, as indicated in **Table 6-46.**

Table 6-34 Hazardous materials control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Induction and training	All personnel involved in hazardous materials handling shall be adequately trained.	Construction Contractor
Management of hazardous materials	All storage locations shall maintain a Material Safety Data Sheet (MSDS) manifest and inventory. MSDSs for all stored hazardous materials shall be readily accessible.	Construction Contractor
Management of hazardous materials	All chemicals used during operations shall be transported, stored, handled and disposed of in accordance with statutory requirements, codes of practice and industry standards (AS1940).	Construction Contractor
Management of hazardous materials	Dangerous goods shall be transported by an appropriately licensed contractor, in accordance with relevant regulatory requirements.	Construction Manager
Management of hazardous materials	Chemical use shall be minimised where practicable.	All personnel
Management of hazardous materials	The minimum practicable volume of chemicals shall be stored on-site.	Construction Manager
Storage and refueling locations	Hazardous materials storage and refueling stations shall have appropriately designed, located and sized containment facilities to prevent the release of spilt substances to the environment and to ensure compliance with regulatory requirements.	Construction Manager
Spill response kit	Appropriate spills kits are to be available in vehicles, refueling vehicles, at each construction camp, and to supervisors.	Construction Contractor
Management of hazardous materials	Hazardous materials are to be provided and stored in sealed, labelled containers, without leaks.	Construction Contractor
Dewatering pumps	Diesel -powered dewatering pumps shall be bunded to contain spills, using an impermeable liner. The bund shall be large enough to contain the contents of the pump's fuel tank.	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
GW pumps	Diesel -powered dewatering pumps shall be bunded to contain spills, using an impermeable liner or be fully self-contained with dual protection	Construction Manager
Vehicle maintenance and hazardous materials storage	Vehicle maintenance, and fuels and chemicals shall not be stored or handled within 200 m of natural or built waterways or water storage areas (e.g. streams, canals, dams, lakes etc.)	Construction Contractor
Maintenance	Hazardous materials storage and refueling equipment to be provided and maintained in good working order.	Construction Contractor
Maintenance	Plant and equipment maintenance shall be undertaken off-site in appropriately equipped areas, with the exception of minor maintenance such as tyre changes which can occur at camp locations.	Construction Contractor
Waste	Contaminated materials such as absorbent pads and soil shall be appropriate contained and disposed of in accordance with regulatory requirements at an approved waste management facility.	Construction Contractor

6.9.6 Monitoring and recording

The monitoring program for hazardous materials has been designed to ensure that construction and operation of the Project are consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 6-47.**

Table 6-35 Hazardous materials monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
MSDS and chemicals inventory	Inspect MSDS register and inventory	To ensure records are accurate and up to date	Weekly	Construction Contractor	• Environmental Inspections
Handling procedures	Routine monitoring of personnel handling hazardous materials	To ensure compliance with safe handling procedures	Ongoing	Construction Contractor	• Weekly Environment Report
Storage areas and bunding	Inspect integrity of bunding and supply of leak-proof trays and self-contained equipment	To ensure adequate containment in the event of a spill	Weekly	Construction Contractor	• Environment Inspections
Spill kits	Inspect spill kits to ensure adequately stocked	To ensure adequate spill response supplies and equipment are available	Weekly	Construction Contractor	• Environment Inspections
Refuelling equipment	Prestart inspections Inspect tanks, lines, hoses, pumps, couplings, valves and associated equipment	To ensure in good working order	Daily prestart Weekly	Construction Contractor	• Weekly Environment Inspections • Prestart records • Event reports for incidents
Training	Spill Response Training	Awareness	Ongoing (at least once by all personnel)	Construction Contractor	• Training records

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Training	Completion of monthly drill	Awareness	Monthly	Construction Contractor	Emergency exercise debrief reports

6.9.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for hazardous material management are not being achieved, contingency actions will be enacted, as indicated in **Table 6-48.**

Table 6-36 Hazardous materials contingencies and corrective action

TRIGGER	ACTION
Spill of hazardous materials in excess of 80 L	1. Identify source of spill 2. Exclude workforce and public from affected area 3. Stop leak or spill, where practicable 4. Implement containment and control to prevent dispersal of hazardous materials 5. Capture and contain hazardous materials 6. Remediate affected area in consultation with relevant authorities 7. Review hazardous materials procedures and report incident
Spill within 100 m of a watercourse	1. Identify source of spill 2. Stop leak or spill, where practicable 3. Exclude workforce and public from affected area 4. Implement containment, such as booms to prevent dispersal downstream 5. Remediate watercourse, in consultation with relevant authorities 6. Engage wildlife rescue service to treat any injured fauna

6.10 Waste management sub-plan

6.10.1 Environmental values

The Project area is remote with few potential sources of waste. A number of remote Indigenous communities and pastoral stations occur in proximity to the Project area. The Project will also require a construction workforce of 250 to 350 personnel.

A number of threatened flora and fauna species are known or likely to occur in the Project area, and the Project intersects a number of watercourses including seasonal creeks and ephemeral lakes.

6.10.2 Environmental aspects to be managed

Construction activities for the Project will generate waste through the following aspects of the TNP:

- Domestic waste from construction camps
- Septic waste from construction camps
- Disposal of hydrotest water to land
- Construction waste
- Disposal of dewatering waste
- Contaminated absorbent material / soil from spill response.

This sub-plan addresses management of issues relating to waste impacts. The management approach to hazardous material, contamination of surface and groundwater are described in the appropriate sub-plans.

6.10.3 Potential environmental impacts

Construction of the Project has the potential to result in the following impacts:

- Reduction in amenity of local area
- Contamination of soils, sediment and watercourses
- Degradation of vegetation and fauna habitat from improper disposal
- Injury or mortality of fauna from improper disposal.

6.10.4 Performance management

Environmental targets and performance indicators have been prescribed in line with waste management objectives for the TNP Project and indicated in **Table 6-49**.

Table 6-37 Waste performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Waste disposal	To minimise environmental or human health impacts due to disposal of waste	▪ *Waste Management and Pollution Control Act* ▪ *Waste Management and Pollution Control (Administration) Regulations* ▪ *Environmental Protection (Controlled Waste) Regulations 2004* ▪ *Environmental Protection (Unauthorised Discharges) Regulations 2004* ▪ MPC Waste Management sub-plan	▪ No uncontrolled discharge of waste to the environment ▪ No contamination or degradation of environmental values from waste disposal ▪ No substantiated reports of human health impact from Project waste	▪ Visible evidence, reports and/or monitoring results of environmental quality ▪ Number of substantiated complaints regarding waste management
Waste production	To minimise waste production (recycling, reuse and recover)	▪ MPC Waste Management sub-plan	▪ Minimise and recycle waste where practicable or dispose at licensed facility	▪ Results of inspection, audits and incident reports.

6.10.5 Control measures

Specific actions have been identified to assist in achieving waste management objectives for the TNP Project, as indicated in **Table 6-50**.

Table 6-38 Waste control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Waste management	Waste to be managed in accordance with the hierarchy of management – minimisation, segregation, management, disposal. Waste to be transported to approved facilities outside of the Project area	Construction Contractor
Induction	All personnel to be inducted on appropriate waste management and disposal.	Construction Contractor
Waste disposal	Waste will be removed by a licensed waste transport company. Package treatments will treat sewage on site to health standards appropriate for effluent disposal to land	Construction Contractor
Waste disposal and treatment	Appropriately designed, located and sized waste storage, treatment and disposal facilities including bins, toilets, and other, will be provided at construction camps and construction sites.	Construction Contractor
Identify waste streams	Waste streams shall be appropriately segregated and stored as either general waste, recyclable, or regulated waste within appropriate vessels.	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Waste storage and treatment	Waste storage and treatment facilities will be regularly inspected and maintained to ensure good, sanitary, working order and to ensure adequate capacity.	Construction Contractor
Waste storage and treatment	Contingency waste storage shall be in place for any works that extend into the wet season to ensure available capacity at construction camp locations.	Construction Contractor
Liquid waste	Liquid wastes will be treated prior to disposal, or contained in an appropriate storage receptacle or facility, as required for disposal at an approved facility.	Construction Contractor
Records	All waste records including general tip dockets, waste tracking certificates and registers shall be retained.	Construction Contractor
Surface and groundwater	Surface and groundwater will be managed in accordance with the surface and groundwater management plan	Construction Contractor
Hazardous material and spills	Contaminated spill response materials to be disposed of in accordance with the Hazardous Materials and Spill Response sub-plan.	Construction Contractor
Hazardous material and spills	Hazardous material storage and spill response will be managed in accordance with the Hazardous materials and spill response management plan.	Construction Contractor

6.10.6 Monitoring and recording

The monitoring program for waste management has been designed to ensure that construction and operation of the Project are consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 6-51**.

Table 6-39 Waste monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Sewage treatment	Wastewater treatment plant for operating efficiency	To ensure effluent discharged complies with health standards	Monthly	Construction Contractor	• Environmental Inspections
Waste storage and disposal facilities	Inspection of housekeeping and waste management on-site	To ensure stores and disposal facilities are working properly and prevent release of waste to the environment	Weekly	Construction Contractor	• Environmental Inspections
Liquid waste	Inspect wastewater storage area and hydrotest water discharge areas	To ensure correct disposal of liquids waste and hydrotest water	Monthly	Construction Contractor	• Environmental Inspections
Waste disposal	Monitor location and volume of discharge of hydrotest water and/or sewage.	To ensure no impact surrounding area	Upon discharge	Construction Contractor	• Health, Safety Environment Report • Environmental Incident Reports
Litter and general waste	Visual inspections at construction	To identify issues with regards to	Weekly	Construction Contractor	• Environmental Inspections

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
	camps and construction sites for litter and general waste	waste disposal and segregation			

6.10.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for waste management are not being achieved, contingency actions will be enacted, as indicated in **Table 6-52**.

Table 6-40 Waste contingencies and corrective action

TRIGGER	ACTION
Unknown waste is located	1. Classify waste. 2. Determine appropriate treatment/disposal.
Excess litter and general waste on-site	1. Determine cause of excess litter 2. Ensure waste bins are accessible and emptied regularly. 3. Review procedure.
Uncontrolled discharge of waste to the environment	1. Determine cause of discharge 2. Contain discharge 3. Inspect waste storage, treatment and disposal facilities to ensure good working order and/or detect faults 4. Implement corrective action 5. Review procedures

6.11 Rehabilitation sub-plan

6.11.1 Environmental values

Rehabilitation will be required to revegetate areas cleared for construction purposes that are not required for operational use. Effective rehabilitation will reduce the risk of introducing weed species, minimise the long-term disturbance of fauna through the re-establishment of habitat, and stabilise disturbed areas, reducing the potential for erosion and sedimentation of surrounding water bodies.

6.11.2Environmental aspects to be managed

- Vegetation clearing
- Soil disturbance and soil compaction
- Bushfire
- Erosion.

This sub-plan addresses management of activities associated with rehabilitation. The management approach to fire, soils and sediment, surface and groundwater, flora and vegetation, terrestrial fauna, and weeds is described in the appropriate sub-plans.

6.11.3 Potential environmental impacts

- Loss of flora and vegetation communities
- Introduction and /or spread of weeds
- Disturbance and loss of fauna habitat
- Fragmentation of fauna habitat
- Erosion and landform instability.

6.11.4 Performance management

Environmental targets and performance indicators have been prescribed in line with rehabilitation objectives for the Project and indicated in **Table 6-53**.

Table 6-41 Rehabilitation performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Vegetation Rehabilitation	To re-establish vegetation cover and diversity in line with pre-disturbance cover.	Completion criteria (see **Section 6.13.7**)	Meet rehabilitation completion criteria.	Site specific established completion criteria.
Site Reinstatement	To re-establish site conditions in line with pre-disturbance conditions.	MPC Reintatement and Rehabilitation Management Plan	No substantiated landholder complaints regarding site reinstatement.	Number of substantiated landholder complaints.

6.11.5 Control measures

Specific actions have been identified to assist in achieving rehabilitation objectives for the Project, as indicated in **Table 6-54.**

Table 6-42 Rehabilitation control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Reinstatement	The Project area will be reinstated in accordance with Project approval conditions, guidance and regulatory requirements	Construction Contractor
Rehabilitation	Progressive rehabilitation shall be undertaken to minimise the amount of disturbance time.	Construction Contractor
Reinstatement	All temporary infrastructure, signage and other installations other than those required for environmental or safety reasons shall be removed once backfilling and tie-ins are completed.	Construction Contractor
Reinstatement	Trenches/excavations shall be backfilled with stockpiled subsoil material following pipe laying to match the natural height and contours of the pre-construction landscape.	Construction Contractor
Reinstatement	All waste materials (e.g. bags, pegs, skids, pillows) shall be removed from the construction areas once backfilling and tie-ins are completed.	Construction Contractor
Reinstatement	Compaction relief shall be undertaken where required by scarifying or ripping as required along the contours, prior to respreading of topsoil.	Construction Contractor
Reinstatement	Structural habitat elements such as timber and rocks shall be reinstated over the rehabiliation area, including; small amounts of rocks and stones generated by the construction process.	Construction Contractor
Rehabilitation	Topsoil and seed stock wil be re-spread over graded surfaces in an even layer to match the natural soil horizons.	Construction Contractor
Rehabilitation	Re-vegetation and rehabiliation treatments (seeding, hydromulching or planting) shall be formulated to be comparable to the species composition to that identified pre-disturbance.	Construction Contractor
Rehabilitation	Inspections shall be undertaken of all stabilised, reinstated and rehabilitated areas at the end of the works to confirm stabilisation is in accordance with the required specifications.	Construction Contractor

6.11.6 Monitoring and recording

The rehabilitation monitoring program has been designed to ensure that construction and operation of the TNP are consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 6-55.**

Table 6-43 Rehabilitation monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Site Closure Inspection	Inspect the suitability of reinstatement efforts.	Ensure reinstatement has been undertaken to the appropriate standard	Once, upon construction completion	Construction Contractor	• Field Inspection checklist
Rehabilitation Monitoring	Identify locations for rehabilitation monitoring sites and adjacent control areas prior to vegetation clearing and ground disturbance, to monitor specified aspects against set criterion.	Determine success of rehabilitation	Establish sites prior to vegetation clearing. Monitor annually for a minimum of 2 years post-construction and/or until the rehabilitated areas have regenerated to a stable condition	Senior Advisor – Environment and Heritage	• Rehabilitation Monitoring Report

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Rehabilitation of threatened fauna habitat	Monitoring of key threatened fauna habitat values to focus on: Greater Bilby - Triodia hummocks predominantly in paleodrainage channels; and Great Desert Skink - *Triodia pungens* and *Melaleuca glomerata* on sandplains and paleodrainage channels within Eucalyptus/Corymbia/ Acacia woodlands over Spinifex habitat and Shrublands over Spinifex on Sandplains habitat.	To ensure re-establishment of threatened fauna habitat.	Establish sites prior to vegetation clearing. Monitor annually for a minimum of 2 years post-construction and/or until the rehabilitated areas have regenerated to a stable condition	Senior Advisor – Environment and Heritage	Rehabilitation Monitoring Report
Photo Monitoring	Photo monitoring sites shall be established within rehabilitation monitoring sites prior to vegetation clearing and ground disturbance. For each round of monitoring, two photographs shall be taken at each photo monitoring site – one in each direction along the corridor.	Determine success of rehabilitation	Prior to vegetation clearing and grade; immediately following reinstatement; and at 12 and 24 months following reinstatement	Land Manager Construction Manager	Rehabilitation Monitoring Report

6.11.7 Rehabilitation criteria

The rehabilitation completion criteria are set out in **Table 6-56**.

Table 6-44 Rehabilitation criteria

ASPECT	COMPLETION CRITERIA
Native flora species diversity (plants per m^2)	Perennial native flora species diversity is equal to or greater than 40% of that in the adjacent control area.
Native flora species richness (per plot)	Perennial native flora species richness is equal to or greater than 40% of that of the adjacent control area.
Native flora species foliage cover (%)	Percentage of foliage cover of perennial native flora species indigenous to each vegetation community is equal to or greater than 40% of that of the adjacent control area.
Weed foliage cover (%)	Percentage of foliage cover of weeds is not greater than that of the adjacent control area at 12 and 24 months (excluding extensive populations of negligible and low ranking weed species).

6.11.8 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for rehabilitation are not being achieved, contingency actions will be enacted, as indicated in **Table 6-57.**

Table 6-45 Rehabilitation contingencies and corrective action

TRIGGER	ACTION
Native flora species diversity, richness and foliage cover less than 20% of adjacent control area after 12 months.	1. Investigate cause 2. Remediate cause if possible. 3. Maintenance of rehabilitated areas until the required outcome is achieved.
Rehabilitation fails to stabilise.	1. Investigate cause (e.g. construction, wind and/or soil erosion, feral animals, inappropriate soil and/or sediment controls). 2. Remediate cause if possible. 3. Maintenance of rehabilitated areas until the required outcome is achieved.
Revegetation/grass seeds fail to establish.	1. Investigate cause (e.g. soil erosion, low seed viability, seeds washed away). 2. Remediate cause if possible. 3. Maintenance of rehabilitated areas until the required outcome is achieved. 4. Continue to monitor revegetation establishment.
Revegetation fails to thrive.	1. Investigate why revegetation fails to thrive (nutrient deficiency, low seed viability, soil erosion or compaction issues etc.). 2. Remediate cause (fertilise, re-seed/re-plant etc.). 3. Continue to monitor revegetation progress.
Unplanned vegetation clearance.	1. Investigate why unplanned vegetation clearance occurred. 2. Mitigate cause (e.g. better operator training, better delineation of areas to be cleared). 3. More regular inspections of vegetation clearance operations.
Weed outbreak.	1. Assess threat to revegetation, based on aggressiveness and fuel load of the species. 2. If deemed a threat, implement weed management activities for the outbreak in accordance with the Weed Management Plan.

7 Operation Environmental Management Plan

7.1 Terrestrial fauna sub-plan

7.1.1 Environmental values

The following threatened species are considered likely to occur in the Project area:

- Great Desert Skink (*Liopholis kintorei*)
- Greater Bilby (*Macrotis lagotis*)
- Grey Falcon (*Falco hypoleucos*)
- Brush-tailed Mulgara (*Dasycercus blythi*)
- Southern Marsupial Mole (*Notoryctes typhlops*)

The following two species have the potential to occur due to the presence of suitable habitat:

- Night Parrot (*Pezoporus occidentalis*)
- Princess Parrot (*Polytelis alexandrae*)

7.1.2 Environmental aspects to be managed

Operational activities have the potential to impact on terrestrial fauna through the following aspects of the Project:

- Physical presence of infrastructure resulting in the facilitation of feral animals, increasing predation
- Vehicle movements associated with pipeline inspection and maintenance may result in collisions with fauna and habitat degradation due to introduction and /or spread of weeds.

This sub-plan addresses management of issues relating to impacts to significant species, including those listed under the EPBC Act potentially affected by the TNP.

7.1.3 Potential environmental impacts

Operation of the Project may result in the following impacts:

- Direct loss of, degradation or fragmentation of fauna habitat
- Direct injury to or loss of individuals
- Introduction or spread of weeds and / or feral animals.

This sub-plan addresses management of issues relating to impacts to significant species, including those listed under the EPBC Act potentially affected by the TNP. The management approach for rehabilitation, weed and contamination management is described in the separate sub-plans.

7.1.4 Performance management

Environmental targets and performance indicators have been prescribed in line with fauna and habitat management objectives for the TNP Project and identified in **Table 7-1**.

Table 7-1 Terrestrial fauna performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Direct fauna impacts	To minimise the potential for direct impacts on fauna through impacts with vehicles and exposure to predators.	▪ *TPWC Act* ▪ Associated regulations.	▪ No deaths of conservation significant fauna as a consequence of operation activities.	▪ Environmental Incident Reports for fauna encounters. ▪ No incidents of vehicle speeds exceeded on access roads.
Fauna habitat decline	To restore disturbed areas to pre-construction condition capable of supporting fauna	▪ *Planning Act* ▪ NT Land Clearing Guidelines ▪ DBP Native Vegetation Clearing Procedure ▪ Flora control measures (**Section sub-plan 5.2**)	▪ Cleared and disturbed areas are rehabilitated and capable of supporting fauna	▪ Rehabilitation criteria completed.

7.1.5 Control measures

Specific actions have been identified to assist in achieving terrestrial fauna and habitat management objectives for the TNP Project and are identified in **Table 7-2**.

Table 7-2 Terrestrial fauna control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Physical presence	Monitor rehabilitation against competition criteria. Rehabilitation will return temporary disturbance to native vegetation and fauna habitat.	Pipeline Operator
Physical presence	Rehabilitation will be undertaken in accordance with the Rehabilitation Management Plan.	Pipeline Operator
Vehicle movement	Vehicle speed limits will be imposed on access roads to minimise the risk of fauna strike, and driving at dawn and dusk will be limited.	Pipeline Operator
Vehicle movement	Fauna encounter procedures will be implemented to allow fauna to move on.	Pipeline Operator
Vehicle movement	Introduction and/or spread of weeds in rehabilitation areas will be managed in accordance with the Weed Management Plan.	Pipeline Operator
Hazardous material storage and handling	Hazardous materials safe storage, handling and disposal will be managed in accordance with the Hazardous and Spill Management Plan.	Pipeline Operator

7.1.6 Monitoring and recording

The monitoring program for terrestrial fauna and habitat management has been designed to ensure that operation of the Project is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as identified in **Table 7-3**.

Table 7-3 Terrestrial fauna monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Feral animals	Opportunistic visual monitoring of evidence of feral animals during operation and maintenance of pipeline.	To monitor occurrence of feral species and implement management actions if required.	Ongoing throughout pipeline operation	Pipeline Operator	▪ Event Report ▪ Environmental Incident Report ▪ Fauna Interaction Report
Rehabilitation	Measure rehabilitation against completion criteria.	To monitor rehabilitation progress.	Twice a year (spring and autumn) for two years after construction.	Senior Advisor – Environmental and Heritage	▪ Rehabilitation Monitoring Report
Fauna presence	Opportunistic visual monitoring of evidence (scats, diggings, burrows, direct observation) of fauna of conservation significance during operation and maintenance of pipeline	To monitor re-population of ROW by conservation significant fauna	Ongoing throughout pipeline operation	Pipeline Operator	▪ Rehabilitation Monitoring Report

7.1.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for terrestrial fauna and habitat management are not being achieved, contingency actions will be enacted, as indicated in **Table 7-4**.

Table 7-4 Terrestrial fauna contingencies and corrective action

TRIGGER	ACTION
Injury or death of conservation significant vertebrate fauna as a result of vehicle collision or other project activities.	1. Investigate cause. 2. Undertake appropriate remedial action (e.g. contacting a nominated carer to assess possible rescue and rehabilitation of the animal) as required. 3. Report as an Incident. 4. Revise procedures and education / induction programs as required to prevent reoccurrence. 5. Collate reports of any such incidents for regular reporting to NT EPA.
Noticeable increase in feral animal numbers within the Project area.	1. Undertake feral animal eradication program. 2. Record location and abundance information.
Failure to meet rehabilitation completion criteria.	1. Investigate cause (e.g. wind and/or soil erosion, feral animals, inappropriate soil and/or sediment controls). 2. Remediate cause if possible. 3. Maintenance of rehabilitated areas until the required outcome is achieved. 4. Continue to monitor revegetation establishment.

7.2 Weed sub-plan

7.2.1 Environmental values

An assessment of the NT weed database for the Project area and adjacent area discovered the following records:

- Athel pine (*Tamarix aphylla*) – Class A
- Bathurst burr *(Xanthium spinosum*) – Class B
- Caltrop (*Tribulus terrestris*) – Class B
- Castor Oil Plant (*Ricinus communis*) – Class B
- Coffee senna (*Senna occidentalis*) - Class B
- Fountain grass (*Cenchrus setaceus*) – Class B
- Khaki weed (*Alternanthera pungens*) – Class B
- Mesquite (*Prospis pallida*) – Class A
- Mossman River grass (*Cenchrus echinatus*) – Class B
- Parkinsonia (*Parkinsonia aculeate*) – Class B
- Rubberbush (*Calotropis procera*) – Class B
- Saffron thistle (*Carthamus lantus*) – Class B.

The Weeds Management Act enables the following weed declarations: Class A (to be eradicated); Class B (growth and spread to be controlled); Class C (not to be introduced into the NT). All Class A and B weeds are also Class C.

During recent flora surveys, four weed species were recorded in the Project area. None of these are Weeds of National Significance (WONS) or declared weeds; however, one species, Buffel grass is listed in the Alice Springs Regional Weed Management Plan as a Significant threat.

- Buffel grass (*Cenchrus ciliaris*)
- Couch grass (*Cynodon dactylon*)
- Spiked Malvastrum (*Malvastrum americanum*)
- Mimosa bush (*Vachelia farnesiana*).

All WONS, declared weeds and Buffel grass are considered weeds of concern to this sub-plan.

7.2.2 Environmental aspects to be managed

Operation activities have the potential to introduce or disperse weeds through the following aspects of the TNP:

- Physical presence of infrastructure
- Vehicle and personnel movements associated with pipeline inspection and maintenance.

7.2.3 Potential environmental values

Operation of the Project has the potential to result in the following impacts:

- Increased infestations of existing weed species in the Project area

- Introduction of new weed species in the Project area
- Degradation of vegetation communities
- Degradation of fauna habitat
- Increased fire fuel load and more intense fires.

This sub-plan addresses management of issues relating to impacts from weeds. The management approach for vegetation is outlined in the Flora and Vegetation sub-plan and fire is outlined in the Bushfire sub-plan.

7.2.4 Performance management

Environmental targets and performance indicators have been prescribed in line with weed management objectives for the TNP Project, as indicated in **Table 7-5.**

Table 7-5 Weed performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Introduction of new weeds	Minimise the introduction of new weed species into the Project area.	▪ *Weeds Management Act* ▪ DBP or equivalent Clean on Entry Procedure	No new species of weeds recorded in the Project area.	Weed species recorded in the Project area.
Spread of existing weeds	Minimise the risk of spreading existing weeds within the Project area and to adjacent areas.	▪ *Weeds Management Act* ▪ DBP or equivalent Clean on Entry Procedure	No change to the extent and distribution of weeds.	Extent and distribution of weeds within 12 and 24 months of completion of construction compared to pre-construction.

7.2.5 Control measures

Specific actions have been identified to assist in achieving weed management objectives for the TNP Project, as indicated in **Table 7-6**.

Table 7-6 Weed control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Existing weeds	Maintain a GIS Environmental Database to present the location of identified hygiene risk areas within the pipelien corridor.	Senior Advisor – Environment and Heritage/GIS Manager
Operation procedure	All vehicles shall remain on designated roads and access tracks and shall not go outside approved access areas.	All personnel
Operation procedure	All vehicles willl be checked to ensure they are free from soil and organic matter prior to arrival on site.	All personnel
Operation procedure	All vehicles shall be cleaned down at hygiene management stations.	All personel
Operation procedure	Identified weed risk areas within the pipeline corridor shall be destroyed through targeted weed management efforts, including but not limited to creeklines including Napperby Creek.	Senior Advisor – Environment and Heritage
Operation procedure	Weed control shall take place prior to seed set and be carried out in all areas affected by the Project.	Senior Advisor – Environment and Heritage / Pipeline Operator

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Induction	All staff shall be inducted regarding the appearance and significance of Weeds of National Environmental Significance (WONS).	All personnel

7.2.6 Monitoring and recording

The monitoring program for weeds has been designed to ensure that operation of the Project is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 7-7**.

Table 7-7 Weed monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Random vehicle inspections	Opportunistic observation for evidence of appropriate weed clean down practices.	Ensure weed hygiene procedures are being complied with.	Random, ongoing	Pipeline Operator	▪ Annual Environmental Report ▪ Environmental Inspection
Weed survey	Monitor for the presence of new weeds, and the spread of existing weeds.	Detect new weeds and the spread of existing weeds.	Annually for the first two years of operations.	Senior Advisor – Environment and Heritage/ all personnel	▪ Annual Environmental Report ▪ Environmental Inspection

7.2.7 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for weeds are not being achieved, contingency actions will be enacted, as identified in **Table 7-8.**

Table 7-8 Weed contingencies and corrective action

TRIGGER	ACTION
Presence of new weed species in the Project area. Spread of existing weeds to previously uninfested areas.	1. WONS/ declared weeds identified should be reported to the Environmental Manager to ensure appropriate management. 2. Identified WONS/ declared weeds within the Project area shall be destroyed through targeted weed management efforts. 3. Review weed control program and relevant procedures (e.g. vehicle hygiene procedures) and modify as required to prevent further incursions or spread of weeds.

7.3 Rehabilitation sub-plan

7.3.1 Environmental values

Rehabilitation will be required to revegetate areas cleared for construction purposes that are not required for operational use. Effective rehabilitation will reduce the risk of introducing weed species, minimise the long-term disturbance of fauna through the re-establishment habitat, and stabilise disturbed areas, reducing the potential for erosion and sedimentation of surrounding water bodies.

7.3.2 Environmental aspects to be managed

- Monitoring of rehabilitation against completion criteria.

This sub-plan addresses management of activities associated with rehabilitation. The management approach to fire, soils and sediment, surface and groundwater, flora and vegetation, terrestrial fauna, and weeds is described in the appropriate sub-plans.

7.3.3 Potential environmental impacts

If the rehabilitation is not successful the operation of the Project may result in the following impacts:

- Loss of flora and vegetation communities
- Introduction and /or spread of weeds
- Disturbance and loss of fauna habitat
- Fragmentation of fauna habitat
- Erosion and landform instability.

7.3.4 Performance management

Environmental targets and performance indicators have been prescribed in line with rehabilitation objectives for the TNP Project as indicated in **Table 7-9**.

Table 7-9 Rehabilitation performance management

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Vegetation Rehabilitation	To re-establish vegetation cover and diversity in line with pre disturbance cover	▪ Completion criteria (**Section 7.3.7**)	▪ Meet completion criteria	Site specific established completion criteria

7.3.5 Control measures

Specific actions have been identified to assist in achieving rehabilitation objectives for the Project, as indicated in **Table 7-10**.

Table 7-10 Rehabilitation control measures

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Monitoring	Rehabiliation monitoring will occur until the completion criteria have been met.	Pipeline Operator
Monitoring	Photos shall be taken at each rehabilitation and control site to document the site condition and vegetation cover.	Pipeline Operator
Monitoring	Weeds shall be managed in accordance with the Weed Management Plan.	Pipeline Operator

7.3.6 Monitoring and recording

The rehabilitation monitoring program has been designed to ensure that construction of the Project is consistent with the control measures. Monitoring will measure the success of these actions in accordance with management objectives and targets, as indicated in **Table 7-11**.

Table 7-11 Rehabilitation monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Rehabilitation Monitoring	Monitor rehabilitation sites and adjacent control areas to monitor aspects against set criterion.	Determine success of rehabilitation	Annually for a minimum of 2 years and until the rehabilitated areas have regenerated to meet completion criteria.	Senior Advisor – Environment and Heritage	Rehabilitation Monitoring Report
Rehabilitation of threatened fauna habitat	Threatened fauna habitat to focus on: Greater Bilby – Triodia hummocks, Melaleuca and Acacia on predominantly loamy or lateritic sandy soils in paleochannels and in proximity to recent records in the north and the south of the Project area. Greater Desert Skink - *Triodia pungens* and *Melaleuca glomerata* on sandplains and paleochannels within Eucalyptus/Corymbia/Acacia woodlands over Spinifex habitat and Shrublands over Spinifex on Sandplains habitat	To ensure re-establishment of threatened fauna habitat	Monitor annually for a minimum of 2 years and until the rehabilitated areas have regenerated to a stable condition.	Senior Advisor – Environment and Heritage	Rehabilitation Monitoring Report
Photo Monitoring	Take two photographs at each photo monitoring site – one in each direction along the corridor.	Determine success of rehabilitation	Annually for a minimum of 2 years and until the rehabilitated areas have regenerated to meet completion criteria.	Senior Advisor – Environment and Heritage	Rehabilitation Monitoring Report

7.3.7 Rehabilitation criteria

The rehabilitation completion criteria are indicated in **Table 7-12**.

Table 7-12 Rehabilitation criteria

ASPECT	COMPLETEION CRITERIA
Native flora species diversity (plants per m^2)	Perennial native flora species diversity is equal to or greater than 40% of that of the adjacent control area.
Native flora species richness (per plot)	Perennial native flora species richness is equal to or greater than 40% of that of the adjacent control area.
Native flora species foliage cover (%)	Percentage of foliage cover of perennial native flora species indigenous to each vegetation community is equal to or greater than 40% of that of the adjacent control area.
Weed foliage cover (%)	Percentage of foliage cover of Declared and Environmental Weeds is not greater than that of the adjacent control area at 12 and 24 months (excluding extensive populations of negligible and low ranking weed species).

7.3.8 Contingencies and corrective action

If monitoring indicates that environment objectives and targets for rehabilitation are not being achieved, contingency actions will be enacted, as indicated in **Table 7-13**.

Table 7-13 Rehabilitation contingencies and corrective action

TRIGGER	ACTION
Native flora species diversity, richness and foliage cover less than 20% of adjacent control area after 12 months.	1. Investigate cause. 2. Remediate cause if possible. 3. Maintenance of rehabilitated areas until the required outcome is achieved.
Weed outbreak.	1. Assess threat to revegetation, based on aggressiveness and fuel load of the species. 2. If deemed a threat, implement weed management activities for the outbreak in accordance with the Weed Management sub-plan.

8 Environmental management system

This section describes the documented systems and processes of the Environmental Management System (EMS) used for the safe construction and operation of the TNP Project. AGIT adopts all DBP policies and procedures across the operation of its business. Implementation of DBP's EMS ensures that hazards are identified and assessed to eliminate or minimise the risk to the environment to a level that is ALARP throughout construction of the TNP Project.

8.1 Induction and training

All staff and contractors shall be required to undertake an environmental awareness induction prior to commencement of works on the TNP. The environmental awareness induction is targeted to educate staff and contractors regarding DBP's environmental objectives and their individual responsibilities for environmental management. The environmental awareness induction covers off on the following key topics:

- Flora
- Fauna
- Weed management
- Cultural heritage
- Spill response
- Waste management
- Waterways crossings
- Rehabilitation.

The induction additionally ensures that all personnel can implement the Job Hazard Analysis (JHA) process to identify and manage risks.

All visitors receive a site-specific induction appropriate in length and content for the type of work being undertaken.

Employees will be trained and provided with appropriate resources to ensure compliance with environmental laws, codes and standards and company policies. These training needs are addressed on an as needs basis. DBP will maintain a record of training for all personnel.

8.2 Job hazard analysis

A Job Hazard Analysis (JHA) (S-FRM-004.1) or Contractor's JHA form approved by AGIT must be completed prior to the commencement of any job that has the potential to have an adverse impact on the environment. Triggers for the preparation of a JHA may include:

- Ground disturbance
- Native vegetation clearing
- Welding, grinding and other hot works
- Weed control
- Excavation and back-filling of trenches

- Handling of hazardous materials (including wastes)
- Activities within watercourses
- Dewatering (if required)
- Pipeline maintenance.

The JHA will identify the specific environmental objectives and hazards associated with the activity and be approved by the individual responsible for completion of the task. Completed JHAs are to be present on the job. All completed JHAs are to be retained and electronic copies provided to AGIT at the completion of Project.

8.3 Incident management

It is a mandatory requirement for any personnel working for or on behalf of AGIT to respond to all hazards and events that have affected or have the potential to adversely affect the environment.

Examples of events include: accidental gas releases (e.g. leaks), fuel spillage, excessive noise incidents, chemical spills, bushfire, or a complaint from a neighbour. The first line of response is to take immediate actions to minimise risks to persons, plant, equipment and the environment. These actions may include:

- Stop work
- Assess site and make the area safe
- Notify other parties that may be affected by the Hazard / Event.

Following this, hazards and events must then be classified and reported in accordance with the risk Classification Matrix contained within the HSE / Event Reporting and Investigation (S PRO-014). The level of analysis required will vary dependent upon the level of associated risk.

At a minimum, this internal reporting will require documentation of all details, notification of key stakeholders (in accordance with the classification) and determination of corrective actions with due dates and accountabilities.

Hazard and event reporting is conducted and recorded via 'InControl' a tailored software system. 'InControl' facilitates the communication of hazards and events, tracking of corrective actions and the analysis of trends. All significant events shall be investigated and specifically those which result in a risk score of intermediate and above, may be subject to a TAPROOT (or equivalent) investigation as determined by the relevant General Manager, led by a suitably qualified Lead Investigator.

Actions arising from the incident reports and TAPROOT (or equivalent) investigations will be monitored (via InControl) to ensure their adequate and timely implementation.

Minor events may also be investigated at a project level to ensure any base causes are determined.

The findings of all incident investigations will be communicated to the business where appropriate to increase awareness and prevent recurrence.

AGIT will conduct an annual targeted review of all events to identify recent any historical trends. Preventative actions will be instigated where necessary, based upon the outcomes of the annual review.

8.3.1 External reporting

AGIT will ensure that all relevant parties are informed of any significant incident verbally within 2 hours of AGIT becoming aware of the incident and then in writing within 3 days.

A Significant Environmental Incident is an event which:

- may but does not necessarily result in any permanent damage to the environment but requires the use of additional personnel or contractors external to the site and additional remediation equipment; or
- the regulatory authority deems as notifiable - the regulatory requirement for external reporting of incidents is summarised in **Table 8-1**;
- involves interference with or damage to an Aboriginal sacred site or breach of a requirement of a Restricted Work Area;
- is likely to cause distress to Aboriginal traditional owners; or
- is likely to result in wide spread public complaints and anger.

External notifications of significant incidents shall be carried out by the designated responsible person in accordance with - External Incident Notification Guideline HSE 2 G.

The NT EPA pollution hotline (1800 064567) must be contacted for reportable incidents under the *Waste Management and Pollution Control Act*.

The Energy Directorate of the NT Department of Primary Industry and Resources must be contacted on: Phone: (08) 8999 5460; Fax: (08) 8999 5191; Emergencies: 1300 935 250; petroleum.operations@nt.gov.au for reportable incidents under the *Energy Pipeline Regulations* and licence conditions

The Commonwealth Department of Environment and Energy must be notified of any actual or potential contravention of the conditions of the EPBC approval.

Contact details for all agencies, including regional offices, that may need to be contacted in the event of an emergency, are specified within the DBP Emergency Response Plan.

Table 8-1 External incident reporting / notification - regulatory requirements

REQUIREMENT	REFERENCE	AGENCY	TIMEFRAME
Notify of incident causing or threatening to cause serious or material environmental harm[1] unless the contaminant or waste is confined within land that is 1 kilometre from the centre of the pipeline[2]	*Waste Management and Pollution Control Act*	NT EPA	As soon as practicable and in any case within 24 hours
Notify of incident causing death, injury, taking, keeping or moving of a listed threatened species to Secretary of the Department of the Environment and Energy	*EPBC Act*	DotEE	Within 7 days of becoming aware of the incident
Give notice of a reportable incident: • results or is likely to result in significant damage to a pipeline (for example, by reducing the capacity of the pipeline to	*Energy Pipelines Regulations*	DPIR	As soon as possible to the Department or an inspector

REQUIREMENT	REFERENCE	AGENCY	TIMEFRAME
contain energy-producing hydro-carbons flowing through it); • results or is likely to result in the death of a person; • results or is likely to result in serious injury to a person; or • is of kind that a reasonable pipeline licensee would consider to require immediate investigation.			

1: **material environmental harm** means environmental harm that:

a) is not trivial or negligible in nature;
b) consists of an environmental nuisance of a high impact or on a wide scale;
c) results, or is likely to result, in not more than $50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or
d) results in actual or potential loss or damage to the value of not more than $50,000 or the prescribed amount (whichever is greater).

serious environmental harm means environmental harm that is more serious than material environmental harm and includes environmental harm that:

a) is irreversible or otherwise of a high impact or on a wide scale;
b) damages an aspect of the environment that is of a high conservation value, high cultural value or high community value or is of special significance;
c) results or is likely to result in more than $50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or
d) results in actual or potential loss or damage to the value of more than $50,000 or the prescribed amount (whichever is greater).

2: Section 6(4)

Recordable incidents shall also be reported monthly with the following details shall be provided:

- Type of incident
- All material facts
- Actions taken to avoid and mitigate impacts of the incident
- Corrective actions applied.

Reportable incidents shall be addressed through documentation and submission of the following details:

- Facility name
- Pipeline title
- Location of incident
- Name of operator
- Names and contact details of witnesses
- Name and contact details of report submitter
- Description of the incident
- Work activity undertaken at time of incident
- Quantity and composition of spilled/vented material
- Duration of spill/vent
- Extent of impact
- Immediate actions taken
- Arrangements for internal investigation

- Corrective actions applied.

Based on the Risk Register for TNP Project, a Reportable Incident may include:

- Disturbance to declared rare of threatened flora
- Fire that will impact on flora, fauna and other land uses
- Ineffective rehabilitation resulting in erosion, sedimentation, visual amenity, alteration to hydrological regimes
- Bushfire.

8.4 Emergency preparedness and response

DBP has three tiers of emergency and crisis response: Incident, Emergency and Crisis (**Figure 8-1**).

The Emergency Response Plan (ERP) provides for an Emergency Management Team (EMT) and an Incident Management Team (IMT) who are responsible for managing emergencies and minor incidents.

The construction contractor's project emergency response plans (one for pipeline and one for facilities) specify the assignment of particular responsibility and provisions for project related emergency response requirements and interfaces with the DBP ERP.

The Crisis Management Plan (CMP) establishes the Crisis Management Team (CMT) which is responsible for managing Crisis events, being those that are likely to be associated with personnel, public safety, supply, pipeline license or DBP reputation issues.

If an emergency deteriorates and can no longer be managed effectively by the Emergency Management Team, the CMT would be activated.

8.4.1 Emergency response plan

The emergency response processes have been designed to effectively respond to all foreseeable emergency events as identified in various operational and project risk assessments (e.g. Formal Safety Assessments (FSAs), HAZOPs, HAZIDs and JHA's) and from DBP experience on other assets including the Dampier to Bunbury Natural Gas Pipeline (DBNGP).

The DBP Emergency Response Plan (ERP) manages events and emergencies so as to limit the consequences with the objective of:

- Minimising or eliminating any danger or risk to individuals
- Minimising or eliminating any risk to the business
- Ensuring that the TNP is returned efficiently to a safe condition, with minimum impact the environment.

The ERP consists of:

- All Hazards Plan (framework) which specifies the arrangements for:
    - incident escalation
    - incident and emergency management structures
    - roles and responsibilities of IMT and EMT and their interface
    - IMT and EMT interface with Crisis Management Team
    - display of emergency information including incident/emergency management logs

- changeover of responsibilities
- emergency operations centre locations

- Emergency Procedures, Contingency Plans and Work Instructions
- Emergency Equipment Management Plan
- Contacts Directory
- Notification and reporting requirements.

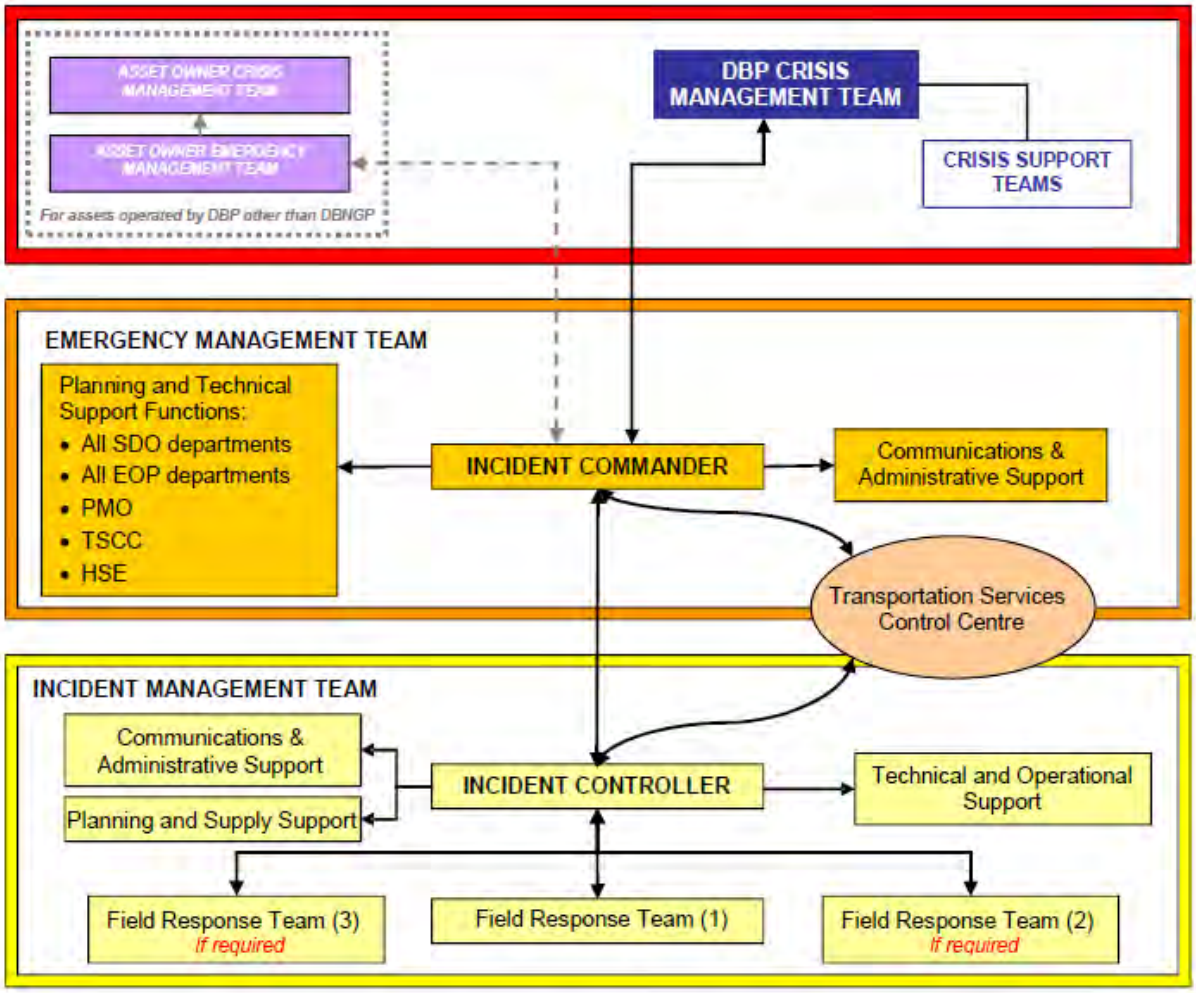

Figure 8-1: Emergency and crisis teams - structures

The DBP ERP operates on risk based incident escalation and notification structures as shown in **Table 8-2**. These structures describe the escalation of an event to an emergency, which triggers the activation of the DBP ERP (**Figure 8-2)**. Depending on the severity of an emergency, the Crisis Management Plan may also be activated.

Table 8-2: Levels of emergencies and categories

INCIDENT	EMERGENCY	CRISIS
Injury		
▪ Minor injury only	▪ Severe injury	▪ Fatality or fatalities ▪ Multiple injuries

Operational Impacts		
▪ No interruption or curtailment of supply ▪ Minor damage to equipment	▪ Short term interruption or curtailment within contractual limits ▪ Moderate damage to equipment, may require repair or replacement	▪ Extensive interruptions or curtailment ▪ Declaration of Force Majeure ▪ Declaration of Gas Supply System Emergency ▪ Major damage to equipment
Environmental Impacts		
▪ Short term impact without lasting effects	▪ Serious impact with medium to long term effects	▪ Major offsite impact; long term severe or permanent effects; rectification required
Community / Government / Reputation / Social / Cultural / Heritage		
▪ Public concern restricted to local complaints ▪ Minor infringement of cultural heritage – repairable	▪ Attention from Media ▪ Ongoing social issues or concerns from local community ▪ Permanent damage to items of cultural or heritage value	▪ Serious social issues with State political ramifications ▪ Significant damage or infringement of cultural heritage with widespread public outcry

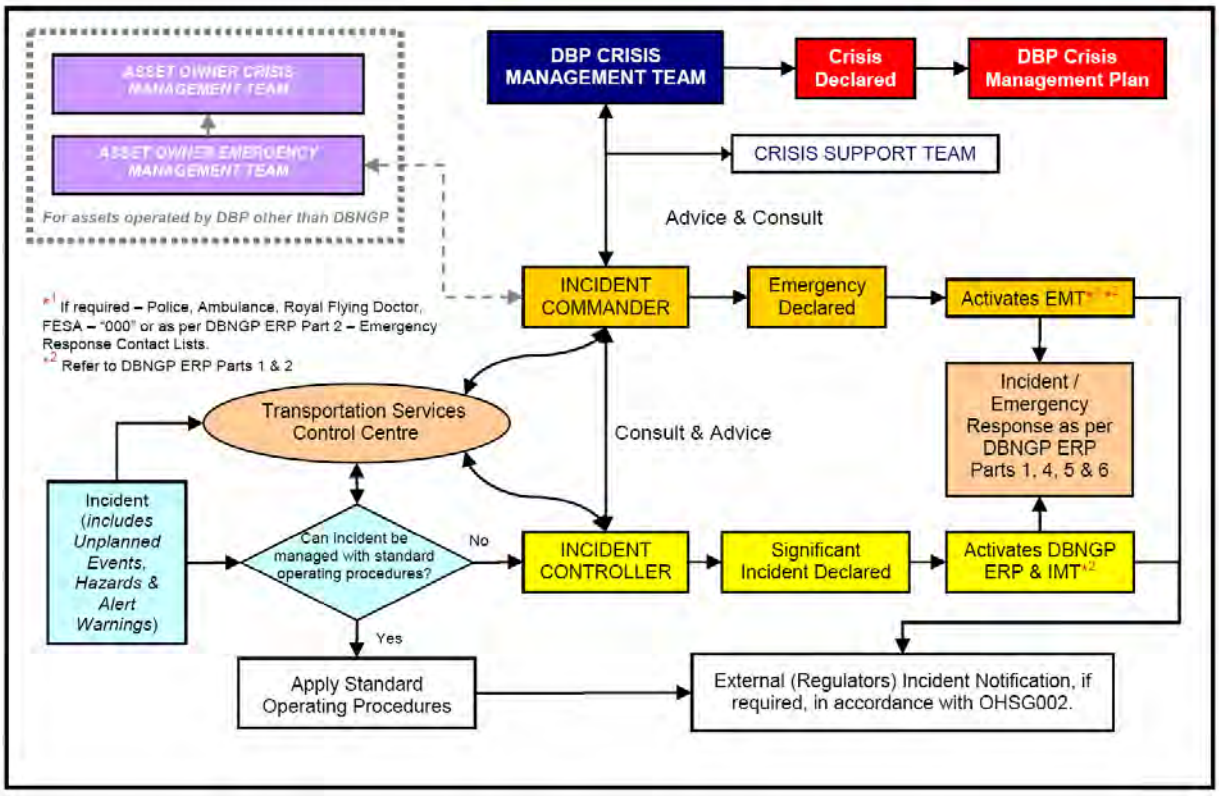

Figure 8-2: Emergency and crisis management teams – flowchart

Project Emergency Response Plans for pipeline and facilities, as approved by AGIT will be implemented for the construction phase to ensure adequate emergency management arrangements (that integrate with DBP emergency management processes) for on-site incidents and emergencies.

The purpose of the Project ERPs is to identify and detail response for potential emergency threats to project personnel and threats to the environment from project activities, and establish an effective

interface with the DBP ERP to support the localised response processes including emergency control structures, communications, management of equipment and local response capability.

The Project ERP will assign roles and responsibilities of key employees (providing clear links to the chain of command) including how personnel within the project emergency management team interact with DBP IMT and EMT, actions to be taken, control measures required and allocation of critical resources.

The Project ERPs will also supply details of the project sites including, site layout; access / egress; location of muster points; control and recording of personnel / visitors; local alarm systems / evacuation and mustering requirements, site based fire fighting and other emergency equipment.

It is a requirement of the Project ERP that all personnel receive training and instruction in employee responsibilities, reporting of incidents and emergencies, site evacuation and the types and responses to possible site emergencies during project induction and as participants in drills and exercises. Any changes to the plans are communicated to personnel during toolbox meetings.

8.5 Monitoring

Monitoring actions for each factor are identified in the respective sub-plan. Any additional monitoring required through legislative and approval requirements will be captured in an approvals matrix.

8.6 Inspections and audits

The Construction Contractor shall be responsible for conducting regular weekly inspections against compliance with the CEMP. Specific monitoring requirements have been detailed within the CEMP sub-plan for the relevant factor.

A Weekly Environmental Inspection shall be completed during construction to ensure compliance with controls within this CEMP and legislative obligations.

AGIT will conduct regular inspections of the Construction Contractor to monitor compliance against this EMP. All open items from previous inspections will be checked during the next inspection to ensure remedial action has been taken, and to determine if that action has been effective. Records of all works including inspections will be maintained to demonstrate compliance with the requirements of the CEMP.

Construction is proposed to commence and be completed within the 2018 calendar year. At a minimum one annual environmental compliance audit will be conducted to ensure that the systems and controls detailed within the CEMP are implemented.

During the operational phase, maintenance crews would undertake external inspection of the pipeline at regular intervals. Specific monitoring requirements to assess successful rehabilitation of the disturbance footprint has been detailed within the OEMP sub-plan for the relevant factor. Over the life of the TNP, an annual environmental compliance audit will be conducted to ensure that systems and controls detailed in the OEMP are implemented.

8.7 Review and improvement

AGIT adopts all DBP policies and procedures across the operation of its business. The DBP EMS provides for ongoing review and improvement of existing systems and controls. DBP conducts an annual comprehensive business strategy planning process which guides the overall business operation for the following year. Key performance indicators for the business and individuals are determined from these reviews. The achievement of compliance with environmental management obligations shall be

considered in each business plan, enabling the identification of issues to upper management and the allocation of resources where necessary to implement improvements.

Additional ongoing review commitments are presented in **Table 8-3**.

Table 8-3: Details of system elements requiring periodic review

SUBJECT	DETAIL	TIMEFRAME	RESPONSIBILITY
EMP	The review shall: ▪ Assess the appropriateness of the EMP to the construction and operational activities based on audit information ▪ Determine if any changes to the EMP are required as a result of scope, legislative or organisational changes. All revisions shall be submitted to DPIR for approval.	In response to a material change to the activities and/or the use of equipment or in response to actions arising from any audit taken.	HSE Manager
HS and E Policies	Review to identify and implement continuous improvement opportunities.	Annual	HSE Manager/ Executive Management Team
Legislation and other requirements	Review to identify amendments to existing and addition of new legislation which is relevant to the environmental management of pipeline activities.	Annual and opportunistic	Audit and Compliance Manager/ Senior HSE Advisor

8.8 Reporting

To demonstrate and maintain compliance against legislative requirements, routine external reporting to key regulatory agencies shall be conducted. Routine external reporting requirements for the TNP are summarised in **Table 8-4**.

It should be noted that the TNP does not trigger reporting thresholds for the National Greenhouse and Energy Reporting scheme (NGERs) or the National Pollutant Inventory (NPI). This requirement shall be reassessed annually through review of this EMP or earlier if in response to a material change to the activities and/or the use of equipment at the TNP.

Table 8-4: External reporting

REPORT	DETAILS	AGENCY	FREQUENCY	RESPONSIBILITY
CEMP implementation	• Trench clearing statistics • Reportable incident summary • External Audit reports close outs	DPIR	Quarterly	Construction Manager
Native vegetation clearing report	• As required in Vegetation Clearing Permits (Development Consent)	DENR	As required in Development Consent	HSE Manager
EPBC Approval	• Annual EPBC reporting	DoEE	As required in relevant EPBC Approval condition	HSE Manager
OEMP implementation	• Rehabilitation success • Reportable incident summary	DPIR	Annually	HSE Manager

8.9 Document control

The DBP Document Management Procedure (TEB-QP-209-01) has been implemented for controlling and publishing documentation relating to DBP strategies, policies, procedures and systems.

The DBP Environmental Document Control Procedure (E-PRO-000) provides for the tracking of Environmental Management System documents to ensure that documents are easily referenced, accessed and reviewed.

This EMP and supporting documentation will be available electronically via the InControl Home Page, to ensure that the most up to date version is readily available.

During the course of using EMP documentation, necessary additions or suggestions for improvement may be identified. No additions or changes to this manual, or associated documents, may be made without the following processes of review and authorisation taking place:

- Addition / change identification
- Review by immediate supervisor and HSE Department
- Receipt and approval of the relevant Departmental Manager or delegate (this will depend on the scope of the change)
- Production of new draft
- Authorisation by the relevant Departmental Manager or delegate
- Acceptance of the change by the DPIR.

8.10 Consultation

The purpose of consultation is to:

- Obtain appropriate input into the ongoing improvement of this EMP
- Keep key stakeholders up to date with activities at the TNP
- Ensure timely response to landholder issues
- Maintain dialogue with regulatory authorities and local councils.

Consultation and communication with relevant landholders, regulatory authorities, Aboriginal and other interest groups and the general public will be undertaken as part of the TNP construction activities. The schedule and key messages to be included in the consultation program is governed by the Land Management Plan. All contact with stakeholders will be recorded in the Land Management System (LMS). The Land Management department and HSE department are responsible for the development and distribution of corporate awareness publications to communicate the details of our environmental commitments to key stakeholders. All other relevant details about land use, foreign crossings, landholder concerns and issues are to be recorded on the LMS for future reference and reporting.

AGIT is implementing a Stakeholder Engagement Strategy to inform local stakeholders on the overall scope, timing and nature of the TNP Project.

To date stakeholders engaged with have included:

- Central Land Council
- Pastoral landowners along the pipeline route

- Northern Territory Government agencies
- Commonwealth Government (DotEE)
- Chamber of Commerce NT – Alice Springs regional office
- Members of Yuendumu, Laramba, and Lajamanu Traditional Owner Groups
- Local employment
- Program operators.

All pastoralists, landholders and relevant government agencies and local government have been consulted and required consents, agreements or approvals have been obtained or are in the process of being obtained in advance of construction.

Ongoing engagement will occur with Aboriginal land holders and Native Title Claimant Groups through the CLC, pastoral land holders, and parties with mining and petroleum interests in the region, consistent with the Land Users sub-plan of the EMP.

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Appendix A Notice of Intent and Statement of Reasons

Appendix B AGIG Health, Safety and Environment Policy and Statement of Commitment

Appendix C Risk register

Appendix D Socio-economic risk assessment

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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