Australian Gas Infrastructure Group

Tanami Gas Pipeline

EPBC 2017/7997

Construction Environmental Management Plan

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Tanami Newmont Gas Pipeline

Environmental Management Plan

Prepared for
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May 2020

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Abbreviations

ABBREVIATION	DESCRIPTION
AGIG	Australian Gas Infrastructure Group
AGIT	AGI Tanami Pty Ltd
AGN	Australian Gas Networks
AS	Australian Standard
CRoW	Construction Right of Way
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
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 Construction Right of Way (CRoW) along the alignment as well as construction camps, access tracks, and temporary water storage during construction. Limited permanent disturbance is required for an access track between KP03 and KP440 to enable ongoing maintenance of the pipeline and above ground infrastructure. The discontinuous maintenance access track will occur in the previously cleared CRoW and access to the track will be from existing tracks off Tanami Road. The track will be approximately 3m in width to allow for single vehicle traffic for operations access. Where possible this has been minimised.

Construction of the TNP commenced in June 2018 and was completed in February 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 owns the Palm Valley Pipeline in the Northern Territory and the Wide Bay Pipeline in Queensland.

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 Environmental Management Plan (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.	To account for the NT EPA Recommendation the track was minimised by 183km and the width was reduced from 5 m to 3 m. Initial construction involved construction of a track between KP0-3 and KP390-440; however, post-construction, parts of the pipeline have been inaccessible and increased access is required. Permanent disturbance is therefore required for a maintenance access track along 257km of the route. The access track will be a discontinuous track (approximately 3 m wide) in the cleared CRoW. The remainder of the CRoW will be	Post construction operations require access for ongoing maintenance of the pipeline and above ground infrastructure.	2.2.1

NT EPA RECOMMENDATION	HOW ADDRESSED IN EMP	RATIONALE FOR AMENDED APPROACH	LOCATION IN EMP
	rehabilitated. Rehabilitation to be undertaken consistent with the measures contained in the Rehabilitation sub-plan, and monitored against the rehabilitation criteria		
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
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	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

NT EPA RECOMMENDATION	HOW ADDRESSED IN EMP	RATIONALE FOR AMENDED APPROACH	LOCATION IN EMP
on trench not to commence until inspection complete. • A veterinarian to be on standby for fauna in need of treatment			
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

Most of the disturbance footprint will be rehabilitated and return to native vegetation over time. A rehabilitation sub-plan is included in this EMP to guide these efforts. The return of native vegetation will provide fauna habitat for the nationally threatened species addressed in this EMP and for these reasons a separate Rehabilitation Plan is to be prepared to specifically address requirements for these species, as a component of commitments made for approval under the EPBC Act.

- 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.

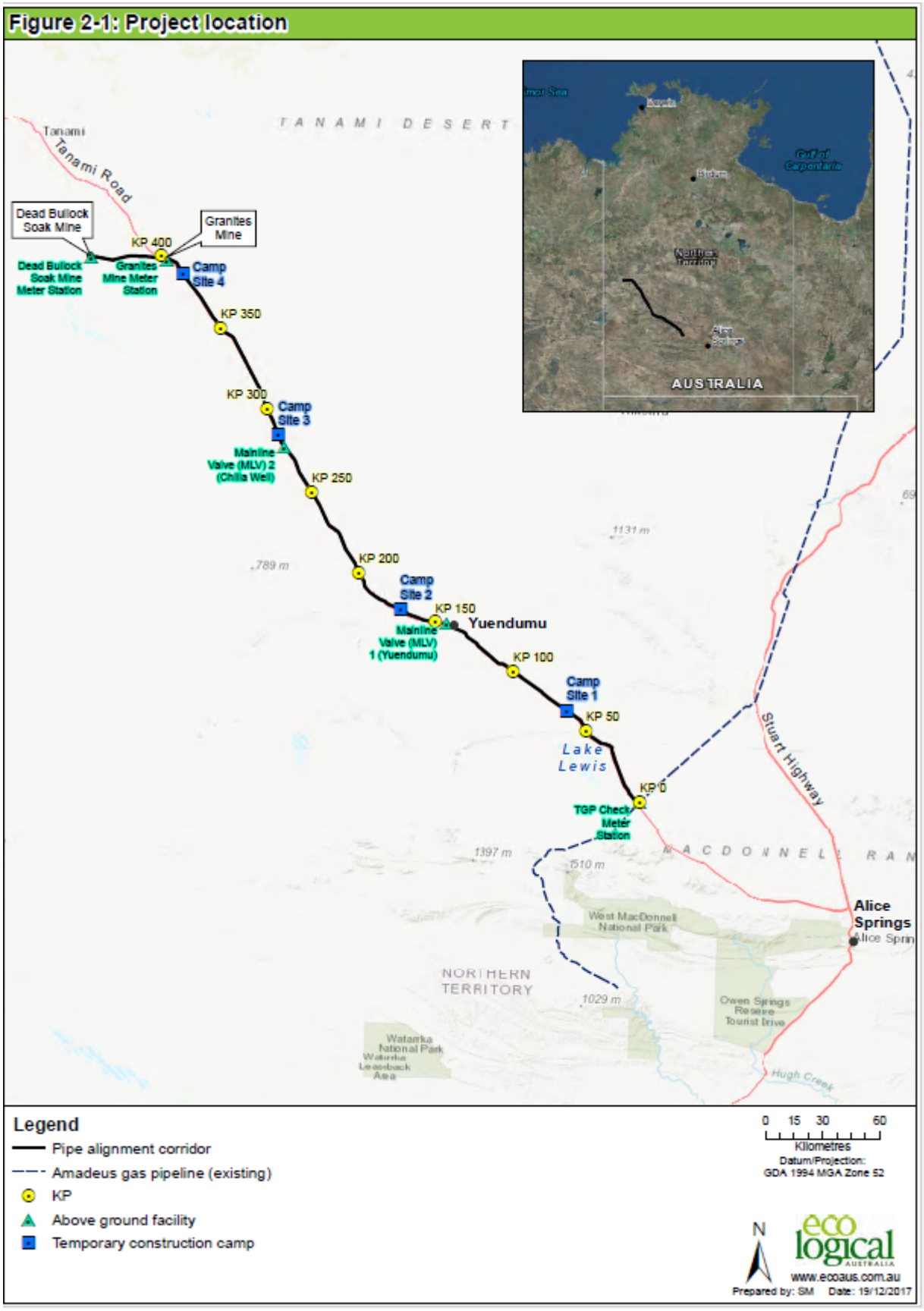
2.2 Project location

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



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 Amadeus Gas Pipeline.

Key design parameters for the TNP are shown in Table 2-1.

Table 2-1: Design parameters

PARAMETER	TANAMI NEWMONT GAS PIPELINE	LATERAL
From: To	Amadeus Gas Pipeline's Tanami Road Scraper Station to Newmont's Dead Bullock Soak Mine	Tanami Newmont 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 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 future offtake 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 early 2018 and to be completed by early 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 CRoW within which the pipeline will be buried, construction of temporary access tracks to the CRoW, construction of a permanent access track between KP0-3 and KP390-440 and a discontinuous maintenance access track along approximately 257 km of the pipeline, 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 and permanent access tracks 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.
- Permanent 3 m wide discontinuous maintenance access track along the pipeline route (approximately 76.98 ha).

2.1.1Tanami 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 meter 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 meter station would be located at the Dead Bullock Soak Mine (KP440) and include the following:

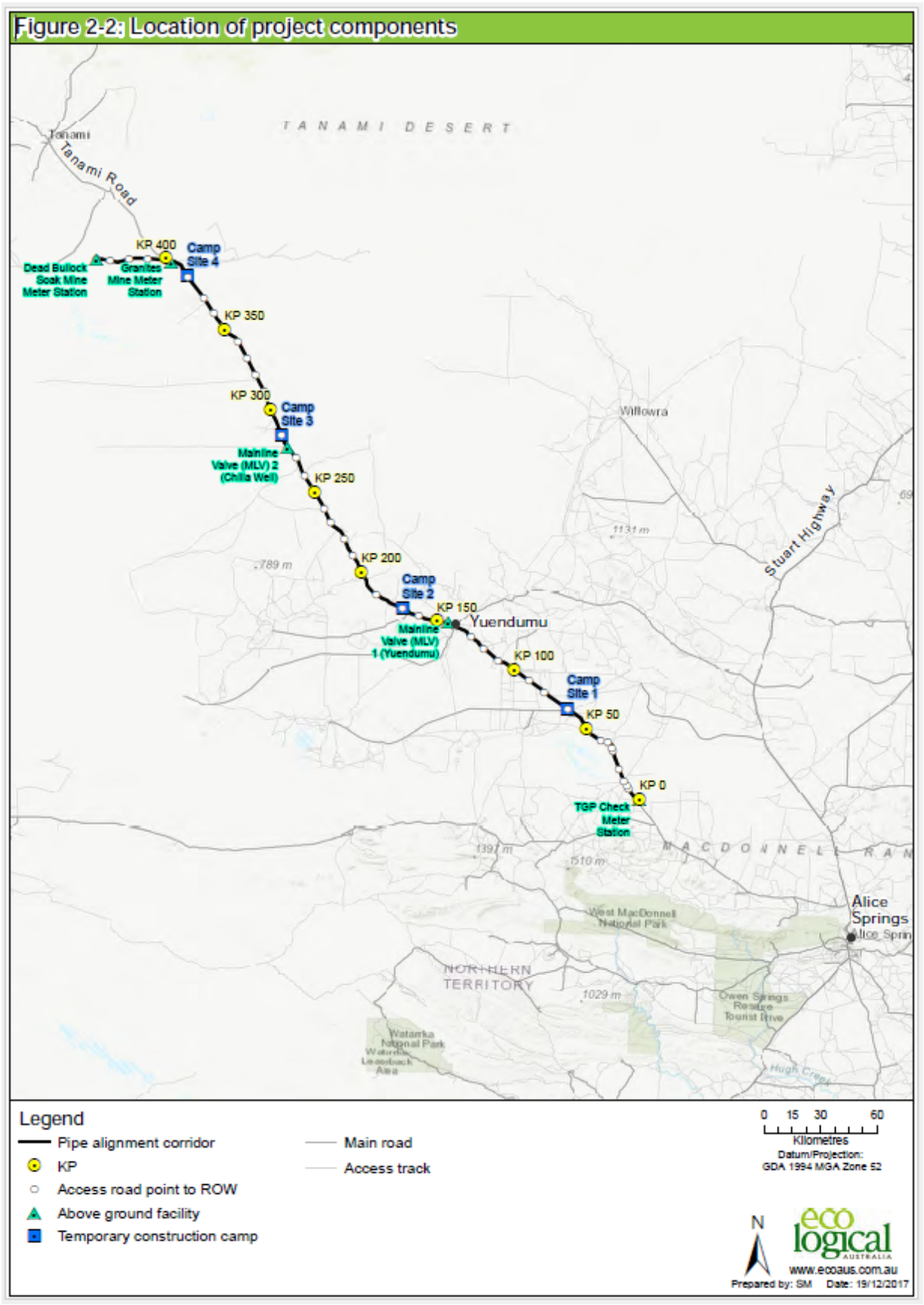
- Pig Receiver and remote operable shutdown valve
- Filtration
- Electric Immersion heater
- Single run meter skid

- Spec break and pressure reduction skid
- Communications via satellite or wireless
- AC power from mine site, with battery back up.

2.1.5 Maintenance access track

A permanent maintenance access track will be constructed along approximately 257 km of the pipeline to enable ongoing maintenance of the pipeline and above ground infrastructure. The discontinuous track will occur in the previously cleared CRoW and access to the track will be from existing tracks off Tanami Road. The total extent of the track is 76.98 ha.

Figure 2-2: Location of project components



2.1.6 Disturbance footprint

The project components and the associated temporary and permanent footprints are set out in Table 2-2. Construction of the Tanami Newmont Gas Pipeline will require land disturbance for the construction corridor of approximately 1121 ha. The majority of the land disturbed will be rehabilitated and allowed to return to native vegetation over time. The total permanent disturbance footprint will be up to 76.98 ha, which is required for a permanent access track between KP0-3 and KP390-440 and a maintenance access track, totalling approximately 257 km, 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 Newmont Gas Pipeline

PROJECT COMPONENT	AREA (HA)	AREA REHABILITATED (HA)	PERMANENT DISTURBANCE (HA)
Original proposal			
Pipeline construction	1136	1108	28
Actual Construction			
Pipeline Construction	1121	1105	16
New Access track			
Removal of rehabilitation for permanent access track. (Note: no new clearing)	60.98	Nil	60.98
TOTAL	**1121**	**1044**	**76.98**

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 CRoW using a production line approach. For the purposes of environmental context for management, the location of the CRoW is considered to be established within the currently defined 300 m wide pipeline corridor. The exact location of the CRoW 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 CRoW. 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 CRoW would be progressively rehabilitated as construction activity moves along the alignment. A discontinuous maintenance access track will be constructed within the CRoW, accessed from existing tracks off Tanami Road to add to the previously approved track, such that the total combined length of the track is 257 km.

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 CRoW would be constructed for transport of workforce and machinery to the worksite. These tracks will also provide access to the maintenance access track. Where a track is not needed for operational access, it will be rehabilitated.
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 CRoW 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.
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.

PROJECT ACTIVITY	DESCRIPTION
Signage	Information signs on the presence of the buried pipeline will be erected in line of sight along the pipeline CRoW as per AS 2885.1.
Restoration and rehabilitation	The majority of the CRoW, with the exception of the access tracks CRoW 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.

2.2.1Access 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 CRoW. The location of these access tracks is shown in **Figure 2-2**.

Post construction, a 3 m wide permanent access track will remain between KP0-3 and KP390-440. In addition, a discontinuous maintenance access track is required within the operational RoW to enable ongoing access and maintenance over the period of pipeline operation. Together, the total length of the combined access track will be approximately 257 km.

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.

2.2.2Clear and grade

Graders and bulldozers would be used to remove vegetation and topsoil within the 25 m wide CRoW, 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.

2.2.3Trenching

As the CRoW 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 CRoW, 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).

2.2.4Crossings

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 CRoW 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. A single anticipated HDD crossing at Chilla Well Watercourse, 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 an angle, curving underneath the watercourse and surfacing on the other side of the crossing. The pipeline would then be pulled 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 a HDD crossing 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 CRoW 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 CRoW 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: Crossings for Horizontal Direct Drilling or Bored Installation

CROSSING	KP	REASONS
Reduced CROW to 10m – Stuart Range	48	Cultural sensitivity
Chilla Well Watercourse	265	Environmental sensitivity at crossing of watercourse
Tanami Road crossing	401	Avoid road and traffic disruption from pipeline lateral
Dead Bullock Soak Mine Road	436	Avoid road and traffic disruption from mainline
Dead Bullock Soak Mine Road at final termination	439	Avoid road and traffic disruption from mainline
Tanami Road	0.19	

CROSSING	KP	REASONS
Granites Mine Road	0.78	

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

A dedicated Rehabilitation Plan has been developed to guide the progressive rehabilitation of the CRoW. The Rehabilitation Plan establishes rehabilitation zones, objectives and completion criteria for each zone, rehabilitation management actions and a detailed monitoring methodology.

In summary, the CRoW 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 CRoW and any stockpiled vegetation placed across the CRoW to assist in soil retention, provision of seed stock and fauna shelter. Contingency and corrective actions will be implemented if and where completion criteria are not achieved.

A permanent access track between KP0-3 and KP390-440 will remain and discontinuous maintenance access track will be constructed within the operational RoW pipeline. The total length of the combined access track will be approximately 257 km and extent of the maintenance access track is approximately 76.98 ha. The remainder of the CRoW would be

rehabilitated. As a result, the majority of the CRoW would be rehabilitated and over time allowed to return to native vegetation.

The Rehabilitation Plan should be referred to for guidance on rehabilitation throughout construction and operation.

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 Newmont 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 • 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

POSITION TITLE	ENVIRONMENTAL RESPONSIBILITIES
	• 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 • 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 NEWMONT 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

LEGISLATION	RELEVANCE TO TANAMI NEWMONT GAS PIPELINE
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.
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

3.4.1Clearing 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*.

3.4.2Surface 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.

3.4.3Cultural 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 consulted 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.

3.4.4Roads 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.

3.4.5Technical 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

4.1.1Climate

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).

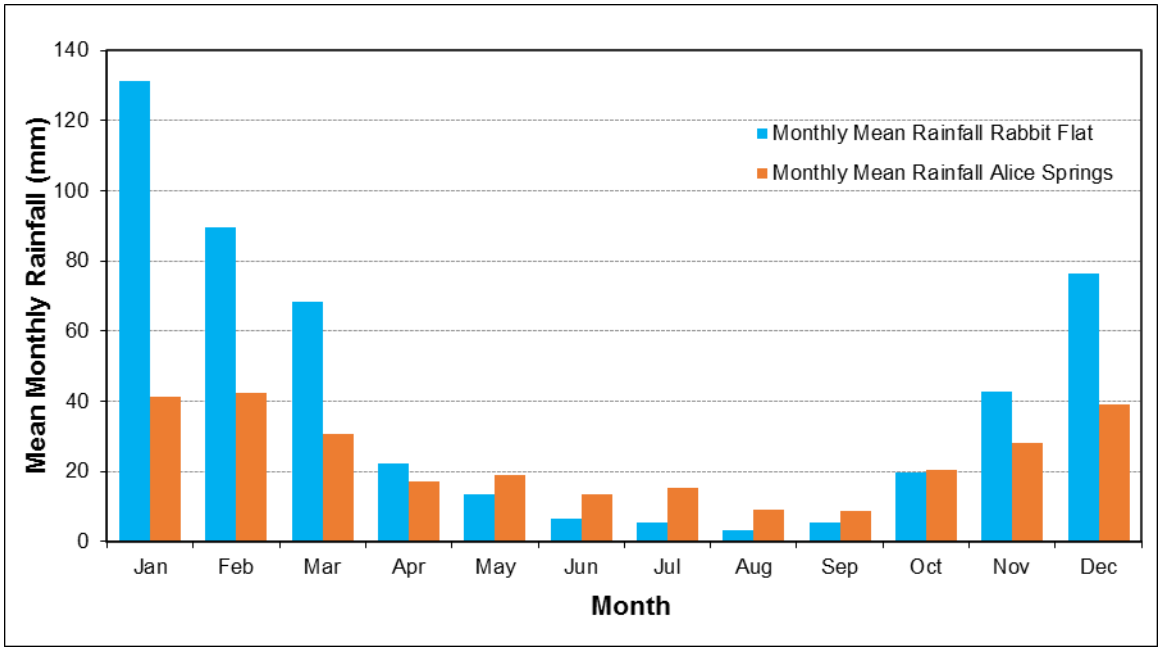


Figure 4-1: Mean annual rainfall at Rabbit Flat & Alice Springs (from IGS 2017)

4.1.2Land 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 Newmont 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

4.1.3Hydrology

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

4.1.4Hydrogeology

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

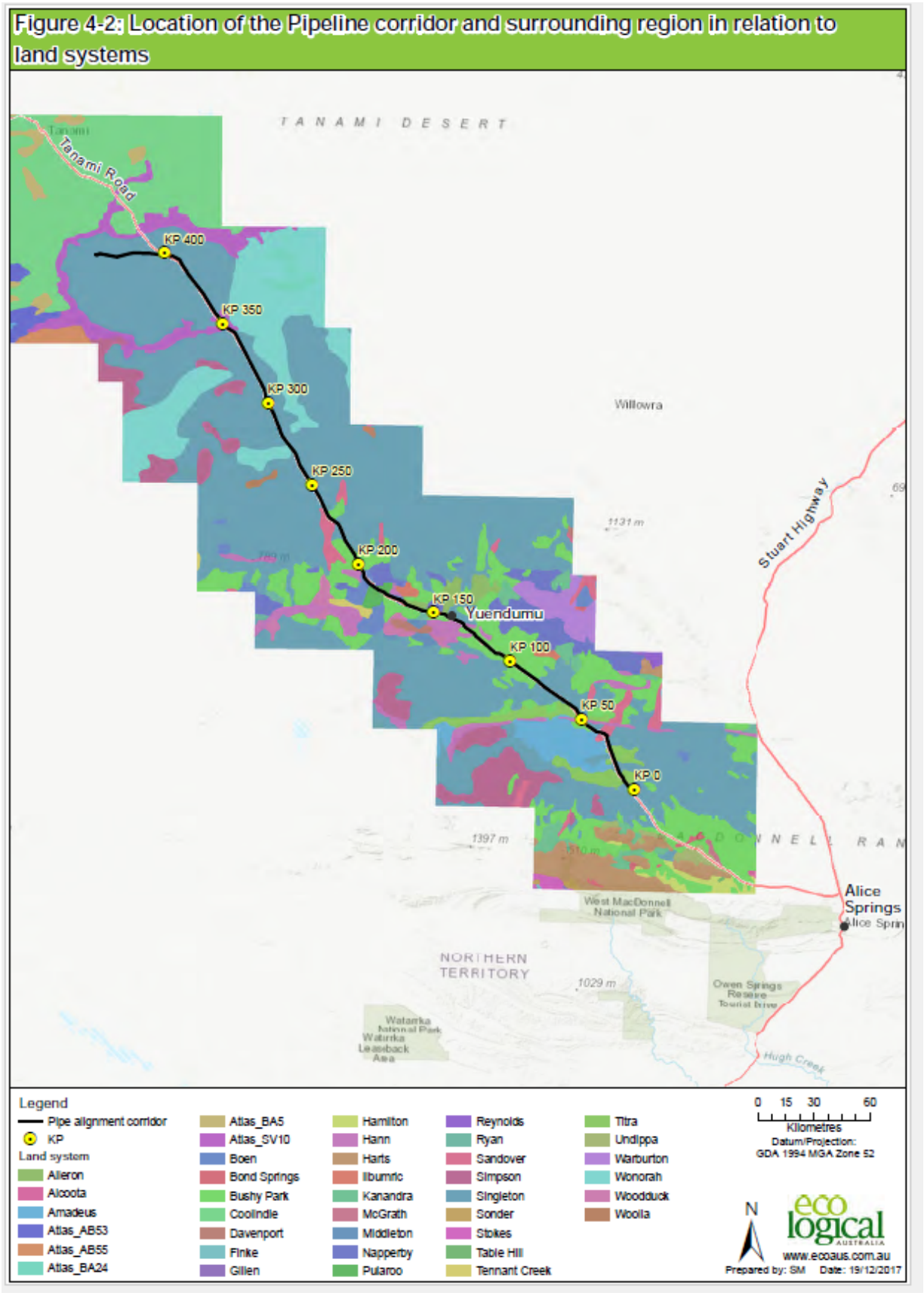
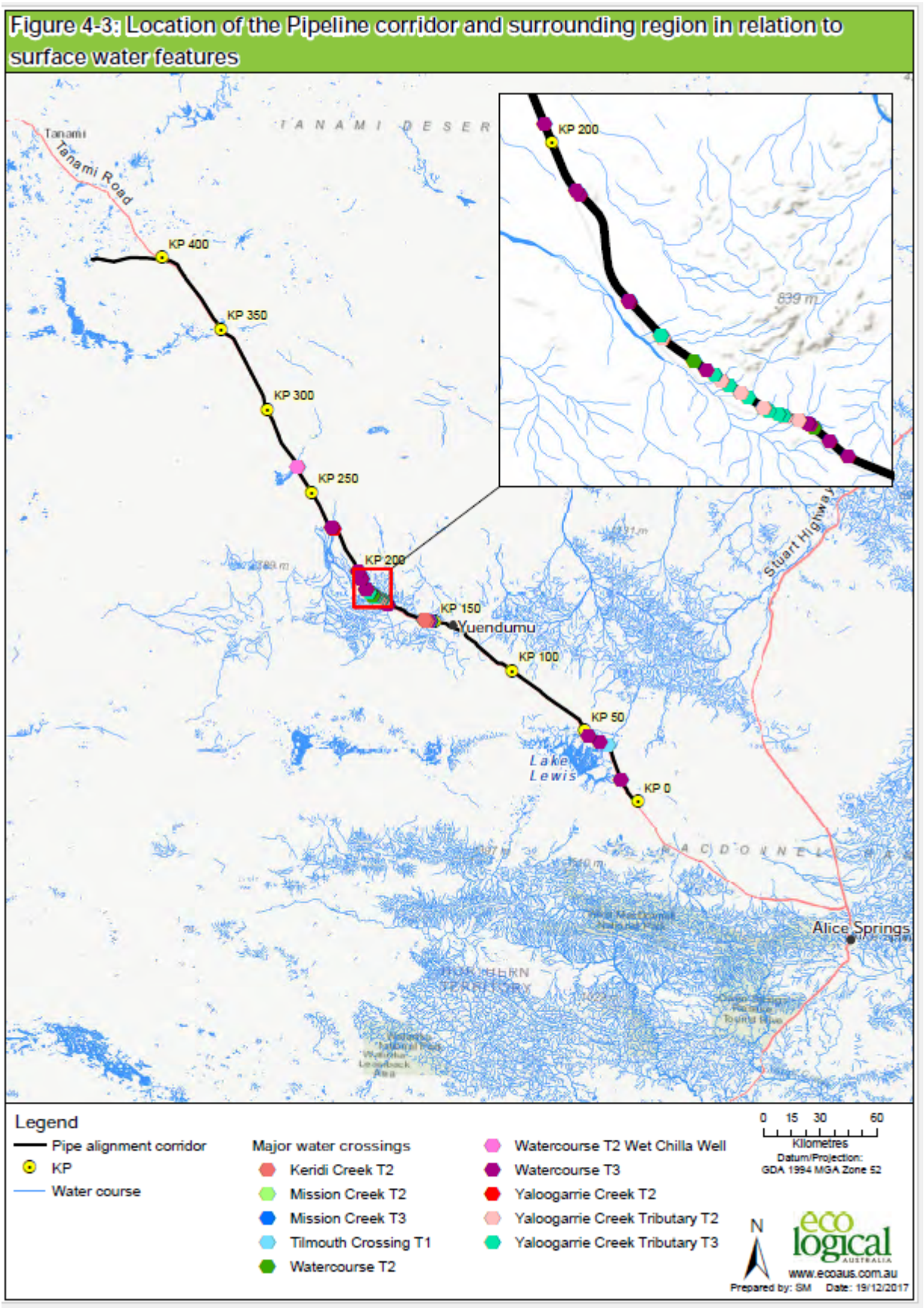


Figure 4-3: Location of the Pipeline corridor and surrounding region in relation to surface water features



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

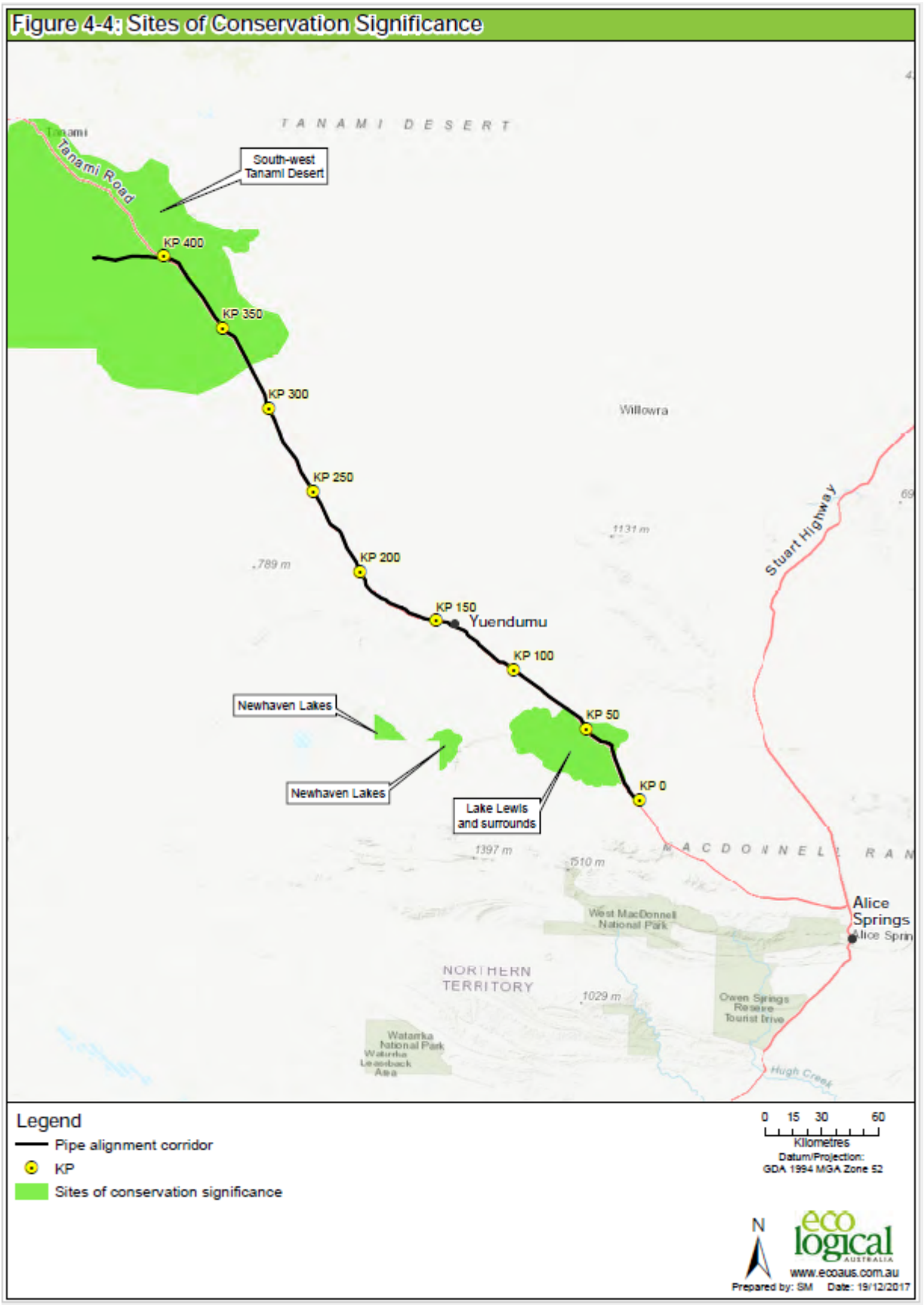
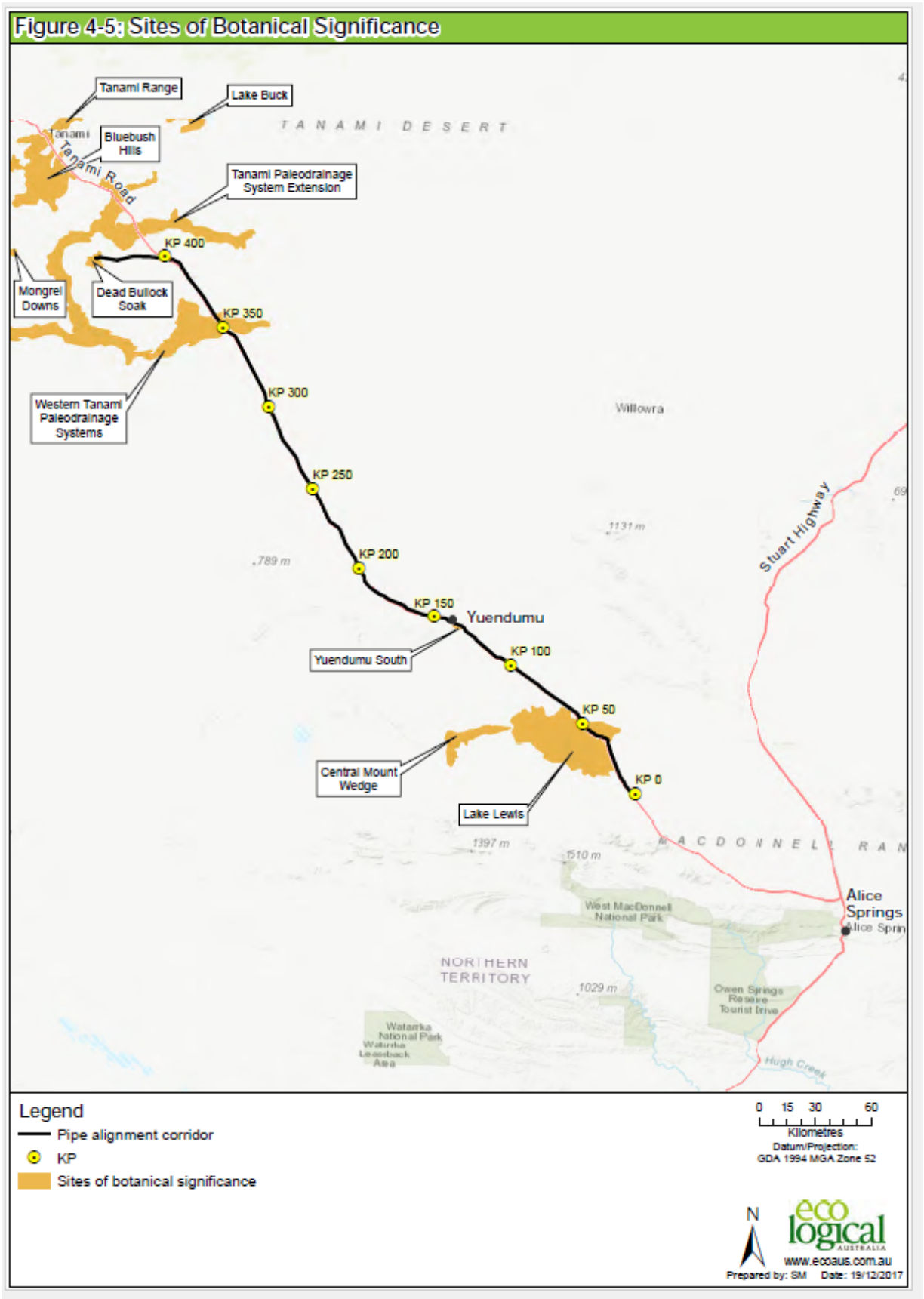


Figure 4-5: Sites of Botanical Significance



4.2.3Vegetation

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).

4.2.4Threatened 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). The pre-clearance survey undertaken (ELA 2018) confirmed that these two species were not located along the proposed pipeline route.

During survey, no threatened flora species were recorded. Field assessment has confirmed there is no suitable habitat 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) but none were found during the pre-cleraance survey (ELA 2018).

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).

4.2.5Weeds

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.

Desktop and field assessment of weed occurrence in the Project area and surrounds have been undertaken (Mattiske 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

FLORA SPECIES	WONS[1]	NT CLASSIFICATION[2]
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
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

4.2.6Terrestrial 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	Unlikely
Princess Parrot (*Polytelis alexandrae*)	Vulnerable: EPBC	Potentially

The pre-clearance survey consisted of an additional habitat assessment which increased the potential area for Princess Parrot to occur (ELA 2018). All other habitat areas remained fairly consistent to that originally mapped.

Additionally, at the request of the DoEE, AGIT developed a Night Parrot Management Plan to conduct further song meter surveys at potential habitat locations along the pipeline route to further assess the potential for Night Parrot to occur. The Night Parrot Management Plan was submitted to DoEE for approval as part of the EPBC approval process. No Night Parrots were located or found during the survey (ELA 2018) or through the construction phase.

4.2.7 Introduced fauna

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

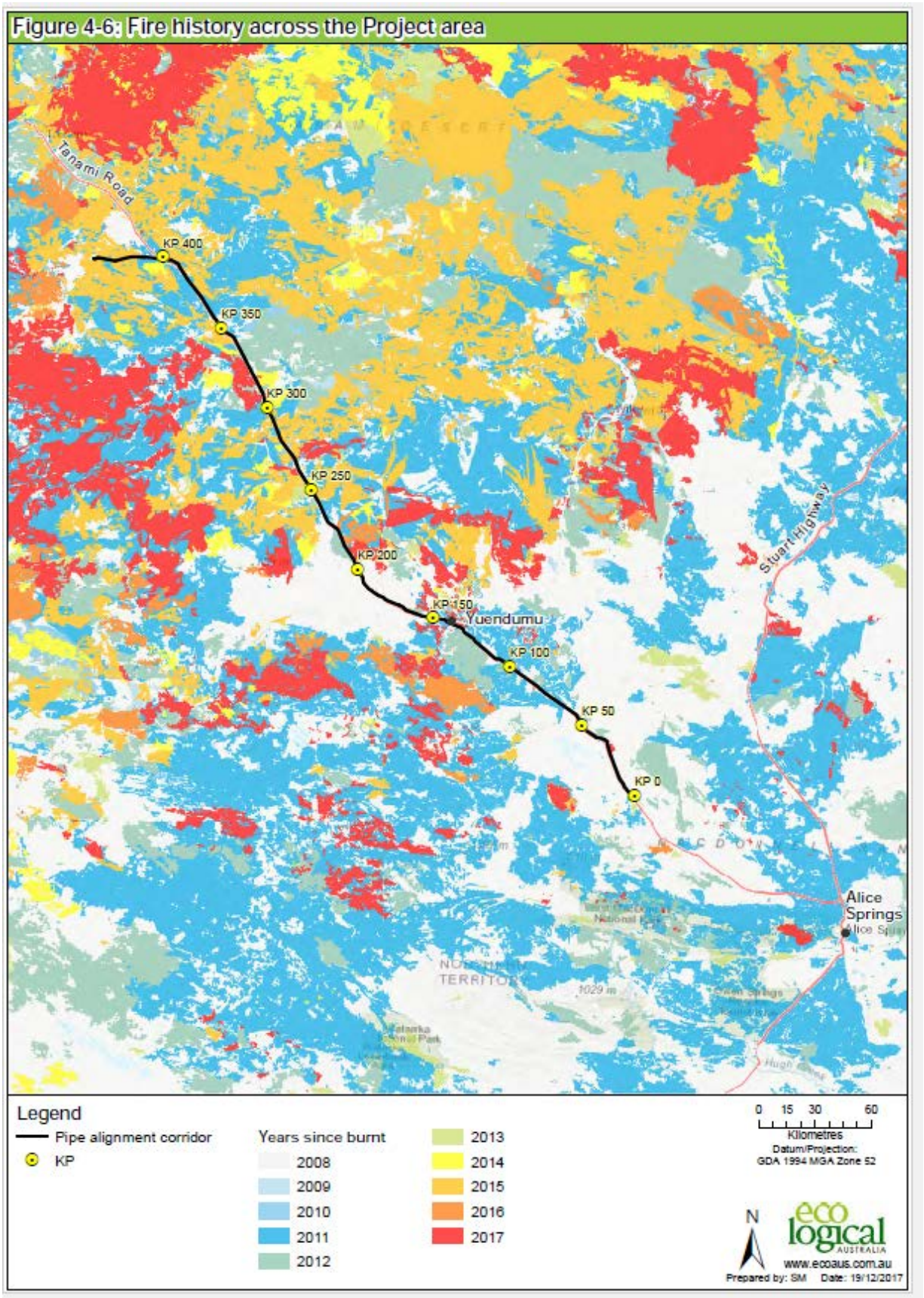
- Camel (*Camelus dromedaruis*)
- Cat (*Felis catus*)
- Cattle (*Bos taurus*)
- Donkey (*Equus asinus*)
- Fox (*Vulpes vulpes*)
- Horse (*Equus caballus*)
- House Mouse (*Mus musculus*)
- House Sparrow (*Passer domesticus*)
- Rabbit (*Oryctolagus cuniculus*)
- Swamp Buffalo (*Babalus bubalis*).

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

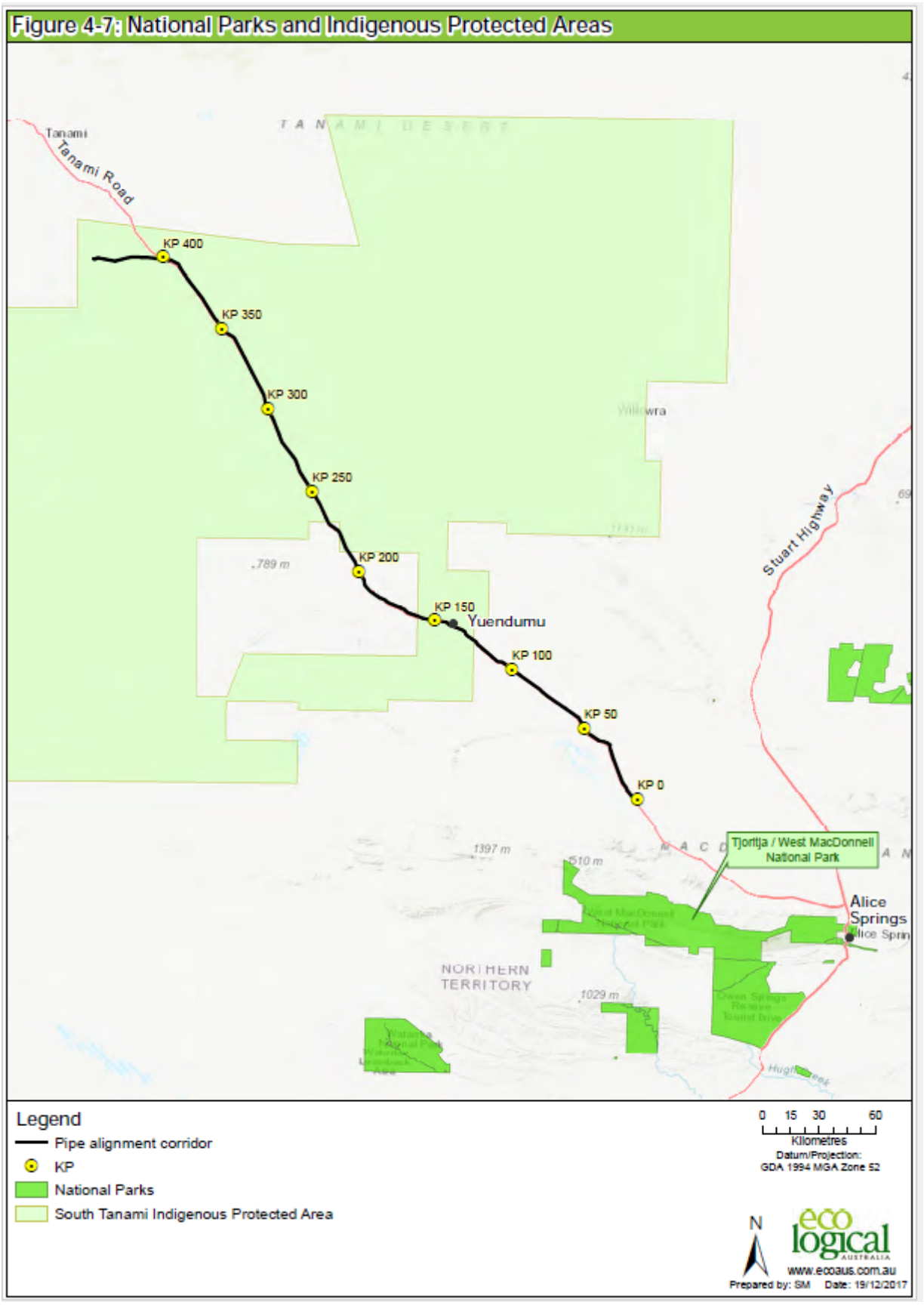


4.2.9 National Parks and protected areas

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



4.3 Cultural heritage environment

AGIT has consulted with and has received, as part of project approvals, a set of agreements with the Central Land Council to undertake the project. This includes the Sacred Site Clearance Certificate (SSCC) which will identify any significant cultural heritage areas and include restricted work areas and exclusion zones along or adjacent to the route.

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

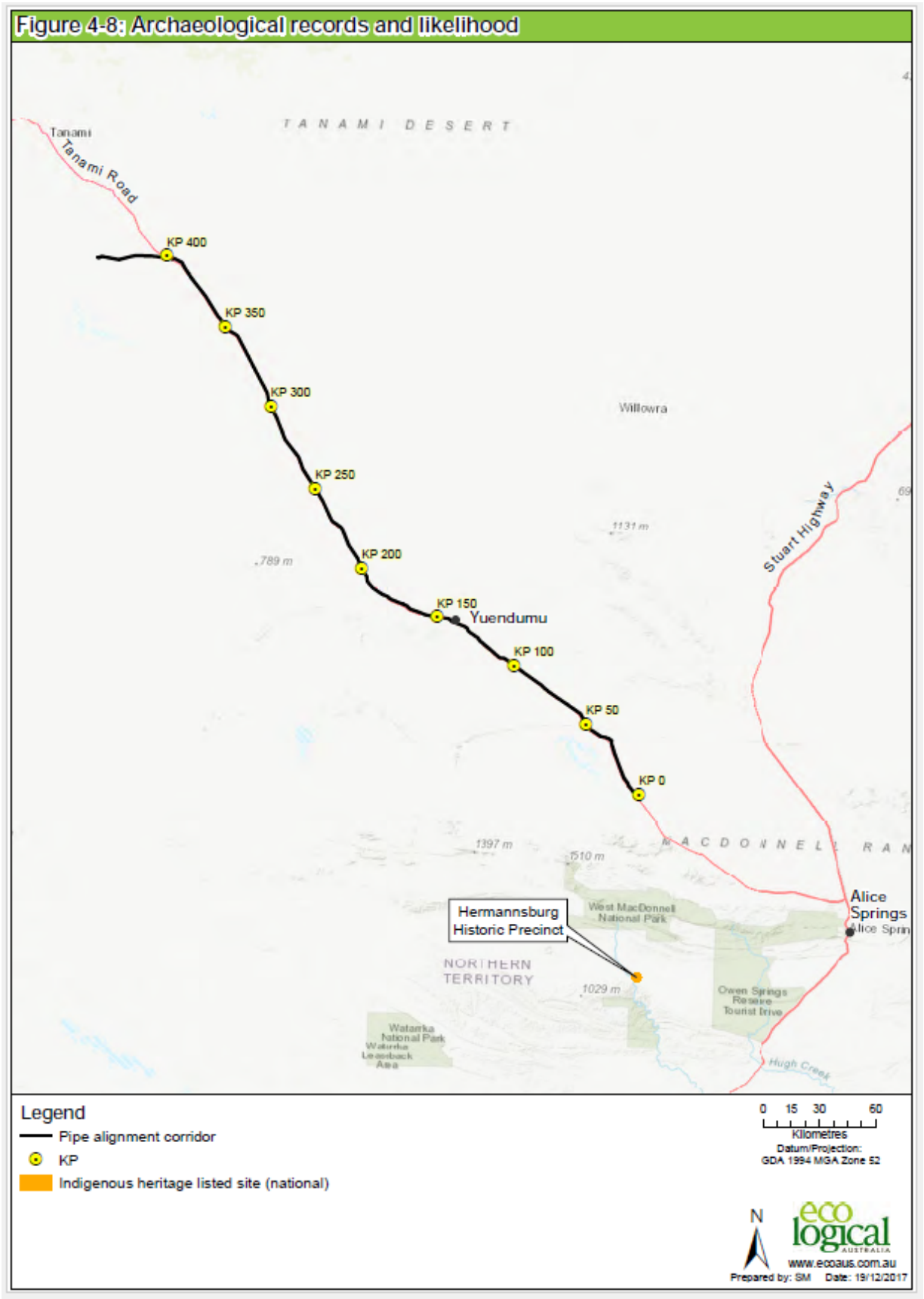


Figure 4-9: Declared heritage places

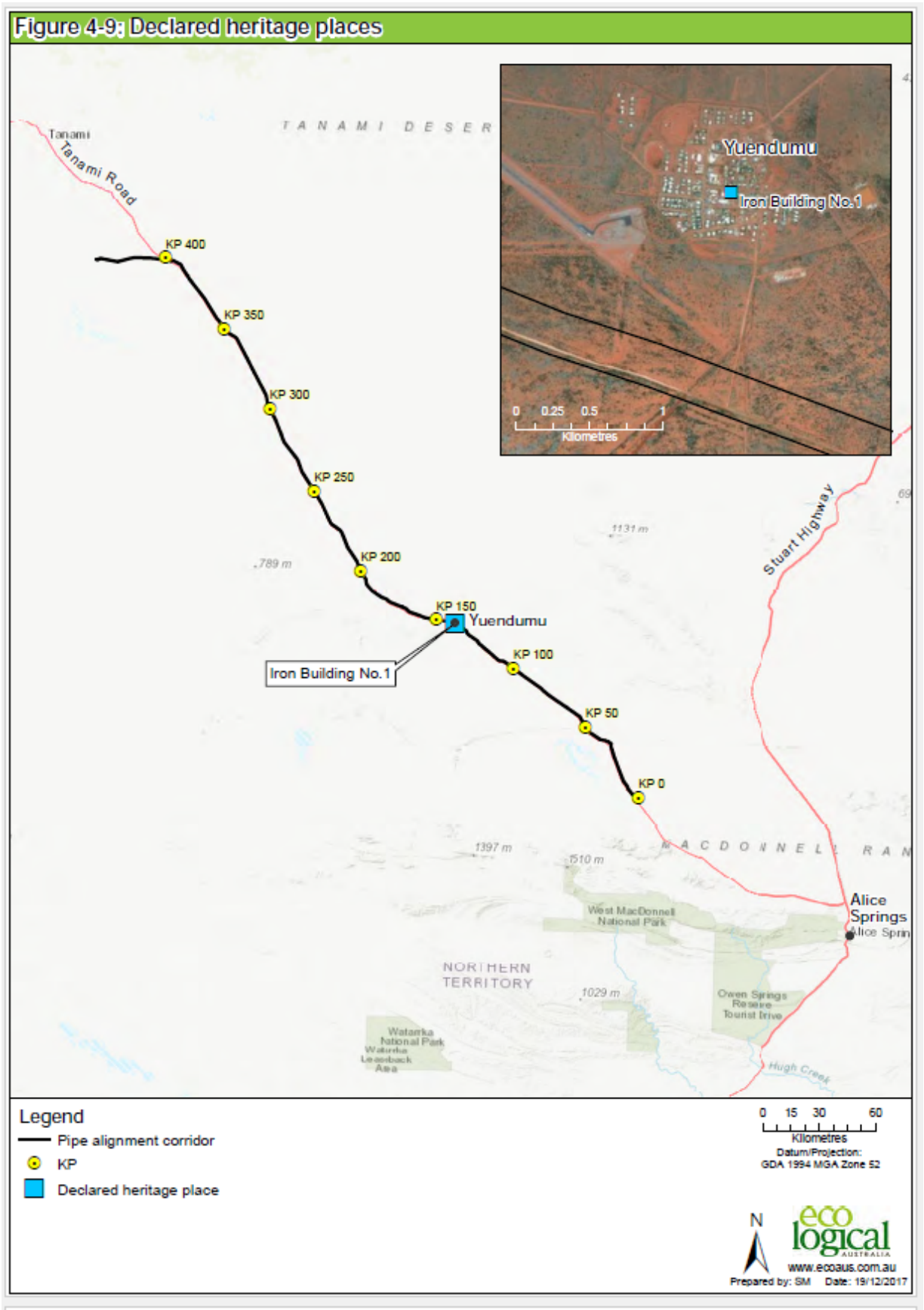
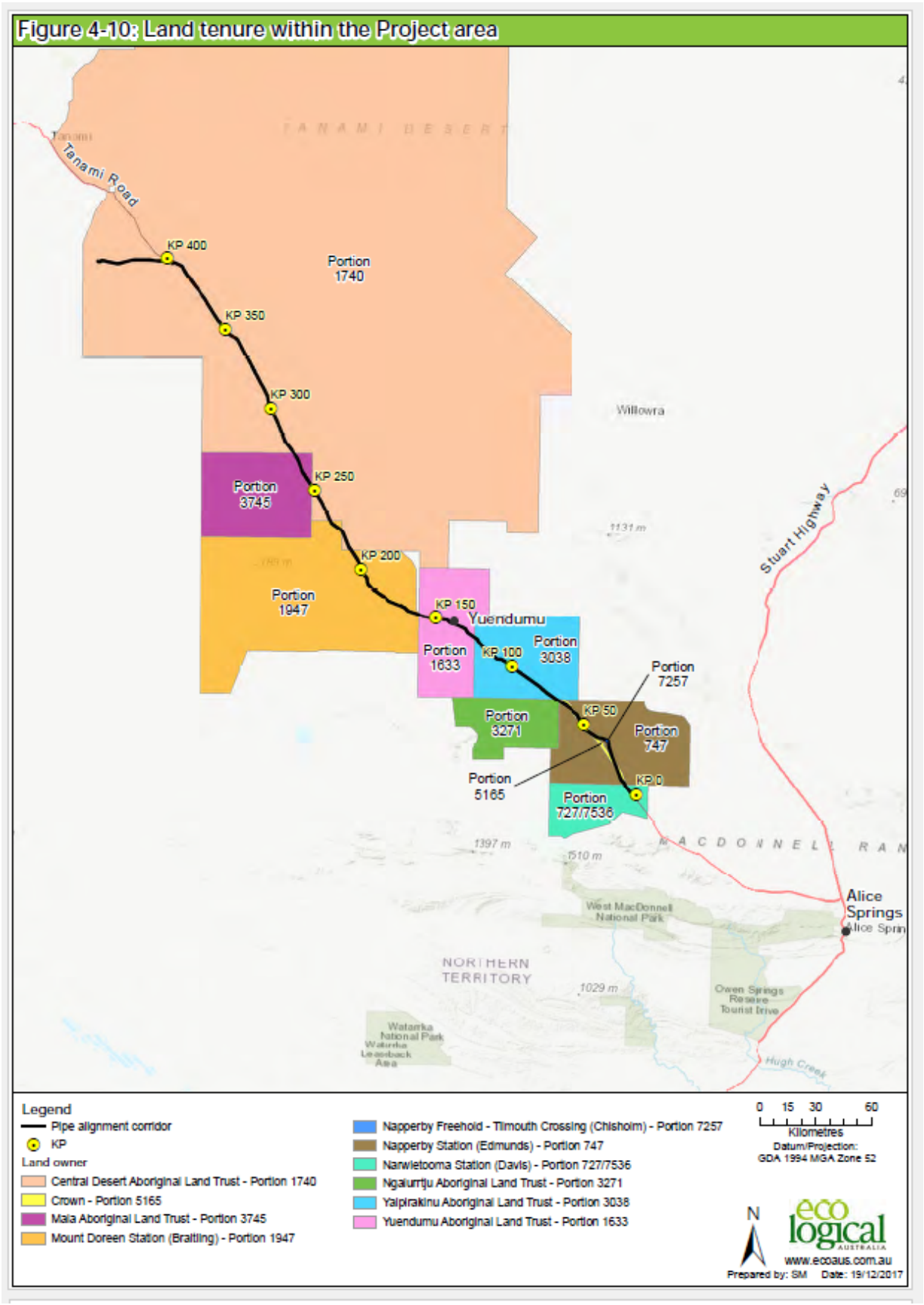


Figure 4-10: Land tenure within the Project area



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).

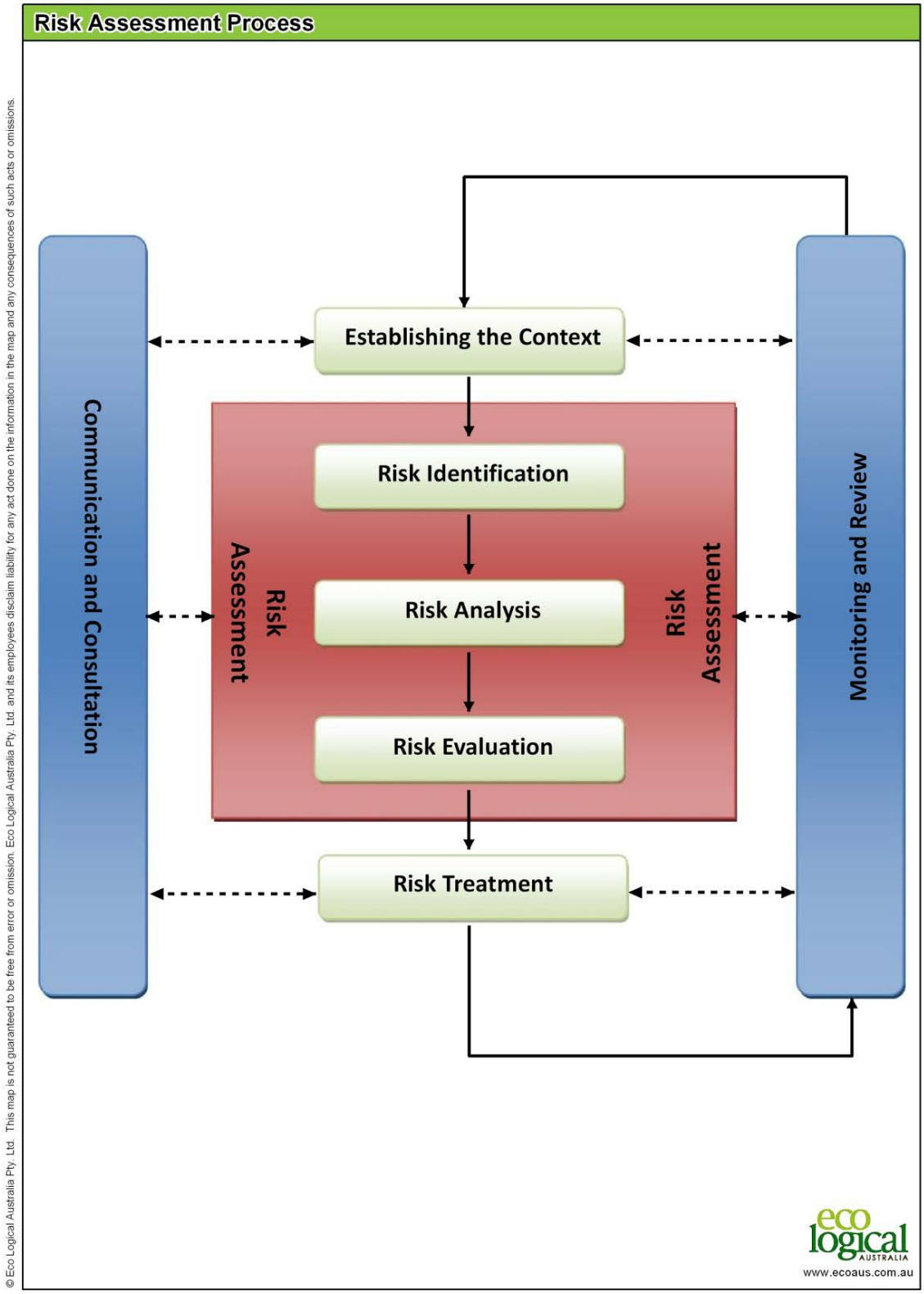


Figure 5-1: Risk assessment process

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)
Princess Parrot (*Polytelis alexandrae*)	Vulnerable	Vulnerable

While Night Parrot was previously considered to have potential to occur, a targeted survey for Night Parrot conducted pre-clearance concluded that the species is unlikely to occur based on limited availability of suitable habitat and degraded state of habitats. This species is therefore considered no further.

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 CRoW 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
Pre-clearance	A pre-clearing survey 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 CRoW, 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

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
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	To prevent fauna entrapment.	Monthly	HSE Manager	▪ InControl

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
	entrapment related fauna injuries and fatalities.				
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. 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 CRoW 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 CRoW
- 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
Dwarf Desert Spike-rush	Pre-clearance surveys 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 CRoW 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
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.

WEED SPECIES	DISTRIBUTION IN 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	▪ *Weeds Management Act* ▪ MPC Pest and Weed Management Procedure	▪ No new species of weeds of concern recorded in the Project area within 3 years of	Species of weed recorded in the Project area. No non-compliance with *Weeds Management Act* and internal weed hygiene procedures.

ISSUE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
	uninfested areas of the Project area.	▪ DBP or equivalent Clean on Entry Procedure	completion of construction ▪ Compliance with the *Weeds Management Act.*	
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 3 years of completion of construction. ▪ Compliance with the *Weeds Management Act.*	Number of recorded locations of weed infestation in GIS database. Extent of weed cover at recorded locations.

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, 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
Weed control	Weed control shall take place prior to seed set and be carried out in all areas affected by the Project.	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	Construction Contractor

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
	area and in proximity to wetlands and creeklines including Napperby Creek.	
Vehicle washdown/ Hygiene station	Vehicle washdowns shall be established on accessible, flat areas that do not run into waterways.	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 for 3 years 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 for 3 years 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

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
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
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

TRIGGER	ACTION
	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 Control in accordance with International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Guidelines 2008. 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

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
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
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.

TRIGGER	ACTION
	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.

Entry onto sacred sites is a breach of the Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976 (ALRA) and the NT Aboriginal Sacred Sites Act. Aboriginal sacred sites near the Project area have been identified through a consultative process with the Central Land Council (CLC) and a Sacred Site Clearance Certificate (SSCC) shall be in place prior to any works commencing and shall be strictly adhered to. The SSCC identifies both Restricted Work Areas (RWA) and Exclusion Zones (EZ) along the route. RWA's allow work but with specific restrictions such as the preservation of mature trees (which have been identified as part of pre-clearance surveys) and requirements for traditional owners to be present during works. Exclusion Zones shall not be entered at any stage.

AGIT shall also have a set of approved agreements with the CLC including Section 19's under the ALRA, Indigenous Land Use Agreements (ILUA) and a Benefits and Impacts Agreement (BIA). All conditions within these agreements must be adhered to as part of the project including both construction and operation phases. The Central Land Council is a Commonwealth independent statutory authority that represents traditional owners, native title holders and custodians of sacred sites with regard to the use of land and protection of sacred sites.

Additional to the agreements and the SSCC with the CLC, AGIT shall also require Aboriginal Areas Protection Authority (AAPA) approval to ensure there is an indemnity from prosecution should works inadvertently disturb an unknown site. AAPA is an independent statutory

authority tasked with administering functions concerning the protection of sacred sites across the NT.

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 6-24.

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 6-25).

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 inTable 6-26**.**

Table 6-26 Land user monitoring and recording

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
Analysis of Incident Trends	Analyse incidents reported for identification of land user complaints.	Determine number of substantiated land user complaints to inform review of management measures, as required.	Quarterly during construction	Construction Contractor / Land Use Manager	• Environmental Incident Report

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 6-27**.**

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 6-28.

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 6-29**.**

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 6-30**.**

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

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
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
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 6-31**.**

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 6-32**.**

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 2. Undertake maintenance and remediation as required (e.g. remove accumulated material) 3. Modify/re-engineer on-site drainage management system as required
Integrity of on-site drainage management system compromised.	
Increased sediment load in watercourses	
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 6-33**.**

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 6-34**.**

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

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
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
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 6-35**.**

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

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
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
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 6-36**.**

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

TRIGGER	ACTION
	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 6-37.

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 6-38.

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

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
Identify waste streams	Waste streams shall be appropriately segregated and stored as either general waste, recyclable, or regulated waste within appropriate vessels.	Construction Contractor
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 6-39.

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

MONITORING	DETAILS	PURPOSE	TIMING	RESPONSIBILITY	RECORDS
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 camps and construction sites for litter and general waste	To identify issues with regards to waste disposal and segregation	Weekly	Construction Contractor	• Environmental Inspections

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 6-40.

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

Progressive rehabilitation will be undertaken throughout the construction process, to revegetate areas cleared for construction purposes that are not required for operational use. Rehabilitation zones have been defined based on ecological surveys to date and include native vegetation (not supporting MNES) and four additional zones, each supporting one or more MNES. The zones are described fully in the dedicated Rehabilitation Plan. Effective rehabilitation of each zone 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. The following provides a summary of rehabilitation measures identified in the Rehabilitation Plan.

6.11.2 Environmental aspects to be managed

The Rehabilitation Plan aims to manage potential impacts arising from the following:

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

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

Construction of the Project has the potential to 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.

6.11.4 Performance management

Rehabilitation objectives and completion criteria have been defined for each of the five rehabilitation zones and these are identified in the Rehabilitation Plan.

6.11.5 Control measures

Specific rehabilitation management actions have been identified to manage potential impacts from construction of the Project. These are identified in the dedicated Rehabilitation Plan.

6.11.6 Monitoring and recording

A rehabilitation monitoring program has been designed to monitor the progress of rehabilitation over time and ensure that objectives and completion criteria are met. In summary, rehabilitation monitoring will be conducted annually for a minimum of three years

in pre-determined monitoring sites (disturbed sites and control sites) within each of the rehabilitation zones.

The monitoring methodology is described fully in the dedicated Rehabilitation Plan.

6.11.7 Rehabilitation criteria

The rehabilitation completion criteria for each of the rehabilitation zones, are defined in the dedicated Rehabilitation Plan.

6.11.8 Contingencies and corrective action

If monitoring indicates that environment objectives and completion criteria for rehabilitation are not being achieved, contingency actions will be enacted, as identified in the Rehabilitation 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 species has the potential to occur due to the presence of suitable habitat:

- 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 completion 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 operational 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.

TRIGGER	ACTION
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 annually for up to 3 years following 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,	Senior Advisor – Environment and Heritage

PARAMETER	CONTROL MEASURE	RESPONSIBILITY
	including but not limited to creeklines including Napperby Creek.	
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
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. The following provides a summary of rehabilitation measures identified in the dedicated Rehabilitation Plan.

7.3.2 Environmental aspects to be managed

- Monitoring of rehabilitation against completion criteria.

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 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

Rehabilitation objectives and completion criteria have been defined for each rehabilitation zone and are identified in the Rehabilitation Plan.

7.3.5 Control measures

Specific rehabilitation management actions have been identified to assist in achieving the rehabilitation objectives for the Project and are identified in the Rehabilitation Plan.

7.3.6 Monitoring and recording

The rehabilitation monitoring program has been designed to monitor the progress of rehabilitation and ensure that objectives and completion criteria are met. In summary, rehabilitation monitoring will be conducted annually for a minimum of three years in pre-determined monitoring sites (disturbed sites and control sites) within each of the rehabilitation zones.

The monitoring methodology is described fully in the dedicated Rehabilitation Plan.

7.3.7 Rehabilitation criteria

The rehabilitation completion criteria for each of the rehabilitation zones, are defined in the Rehabilitation Plan.

7.3.8 Contingencies and corrective action

If monitoring indicates that environment objectives and completion criteria for rehabilitation are not being achieved, contingency actions will be enacted, as identified in the Rehabilitation 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	*Waste Management and Pollution Control Act*	NT EPA	As soon as practicable and in any case within 24 hours

REQUIREMENT	REFERENCE	AGENCY	TIMEFRAME
within land that is 1 kilometre from the centre of the pipeline[2]			
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 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.	*Energy Pipelines Regulations*	DPIR	As soon as possible to the Department or an inspector

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.

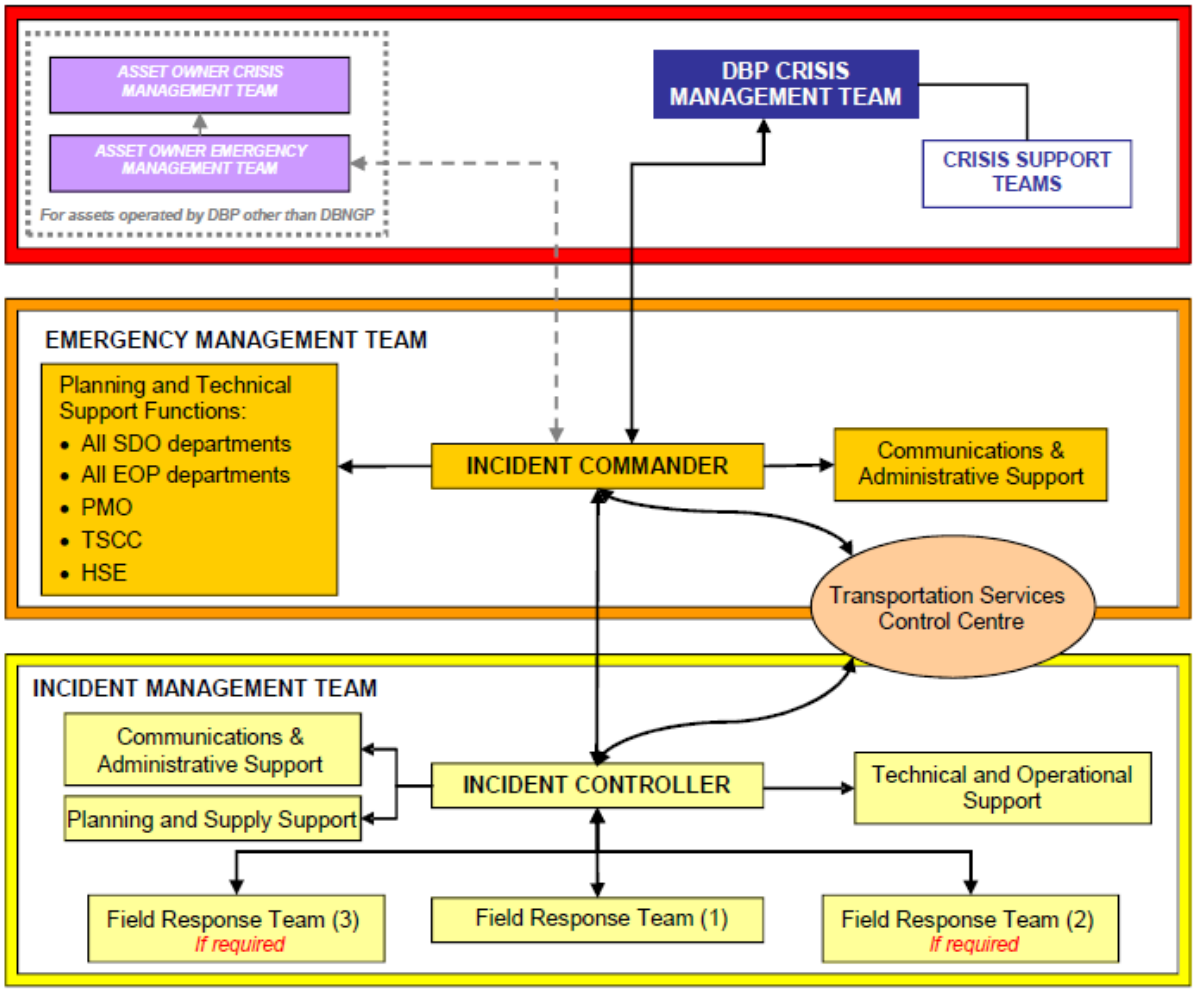


Figure 8-1: Emergency and crisis teams - structures

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

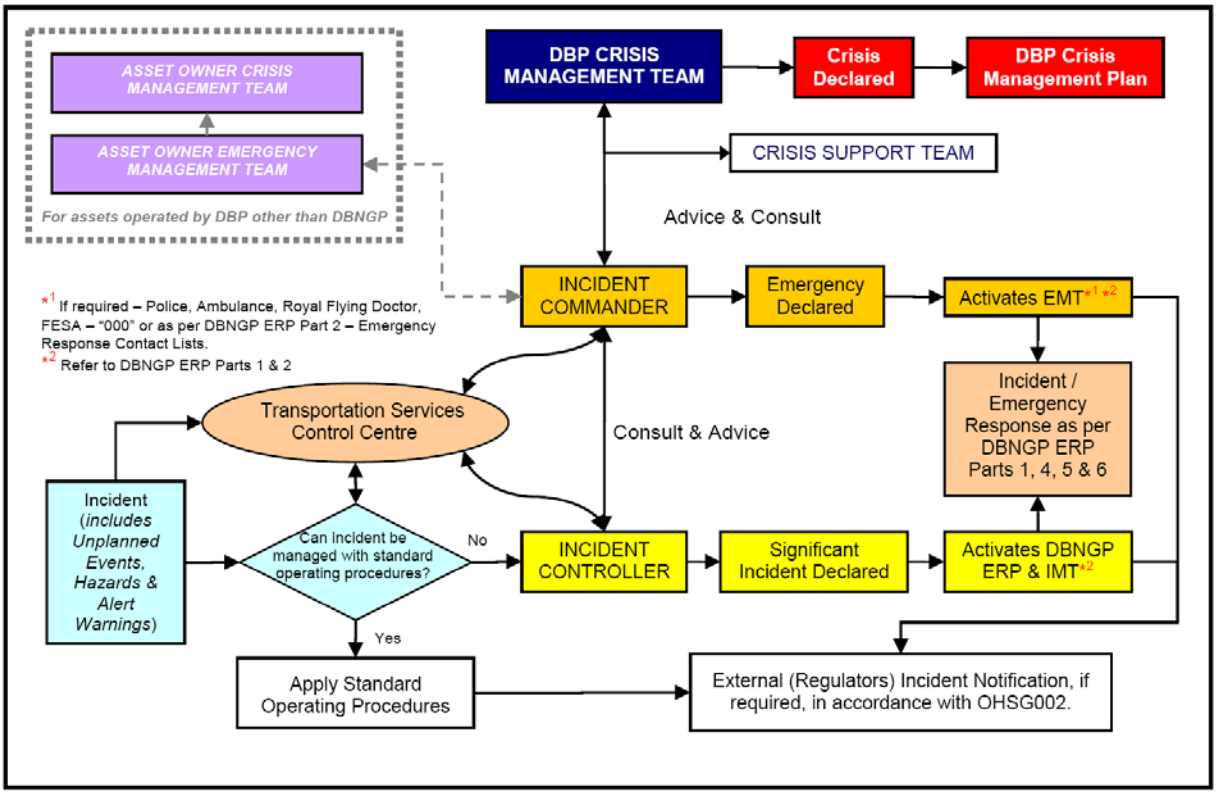


Figure 8-2: Emergency and crisis management teams – flowchart

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	DPIR	Quarterly	Construction Manager

	• Reportable incident summary • External Audit reports close outs			
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.

References

Australian Bureau of Statistics (ABS). Yuendumu – Anmatjere (SA2) [Online], Available at: http://stat.abs.gov.au/itt/r.jsp?RegionSummary&region=702011054&dataset=ABS_REGIONAL_ASGS&geoconcept=REGION&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_NRP9_LGA&regionLGA=REGION&regionASGS=REGION Accessed 21 September 2017.

Australian Institute of Health and Welfare (AIHW) 2016. *Australia's Health 2016*. AIHW, Canberra.

Biodiversity Assessment and Management (BAAM). 2016. *Tanami gas pipeline terrestrial ecology desktop assessment, Tanami Desert, Northern Territory*. Prepared for Advisian, Draft A.

Biostat Pty Ltd. 2017*. Reconnaissance fauna survey of the proposed Tanami Gas Pipeline, Northern Territory*. Prepared for AGIG.

Circle Advisory Pty Ltd (Circle Advisory) 2017. Social and Economic Settings for the Tanami Gas Pipeline. Prepared for AGIT.

Department of the Environment and Energy (DotEE) 2008. Tanami bioregion [Online], Available at: https://www.environment.gov.au/system/files/resources/.../bioregion-tanami.pdf Accessed 21 September 2017.

Domahidy, G. 1990. *Hydrogeology of The Granites – Tanami Mining Region, explanatory notes for 1: 250,000 scale map, report 74/1990*, July 1990.

Eco Logical Australia (ELA). 2017. *Tanami Gas Pipeline Groundwater and Surface Water Assessment*. Prepared for DDG Operations Pty Ltd.

Environment Protection and Heritage Council and the Natural Resource Management Ministerial Council (EPHC & NRMMC). 2011*. National Guidance for the Management of Acid Sulfate Soils in Inland Aquatic Ecosystems 2011.* Available from: http://www.environment.gov.au/system/files/resources/bcef08f2-0c60-4931-9b5e-1522ca55da74/files/guidance-management-acid-sulfate-soils.pdf Accessed: 21 September 2017.

Innovative Groundwater Solutions (IGS) 2017. *Tanami Road Hydrogeological Assessment & Water Supply Strategy: An abridged final report*, prepared for the Department of Infrastructure, Planning and Logistics, Northern Territory.

International Erosion Control Association (IECA). 2008. *Best Practice Erosion and Sediment Control - Appendix P: Land-based Pipeline Construction.* Available from: https://www.austieca.com.au/documents/ item/608. Accessed: 21 September 2017.

Kershaw PA, Clark JS, Gill Am, C'Costa DM 2002. *A history of fire in Australia. In 'flammable Australia" the fire regimes and biodiversity of a continent*.' Pp 1-24. Cambridge University Press.

Mattiske Consulting Pty Ltd (Mattiske). 2017. *Flora and Vegetation Assessment of the Tanami Gas Pipeline Project Area, Northern Territory*. Prepared for DDG Operations Pty Ltd.

MWH (2017). *Newmont Gas Pipeline – Groundwater Scoping Study report; a scoping study to identify a strategy, costing and proposed implementation of works to assess and secure the required groundwater supply along the pipeline alignment.* Prepared for DBP Development Group.

WANT Geotechnics Pty Ltd. 2017. *Geotechnical Desktop Study Report for the Proposed Tanami Gas Pipeline, Northern Territory*. Prepared for Fyfe Pty Ltd.

Worley Parsons Services Pty Ltd (Worley Parsons) 2016. *Tanami Gas Pipeline FEED Project Definition Report*. Unpublished report for Power and Water Corporation.

Appendix A Notice of Intent and Statement of Reasons

Tanami Gas Pipeline

Notice of Intent: Environmental Assessment Act

Prepared for
DDG

16 June 2017

DOCUMENT TRACKING

Item	Detail
Project Name	Tanami Gas Pipeline NoI and EPBC Act Referral
Project Number	7353
Project Manager	Andrew Buick
Prepared by	Andrew Buick and Sarah Smith
Reviewed by	Ailsa Kerswell, Warren McGrath
Approved by	Warren McGrath
Status	FINAL
Version Number	4
Last saved on	25 July 2017

This report should be cited as 'Eco Logical Australia 2017. *Tanami Gas Pipeline Notice of Intent*. Prepared for DDG.'

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This document has been prepared by Eco Logical Australia Pty Ltd.

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Abbreviations

Abbreviation	Description
ASME	American Society of Mechanical Engineers
AS	Australian Standard
CEMP	Construction Environmental Management Plan
MNES	Matter of National Environmental Significance
NoI	Notice of Intent
NT	Northern Territory
NTEPA	Northern Territory Environment Protection Authority
NVIS	National vegetation inventory system
OEMP	Operation Environmental Management Plan
PER	Public Environment Report
RoW	Right of Way
TGP	Tanami Gas Pipeline

1 Scope and purpose

This Notice of Intent (NoI) provides an overview of the proposed Tanami Gas Pipeline for the purposes of:

- Notifying the Northern Territory Government of the proposal.
- Summarising the relevant environmental features along the pipeline route, the potential impacts and the measures proposed to mitigate environmental risks.
- Providing the Northern Territory Environment Protection Authority (NTEPA) with sufficient information to determine whether formal environmental assessment of the project is required (pursuant clause 8 of the Administrative Procedures of the *Environmental Assessment Act*).
- Providing sufficient information for Terms of Reference to be prepared by the NTEPA, should a decision be made to require the preparation of an Environmental Impact Statement or a Public Environment Report.

The Notice of Intent has been written to the requirements set out in the 'Guideline for the Preparation of a Notice of Intent' (NTEPA 2015). Works associated with the changeover of power generation from diesel to natural gas at the Granites and Dead Bullock Soak mines are not part of the proposed action and are therefore not dealt with in this NoI.

2 Project details

2.1 Project summary

DDG propose to construct and operate the Tanami Gas Pipeline (TGP), connecting the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines, operated by Newmont Mining. Operation of the Tanami Gas Pipeline 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 will be buried and require above ground infrastructure including: metering station, mainline valves, and tie-in stations.

Construction of the pipeline will require clearing of a 30 m Right of Way (RoW) and access tracks to the RoW from the Tanami Road. For assessment and approval purposes the RoW will be established within a 300 m wide pipeline corridor, to accommodate deviations in the alignment required to address site constraints (this may necessitate placing the pipeline on the south-western side of the Tanami Road for short distances).

2.2 Contact details

2.2.1 Proponent

The proponent of the Tanami Gas Pipeline is DDG Operations Pty Ltd

The contact for the proponent is:

Neil Parry
Land Manager
PO Box Z5267
Perth, St Georges Terrace WA 6831
Telephone +61 8 9223 4300
landmanagement@DDG.net.au

2.2.2 Consultant

Eco Logical Australia Pty Ltd (ABN 87 096 512 088) is providing environmental consulting services to DDG for the purposes of preparing this Notice of Intent.

The contact for the environmental assessment and approval of this proposal is:

Dr Sarah Smith
Senior Ecologist
Eco Logical Australia
GPO Box 1615, Darwin NT 0801
Phone: 08 8989 5602
Fax: 08 8901 1299
Email: sarahs@ecoaus.com.au

2.3 Location

The proposed Tanami Gas Pipeline traverses a 439 km route from tie-in with the Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines (Figure 1). Minor deviations to the alignment may occur during further design and in response to environmental and cultural heritage constraints.

The location of the start and end points of the pipeline and each direction change is provided in Table 1.

Table 1: Proposed Location of the Tanami Gas Pipeline

Point	Longitude (Deg, Min, Sec)	Latitude (Deg, Min, Sec)
1 (start)	129° 56' 21"	20° 31' 56"
2	129° 56' 45"	20° 32' 12"
3	129° 57' 34"	20° 31' 44"
4	130° 2' 54"	20° 32' 38"
5	130° 8' 0"	20° 31' 27"
6	130° 12' 45"	20° 31' 33"
7	130° 15' 40"	20° 31' 51"
8	130° 17' 47"	20° 31' 17"
9	130° 22' 9"	20° 33' 19"
10	130° 25' 40"	20° 38' 29"
11	130° 29' 40"	20° 43' 15"
12	130° 36' 19"	20° 52' 33"
13	130° 39' 19"	20° 54' 17"

Point	Longitude (Deg, Min, Sec)	Latitude (Deg, Min, Sec)
14	130° 48' 24"	21° 10' 12"
15	130° 54' 34"	21° 24' 19"
16	130° 58' 51"	21° 29' 43"
17	131° 9' 5"	21° 47' 14"
18	131° 12' 11"	21° 49' 28"
19	131° 14' 47"	21° 54' 43"
20	131° 20' 1"	22° 2' 59"
21	131° 20' 45"	22° 5' 6"
22	131° 27' 35"	22° 9' 30"
23	131° 36' 23"	22° 13' 6"
24	131° 45' 57"	22° 15' 6"
25	131° 51' 14"	22° 17' 23"
26	132° 1' 41"	22° 25' 46"
27	132° 3' 8"	22° 25' 57"
28	132° 26' 44"	22° 41' 13"
29	132° 29' 47"	22° 45' 36"
30	132° 36' 46"	22° 49' 29"
31	132° 40' 58"	22° 59' 41"
32	132° 42' 11"	23° 1' 5"
33	132° 42' 24"	23° 1' 43"
34	132° 44' 3"	23° 3' 33"
35 (end)	132° 45' 39"	23° 4' 7"

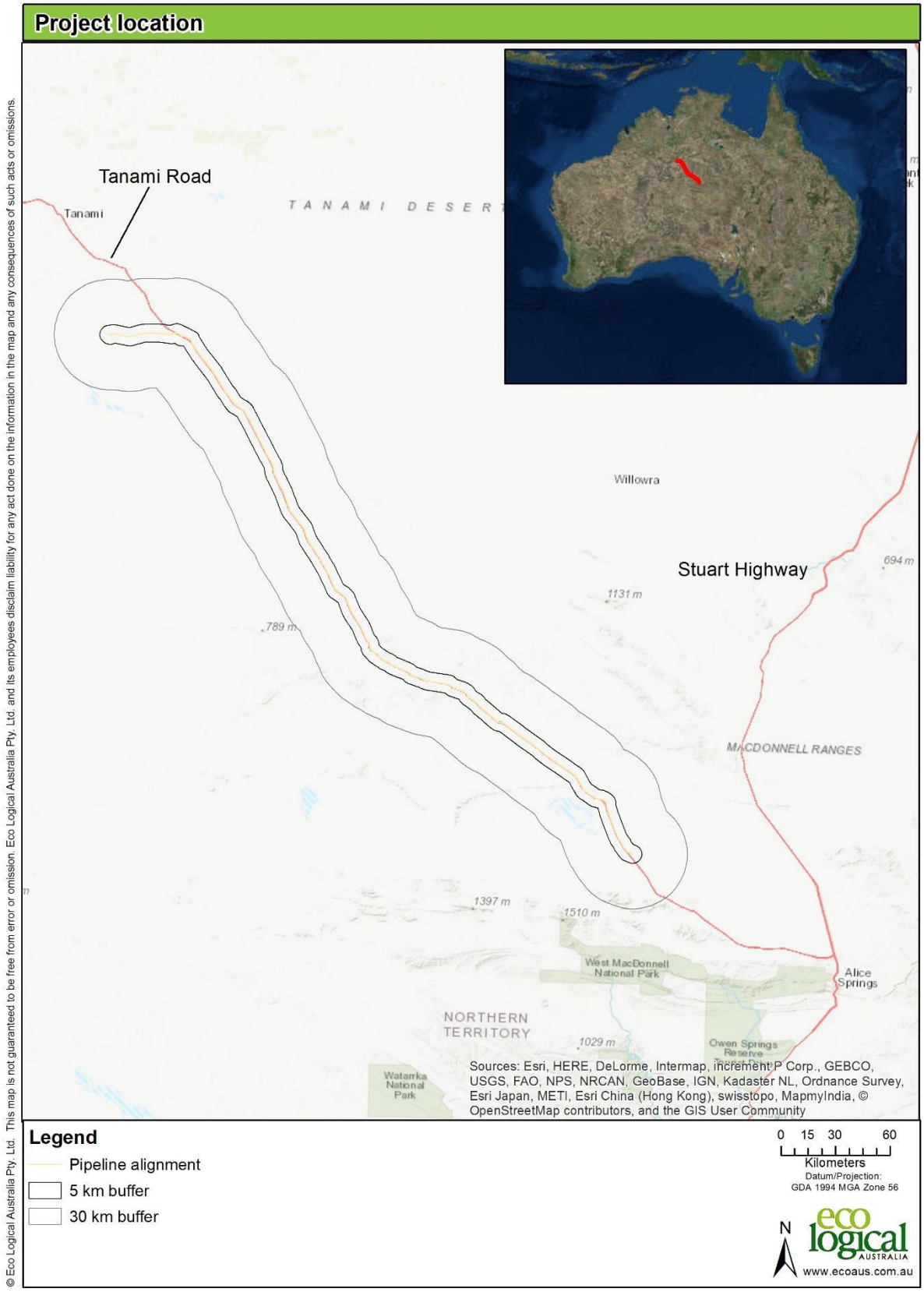


Figure 1: Location of the TGP project

The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures (Table 2). Mineral and petroleum tenements intersected by the pipeline alignment are summarised in Table 3. Most of the pipeline alignment occurs within the Central Desert Regional Council, with a small section near the tie-in with the Amadeus Pipeline, located within the MacDonnell Regional Council.

Table 2: Land tenures traversed by the Tanami Gas Pipeline

Land parcel (Vol/Folio)	Registered proprietor/controlling agency	Portion / Allot No.	Tenure
CUFT 814/294	Anthony Woodley Davis and Pamela Ruth Davis	727/7536	Perpetual Pastoral Lease 1019
NT Portion 4284	Crown - Northern Territory Government	4284	
NT Portion 5165	Crown - Northern Territory Government	5165	
CUFT 652/345	Hiraji Pty. Limited (ACN 009 591 664)	747	Perpetual Pastoral Lease 1178
CUFT 639/281	Telstra Corporation Limited (ACN 051 775 556)	3971	Estate in Fee Simple
CUFT 814/313	Ngurratjuta/Pmara Ntjarra Aboriginal Corporation (ICN 414)	7256	Estate in Fee Simple
CUFT 812/121	Kumanji Pty Ltd (ACN 098 097 002) as trustee for the Counterfeit Superannuation Fund	7257	Estate in Fee Simple
CUFT 626/309	Ngalurrtju Aboriginal Land Trust	3271	Estate in Fee Simple
CUFT 655/232	Yalpirakinu Aboriginal Land Trust	3038	Estate in Fee Simple
CUFT 750/18	Yuendumu Aboriginal Land Trust	1373-1633	Estate in Fee Simple
NT Portion 4264	Crown - Northern Territory Government		
CUFT 781/450	Braitling Nominees Pty Ltd (ACN 009 598 958)	1947	Perpetual Pastoral Lease 1035
CUFT 300/92	Australian and Overseas Telecommunications Corporation Limited	3968	Estate in Fee Simple
CUFT 499/156	Meercantie Aboriginal Corporation	4871	Estate in Fee Simple
CUFT 664/694	Central Desert Aboriginal Land Trust	1740	Estate in Fee Simple
CUFT 664/702	Mala Aboriginal Land Trust	3745	Estate in Fee Simple
	Crown - Northern Territory Government		

Table 3: Mineral and petroleum tenements traversed by the Tanami Gas Pipeline

Tenement number	Tenement holder
27604	ABM RESOURCES NL
29906	OZ URANIUM (NT) PTY LTD
28694	TODD RIVER METALS PTY LTD
2367	NEWMONT TANAMI PTY LTD
2366	NEWMONT TANAMI PTY LTD

Tenement number	Tenement holder
24451	ENERGY METALS LTD
4529	NEWMONT TANAMI PTY LTD
154	NEWMONT TANAMI PTY LTD
165 – Petroleum	TAMBORAN (NGALIA) PTY LTD
166 – Petroleum	TAMBORAN (NGALIA) PTY LTD

The pipeline alignment also intersects land on which Native Title has been determined as follows:

- Napperby Perpetual Pastoral Lease, NTD 4/2011 (non-exclusive)
- Mount Doreen Perpetual Pastoral Lease, NTD 39/2011 (non-exclusive)

Additionally, the pipeline alignment intersects land covered by the Narwietooma Native Title Determination Application (NTD 6/2013).

3 Regulation

The Tanami Gas Pipeline will be constructed and operated in accordance with a range of Northern Territory and Commonwealth laws relating to environmental assessment and management, cultural heritage management, and protection of public and worker health and safety. Legislation governing the primary environmental approvals required for the project are set out in Table 4. Details of legislation governing secondary approvals and regulation of the project are provided in Table 5.

Securing consent for access to lands traversed by the pipeline are dealt with through legislation including:

- *Aboriginal Land Rights (Northern Territory) Act* (Cwlth)
- *Native Title Act* (Cwlth)
- *Aboriginal Land Act* (NT)
- *Crown Lands Act* (NT)
- *Pastoral Lands Act* (NT)

Table 4: Primary environmental approvals for Tanami Gas Pipeline

Legislation	Relevance to Tanami Gas Pipeline project
Commonwealth legislation	
Environment Protection and Biodiversity Conservation Act	Assessment under this Act is required for actions that are likely to have a significant impact on a matter of national environmental significance. If the project is likely to have a significant impact on a Matter of National Environmental Significance (MNES), then referral to the Commonwealth Environment Department is required. If the pipeline project is subsequently declared a controlled action further assessment and subsequent approval by the Commonwealth Minister for the Environment will be required. The NT bilateral agreement may be used to facilitate the assessment process.
Northern Territory legislation	

Environmental Assessment Act & *Environmental Assessment Administrative Procedures*	If the NT EPA consider the pipeline project has potential to cause a significant impact to the environment, the project will require the preparation of an Environmental Impact Statement (EIS) or Public Environment Report (PER).
Energy Pipelines Act & *Energy Pipeline Regulations*	The *Energy Pipelines* Act & *Energy Pipeline Regulations* require that the survey, construction, testing and operational activities of the pipeline be permitted and licenced. A pipeline licence under the *Energy Pipelines Act* is required before construction or operation of a pipeline can commence. It is understood that environmental conditions, including those arising from recommendations flowing from the assessment under the EA Act, are placed on the pipeline licence. A Construction Environmental Management Plan (CEMP) and Operation Environmental Management Plan (OEMP) are required for the licence.

Table 5: Secondary environmental approvals and regulation for Tanami Gas Pipeline

Legislation	Relevance to Tanami Gas Pipeline Project
Dangerous Goods Act and *Dangerous Goods Regulations*	Handling and storage of hazardous and explosive materials will need to conform to the requirements of the Act
Heritage Act	All sites of Aboriginal archaeology are protected and will require pre-clearance survey and permit if materials are to be disturbed. Declared heritage places are protected and will need to be avoided or consent obtained if site is to be disturbed.
Northern Territory Aboriginal Sacred Sites Act	Provides for the identification and protection of Aboriginal sacred sites. Consultation on sacred sites will occur through the Central Land Council and an Authority Certificate will be sought from the Aboriginal Areas Protection Authority to ensure that sacred sites are protected.
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. Erosion and Sediment Control Plans 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.
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	Extraction of surface and ground waters, and discharge into waterways will require licensing.
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.

4 Detailed description of project proposal

4.1 Project components

The project components include clearing of a 30 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 (metering station, mainline valves and tie-in stations).

Five above ground facilities are proposed:

- Tanami metering station (at tie in with the Amadeus Gas Pipeline)
- Two mainline valves located along the pipeline
- Granites Mine Tie-in Station
- Dead Bullock Soak Mine Tie-in Station.

The project components and the associated temporary and permanent footprints are set out in Table 6. Construction of the Tanami Gas Pipeline will require clearing of up to 1348.5 ha of native vegetation along its 439 km length, of which 1125 ha (83 %) will be rehabilitated (Table 6). Much of the disturbance footprint will be allowed to return to woody native vegetation over time. The total permanent disturbance footprint will be up to 223.5 ha, which is required for a 5 m wide permanent access track along the length of the alignment 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.

Table 6: Disturbance footprint for Tanami Gas Pipeline

Project component	Area disturbed (ha)	Area rehabilitated (ha)	Permanent disturbance (ha)
Construction Corridor (439 km x 30m)	1317	1097	220
Construction access tracks (Tanami Road to construction corridor)	1	0.5	0.5
Camp (2ha x 5)	10	10	0
Laydown (1.5ha x 5)	7.5	7.5	0
Pipeyard (1ha x 5)	5	5	0
Turkeys Nests	3	3	0
Permanent facilities	5	2	3
TOTAL	**1348.5**	**1125**	**223.5**

4.2 Schedule

Construction of the pipeline is scheduled to begin in February 2018 and to be completed by December 2018. Construction will be progressive and commence at the tie-in with the Amadeus Gas Pipeline and finish at the Dead Bullock Soak Mine.

4.3 Pipeline construction

The pipeline will be constructed and operated in accordance with the requirements of AS 2885 Pipelines - Gas and Liquid Petroleum, and the Australian Pipelines and Gas Association: Code of Environmental Practice Onshore Pipelines (2013).

Construction will typically be carried out within a 30 m wide RoW using a production line approach. A number of turnaround points and potentially some water course crossings will require a wider disturbance width. 'Turkey nest dams' will be constructed to temporarily store hydro-test and construction water.

Construction of the pipeline will be undertaken by a number of specialised teams that will fabricate and install the pipeline along the RoW. The construction RoW will be progressively rehabilitated as construction activity moves along the alignment. A 5 m wide permanent access track within the RoW will be maintained for the period of pipeline operation. A description of the pipeline construction activities is provided in Table 7.

Table 7: Construction activities for Tanami Gas Pipeline

Activity	Description
Access	Access during construction will be via the Tanami Road and a number of small (50-120 m in length) temporary access tracks to link to the construction RoW. The location of these access tracks is yet to be determined, but will allow for flexibility to avoid significant environmental values. Clearing of up to 1ha is estimated to be required for construction of these additional access tracks (Table 6). Some of these access tracks will not be required post construction and they will be rehabilitated. Post construction, an access track (approximately 5 m wide) will be maintained from within the construction RoW for ongoing operational access.
Clear and grade	Graders and bulldozers will be used to remove vegetation and topsoil within a 30 m wide area to provide for construction activities. This RoW may be widened at watercourse crossings. Vegetation will be pushed aside and residue vegetative material stockpiled in windrows for final respreading out over the reinstated ground following trench backfill. Within the disturbance footprint, topsoil will be graded to a depth of 100 to 150 mm and stockpiled separately for return to the source area during rehabilitation and will be stockpiled separately to overburden.
Trenching and pipeline installation	As the RoW is progressively cleared, a trench will be dug for installation of the pipeline in accordance with pre-defined depths of burial (the trench will typically be 1.2 m deep but this is subject to detailed design). Desktop assessment of possible ground conditions indicates that trenching or rip and hoe techniques will be suitable for most of the length of the pipeline alignment. The need for rocksaw and/or dill and blast techniques is expected to be minor. Trench spoil will be stockpiled in the construction RoW, usually on the non-working side, and will be stockpiled separately to topsoil. The length of open trench at any one

Activity	Description
	time will be monitored daily for fauna entrapment. Fauna refuges (hessian bags or similar) will be placed in the trench to provide protection for fauna that temporarily occupy the trench. The trenches will be ramped at regular intervals to allow larger fauna to escape.
Stringing	Steel pipe will be trucked to the construction site and sections laid end-to-end next to the trench as the excavation progresses from south-east to north-west. The sections will 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 will be bent to match changes in either elevation or direction of the route.
Welding	After stringing and, if required, bending, pipe sections will be welded together.
Non-destructive weld testing	The pipe welds will be inspected using x-ray or ultrasonic equipment as per AS2885.2.
Joint coating	The area around the weld will be grit blasted and then coated with a protective coating to prevent corrosion.
Padding	Where required, padding machines will be used to sift the excavated subsoil to remove coarse materials to prevent damage to the pipe coating. The remaining fine material will be used to pad beneath and on top of the buried pipe. In some instances (e.g. rocky soils), imported sand or foam pillows will be used for padding.
Lowering in	Side booms or excavators will be used to lower the welded pipe into the trench. Trench spoil will be returned to the trench and material compacted to minimise the likelihood of subsidence of material over the pipe.
Backfilling	The period of time that any part of the trench is left open will be minimised. Trenches will be stopped and started at regular intervals with “plugs” between these sections to allow for unimpeded movement of fauna that may fall into the trench. Where possible, trenching will be delayed until completion of welding and joint coating as part of ensuring that the trench is open for the minimum amount of time necessary.
Road crossings	All roads intersecting the pipeline alignment are unsealed and open cut methods will be used to install the pipeline. Should crossing a sealed section of the Tanami Road be required to accommodate site constraints, bored installation would be employed.
Watercourse crossings	The preference will be to install the pipeline at dry or no-flow using open cut (trenching) methods during the construction period. Erosion and sediment control measures will be implemented to ensure there are no significant impacts at these crossings. Consideration will be given to the use of horizontal direct drilling at water course crossings that have high environmental or cultural values.
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. During hydrostatic testing, the pipeline will 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 will then be conducted. Post each section of the pipeline being tested, they hydrotest water will generally be pumped forward in the pipeline for re-use in the next section. The sourcing of hydrotest water is yet to be determined but may include one or a mixture of options including: groundwater extraction from local existing bores, groundwater extraction from temporary bores constructed for the project, or cartage from more distant sources. Extraction of groundwater will be in accordance with water extraction licensing under the *Water Act*.

Activity	Description
	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 chemicals 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. Disposal of the hydrotest water will be undertaken to an approved plan and in accordance with discharge licensing requirements under the *Water Act*. It is generally anticipated (and subject to licensing requirements and landholder approval) that hydrotest water will be discharged to the surrounding environment. Discharge would be once-off during commissioning of the pipeline.
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 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 of the RoW using appropriate species will be undertaken to restore vegetation cover if and where areas do not respond to the initial rehabilitation treatment, as evaluated by monitoring.

4.4 Other construction requirements

4.4.1 Construction camps

A workforce of between 250 and 350 people will be required during the construction period. The construction workforce is proposed to be accommodated in a temporary workcamp, generally established no greater than 50 km from the work front. The workcamps will have a capacity of 120 people each and will move to a new location at approximately 100 km intervals, as construction proceeds. Construction will initially require two camps and at the peak require up to four operational camps with varying occupancy and water usage.

4.4.2 Water

Water will be required for potable use (i.e. accommodation camps), dust suppression and hydrotesting. The peak requirements are as follows:

- Potable camp water: 0.54 kL /per day
- Construction/Process Water: 4.54 kL/per day (roads and hydrotesting).

The source of the water supply is yet to be determined and will be evaluated during further design. A combination of the following options is likely:

- Established bores near the pipeline alignment
- Drilling of new bores where practical
- Constructed turkey nest dams to contain bore supplies
- Cartage from more distant water sources
- Potable water to be carted in from Alice Springs.

Water extraction of groundwater for the project will be undertaken in accordance with water extraction licences issued under the *Water Act*.

4.4.3 Power

Solar power will be utilised at the metering station. There are no power requirements at the mainline valve stations. Power to the mine tie-in stations will be provided from the respective mines.

4.4.4 Waste

Construction activities will generate most of the waste arising from the proposal. Subject to consultation with the relevant local government, existing approved municipal landfill services will be used to dispose of non-hazardous waste, particularly waste deriving from construction camps.

Sewage from construction camps will be treated on-site and disposed of in accordance with the Code of Practice for On-site Wastewater Management (DoH 2014), and approval from the Department of Health.

Hazardous wastes generated during construction will include hydrocarbon waste, paints, coating residues, batteries, chemical drums and miscellaneous wastes (aerosols etc) and these will be removed from site and transported to an approved facility for treatment and disposal. The quantities of these wastes are expected to be small.

4.5 Pipeline operation

The pipeline will transport gas from the tie-in with the Amadeus Gas Pipeline to power stations at the Granites and Dead Bullock Soak mines. All permanent above ground facilities will be unmanned

The pipeline and permanent above ground facilities will be operated and maintained in accordance with the Australian Standard and industry guidelines. Maintenance crews will undertake external inspection of the pipeline at regular intervals. The asset management and maintenance requirements are prescribed in the Australian Standard 2885. A 5 m wide access track will be maintained alongside the pipeline length within the ROW. Maintenance crews will also maintain line of sight to pipeline warning signage along the pipeline by regularly removing tall woody vegetation nominally 2 m either side of the pipeline (4 m width in total).

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

No waste generation and water-use will occur during the operational phase.

4.6 Pipeline decommissioning

The Tanami Gas Pipeline will be designed with an operational life of 20 years and will be designed fit for purpose. With continued protection the pipeline may have a much longer operational life dependent on continued mining activity.

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, and the views of landholders and regulatory authorities. At the appropriate time, a detailed decommissioning and rehabilitation plan will be prepared to guide these activities.

4.7 Alternatives considered

The only alternative to the Tanami Gas Pipeline proposal is the 'do nothing' option. The implications of the 'do nothing' option would ultimately be the loss of economic benefits for the local, regional and national economies, including the loss of local, regional and national employment and business opportunities in both the short and longer term. While the works required for the transition from diesel to gas at the Granites and Dead Bullock Soak Mines do not form part of the proposed action, construction of the Tanami Gas Pipeline will facilitate this transition. The resultant reduction in the intensity of greenhouse gas and other air emissions at the mines is a significant co-benefit of the proposed pipeline. Not proceeding with the pipeline will result in continued use of existing diesel fuel at the Granites and Dead Bullock Soak Mines and higher greenhouse gas emissions intensity and higher air emissions (compared to gas generated power).

There are no alternative locations, time frames or activities that form part of the proposed action. Location of the Tanami Gas Pipeline adjacent to the Tanami Road places impacts within an existing landscape scale 'disturbance corridor' and minimises additional disturbance from access tracks that would otherwise need to be considerably longer under any other alternative alignment.

Minor deviations in the alignment will be considered during detailed design, to accommodate any environmental or cultural heritage constraints and to provide the best engineering option.

4.8 Consultation to date

DDG has consulted with the following stakeholders as a part of the initial round of engagement. Further intensive engagement will occur post the final investment decision being made.

- The Central Land Council
- Department of Trade, Business and Innovation
- Chamber of Commerce and Industry- Alice Springs
- Department of Infrastructure, Planning and Logistics
- Aboriginal Areas Protection Authority
- Local business owners and suppliers.

5 Existing environment

The existing environment in the pipeline region has been assessed using sources outlined in Table 8.

Table 8: Sources of environment data

Report section		Data source
5.1	Land use history	NT Atlas and Spatial Data Directory (http://www.ntlis.nt.gov.au/imfPublic/imf.jsp?site=nt_atlas)
5.2.1	Climate	NRM InfoNet (http://www.ntinfonet.org.au)
5.2.2	Geology, soils and landform	WorleyParsons, 2016

Report section		Data source
5.2.3	Land systems	Data held by the Department of Environment and Natural resources available from NT Maps (nrmaps.nt.gov.au)
5.2.4	Surface and groundwater hydrology	Bureau of Meteorology (http://www.bom.gov.au/water/geofabric/)
2.2.5	Flora and fauna	NR Maps, Mattiske 2017, BAAM 2016, Protected Matters Report, Atlas of Living Australia (ALA)
5.2.6	Significant sites or features	NR Maps Mattiske 2017, BAAM 2016
5.3.1	Aboriginal Sacred Sites	NA (Central Land Council to undertake the appropriate consultation)
5.3.2	Aboriginal archaeology	NA (archaeological survey to be completed)
5.3.3	Historic cultural heritage	NT Heritage Register, National Heritage Register
5.4	Social and economic environment	Census data (ABS 2008)

5.1 Land use history

The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures and is located close to the Tanami Road. While for the most part, the pipeline will not be located within the road easement, its close proximity means that the pipeline will pass through the 'disturbance corridor' established by the road. While condition of the land is to be confirmed during further survey, pressures resulting from higher presence of weeds are likely, along with those arising from grazing by both stock and feral animals. Land contamination is considered unlikely and there are no sites along the alignment known to the NT EPA that have been assessed as potentially contaminated and requiring a statement of environmental audit.

5.2 Natural environment

5.2.1 Climate

The closest long term weather station to the pipeline corridor is at Yuendemu. Rainfall in the region occurs primarily over the months November to March. The average rainfall is 362 mm. Temperatures are typical of an arid inland environment with cooler months in May-August. Detailed climate statistics are provided in Appendix A

5.2.2 Geology, soils and landform

A desktop assessment conducted by WorleyParsons (2016) has indicated that the majority of the pipeline alignment is underlain by soil formations including aeolian (mobile dune) sands, alluvial deposits of clay, silt and sands (ephemeral creeks and rivers); and red earth (colluvium and sheetwash) comprising silt, sand clay and minor gravel. Bedrock outcrop or subcrop is likely to be present along several sections of the pipeline alignment. The rock types vary from sedimentary (sandstone, mudstone and conglomerate), igneous (granite and granodiorite) and metamorphic (schist, gneiss and migmatite).

The WorleyParsons (2016) assessment indicated that the following ground conditions along the alignment are likely:

- Soils: 385 km (88% of alignment)

- Calcrete, silcrete and lateritic limestone: 29.5 km (7% of alignment)
- Weathered bedrock: 18 km (4% of alignment)
- Vein quartz rubble: 4.5 km (1% of alignment).

5.2.3 Land systems

Land systems traversed by the pipeline alignment are shown in Figure 2 and set out in Table 9.

Table 9: Land systems traversed by Tanami Gas Pipeline study area

Land system	Description	Indicative proportion of the RoW*
Alluvial floodplains	Alluvial floodplains, swamps, drainage depressions and alluvial fans; sandy, silty and clay soils on Quaternary alluvium	25%
Desert dunefields	Dunefields with parallel linear dunes, reticulate dunes and irregular or aligned short dunes; red sands	0% (within buffer)
Desert sandplains	Level to undulating sandplains with red sands	60%
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	<5%
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	<5%
Granite ranges	Rugged mountain ranges on gneiss, schist and granite; outcrop with shallow, gritty and stony soils	0% (within buffer)
Lateritic plains and rises	Plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	0% (within buffer)
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	5%
Salt pans	Salt pans with waterlogged saline clays and fringing dunes	<5%
Sandstone hills	Low hills, hills and stony plateaux on sandstone, siltstone, quartzite and conglomerate (deeply weathered in places); outcrop with shallow stony soils	<5%
Sandstone ranges	Rugged ranges on quartzite, sandstone and conglomerate; outcrop with shallow, stony sandy soils	0% (within buffer)
Sandstone plains and rises	Plains, rises and plateaux on mostly on sandstone, siltstone, claystone, shale and some limestone; commonly shallow soils with surface stone and rock outcrop	0% (within buffer)

* The Indicative proportion of the route is rounded to the nearest 5%, the actual 30m RoW may change with minor realignments (e.g. due to environmental or cultural heritage constraints)

Surface and groundwater hydrology

Watercourses crossed by the pipeline alignment are shown in Figure 3 and comprise ephemeral creeks, holding water during periods of significant rainfall. A number of watercourse crossings in the south-eastern section of the alignment are associated with drainage into Lake Lewis which is a large

ephemeral saline lake fed by Napperby Creek and other small ephemeral creeks. The lake system comprises areas of saltpans, claypans and associated saline lakes. When inundated Lake Lewis is relatively deep and standing water may last up to six months (DNRETAS 2017). At its closest, the pipeline alignment passes approximately 5 km from Lake Lewis.

Groundwater in the region comprises palaeozoic and pre-cambrian fractured rock aquifers with low permeability (BoM 2010).

5.2.4 Significant sites or features

Sites of Conservation Significance

The Northern Territory Government has identified 67 sites of conservation significance SoCS across the NT. These sites represent some of the most important areas for biodiversity conservation. The Tanami Gas Pipeline would pass through the following sites of conservation significance:

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).

The Greater MacDonnell Ranges SoCS (site number 55) occurs in the regions but does not intersect the RoW. The intersection of the pipeline alignment with the Sites of Conservation Significance is shown in Figure 4.

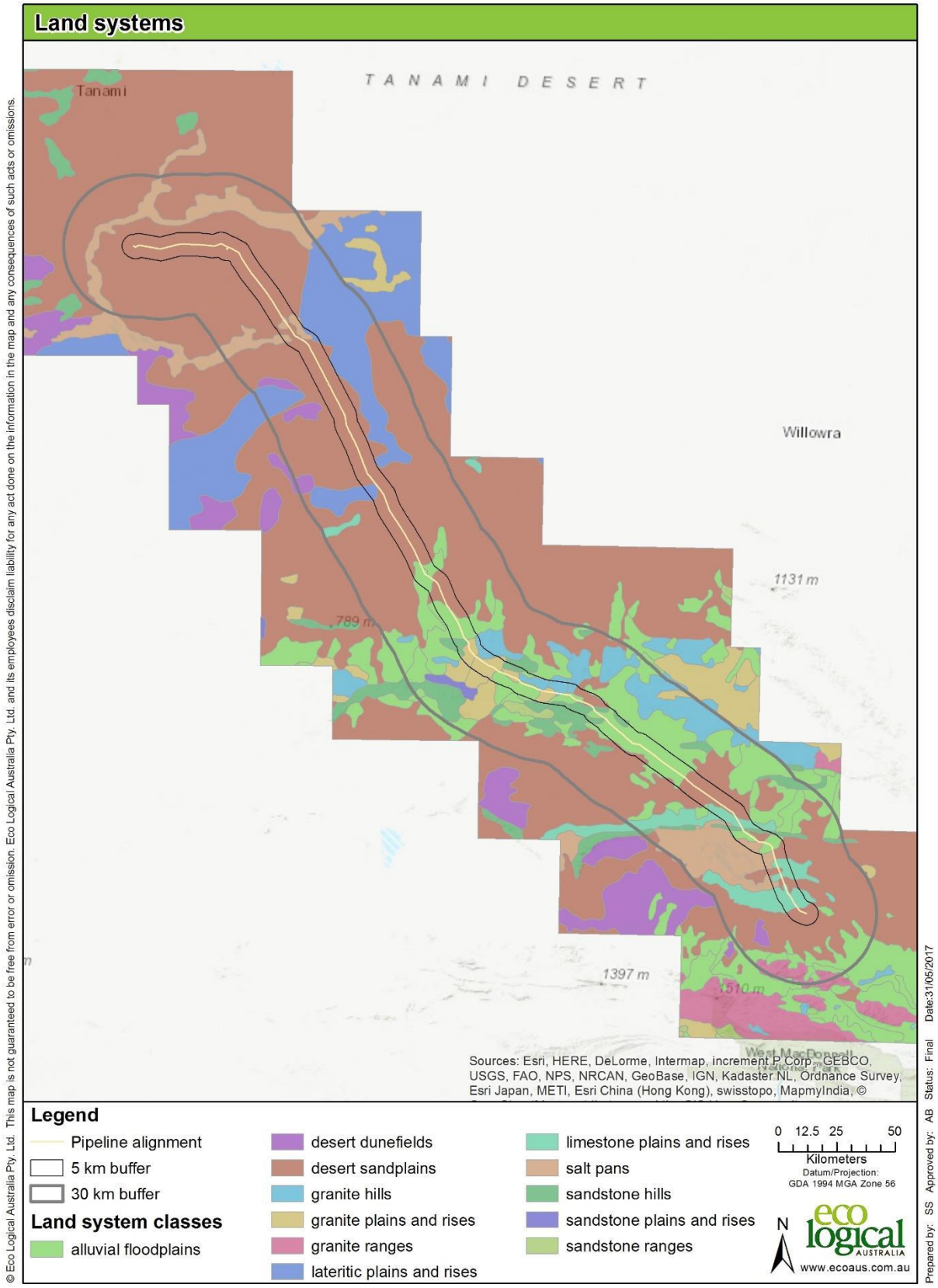


Figure 2: Location of pipeline alignment in relation to land systems

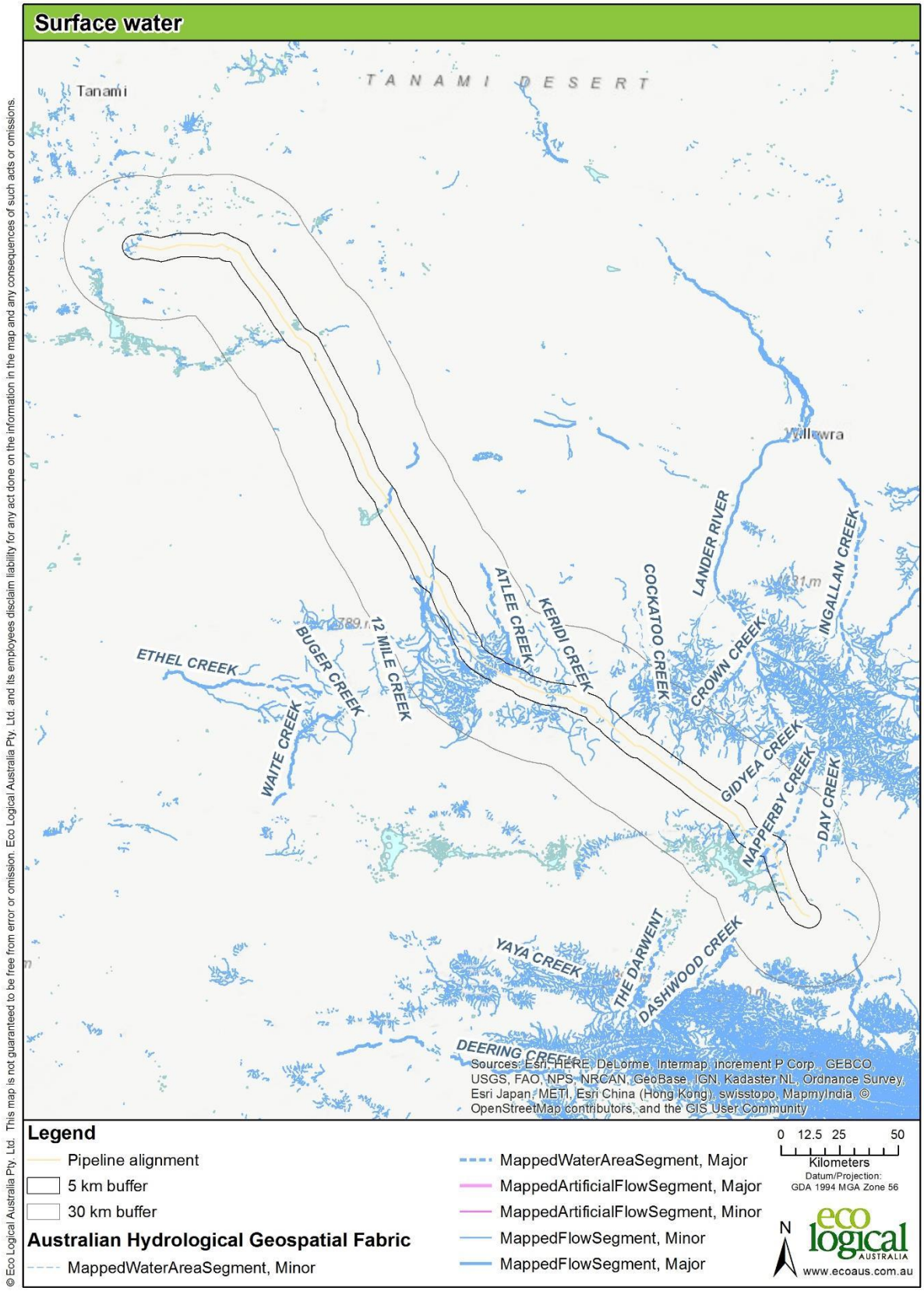


Figure 3: Location of pipeline alignment in relation to surface water features

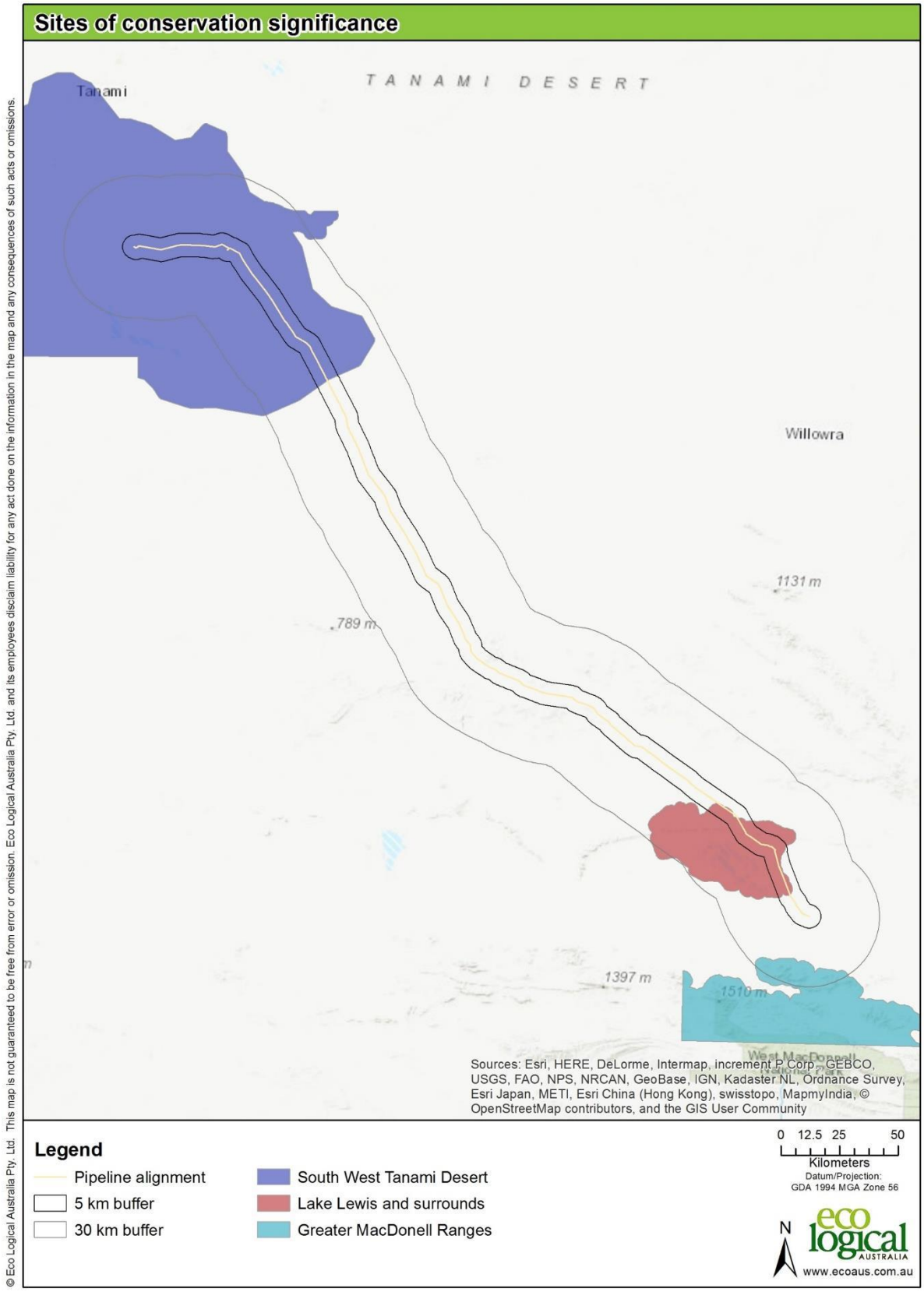


Figure 4: Location of pipeline alignment in relation to Sites of Conservation Significance

Sites of Botanical Significance

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

The pipeline corridor intersects four sites of botanical significance: Lake Lewis, Yuendumu South, Dead Bullock Soak, and Western Tanami Paleodrainage Systems (Figure 5). The Central Mount Wedge and Tanami Paleodrainage System Extension sites of botanical significance occur in the region but do not intersect the RoW.

National Parks, Conservation Reserves and Indigenous Protected Areas

The western portion of the pipeline passes through the Southern Tanami Indigenous Protected Area (IPA), this is the largest declared IPA and is managed by the Warlpiri Ranger group (Figure 6). The nearest national park is the West MacDonnell National Park, approximately 50 km to the south of the tie-in with the Amadeus Gas Pipeline.

5.2.5 Flora and fauna

Bioregions

The pipeline corridor passed through the Burt Plain, Great Sandy Desert and Tanami bioregions (Figure 7). Key environmental characteristics of these bioregions are outlined in Table 10.

Vegetation

Eight broad vegetation communities occur in the region of the pipeline (Figure 8). Of these, 4 occur within the 30 m RoW, including 10 vegetation subtypes (classified to National Vegetation Inventory System (NVIS) level 4) (Figure 8, Table 11). The communities mapped are not threatened or locally restricted, as they extended well beyond the proposed alignment or occur in the region, and no Threatened Ecological Communities protected under the EPBC Act occur (or have the potential to occur) in the region. Inland salt lakes also occur near the alignment and there are a range of floodplains, swamps, depressions and alluvial fans.

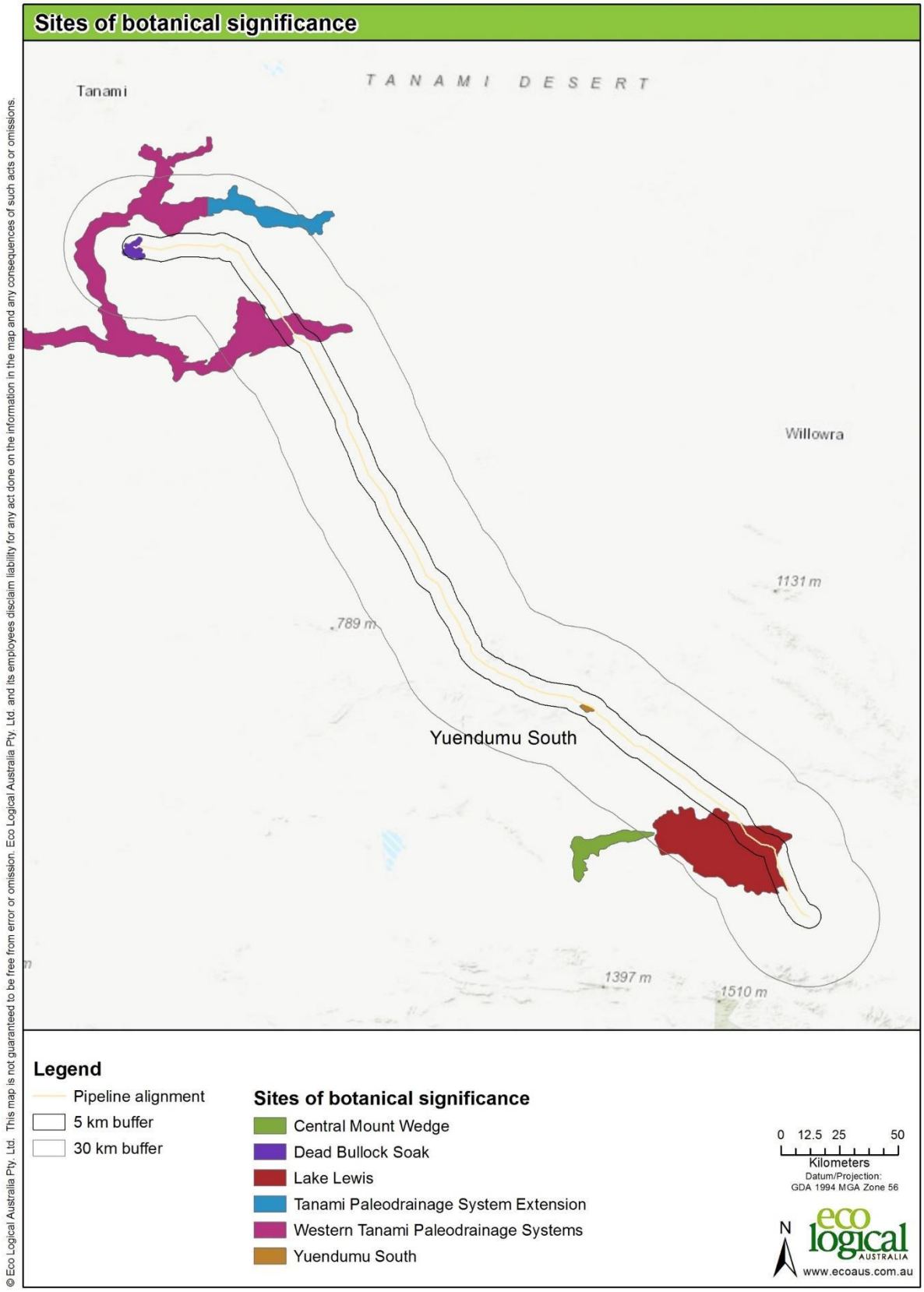


Figure 5: Location of pipeline alignment in relation to Sites of Botanical Significance

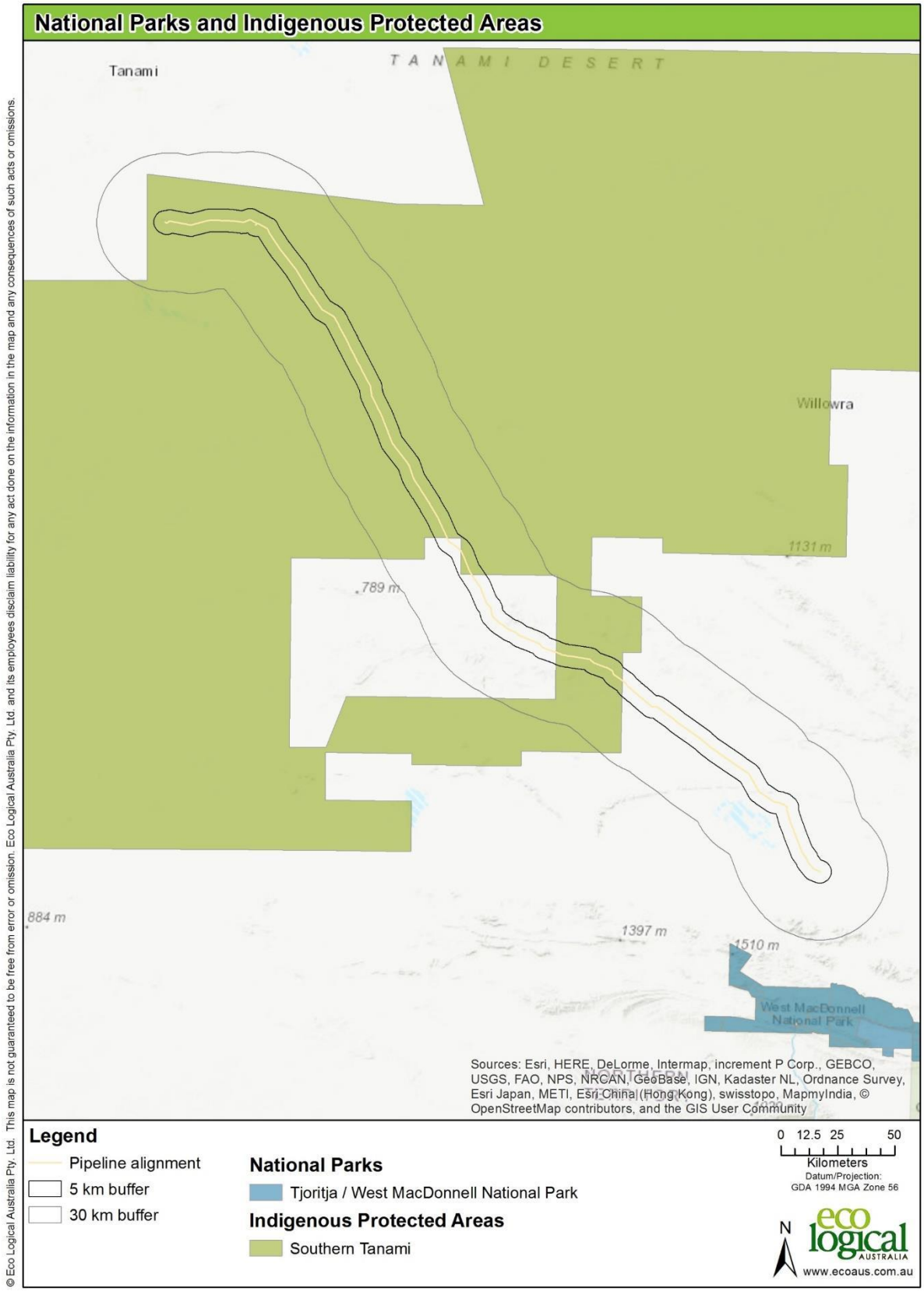


Figure 6: Location of pipeline alignment in relation to national parks and other protected areas

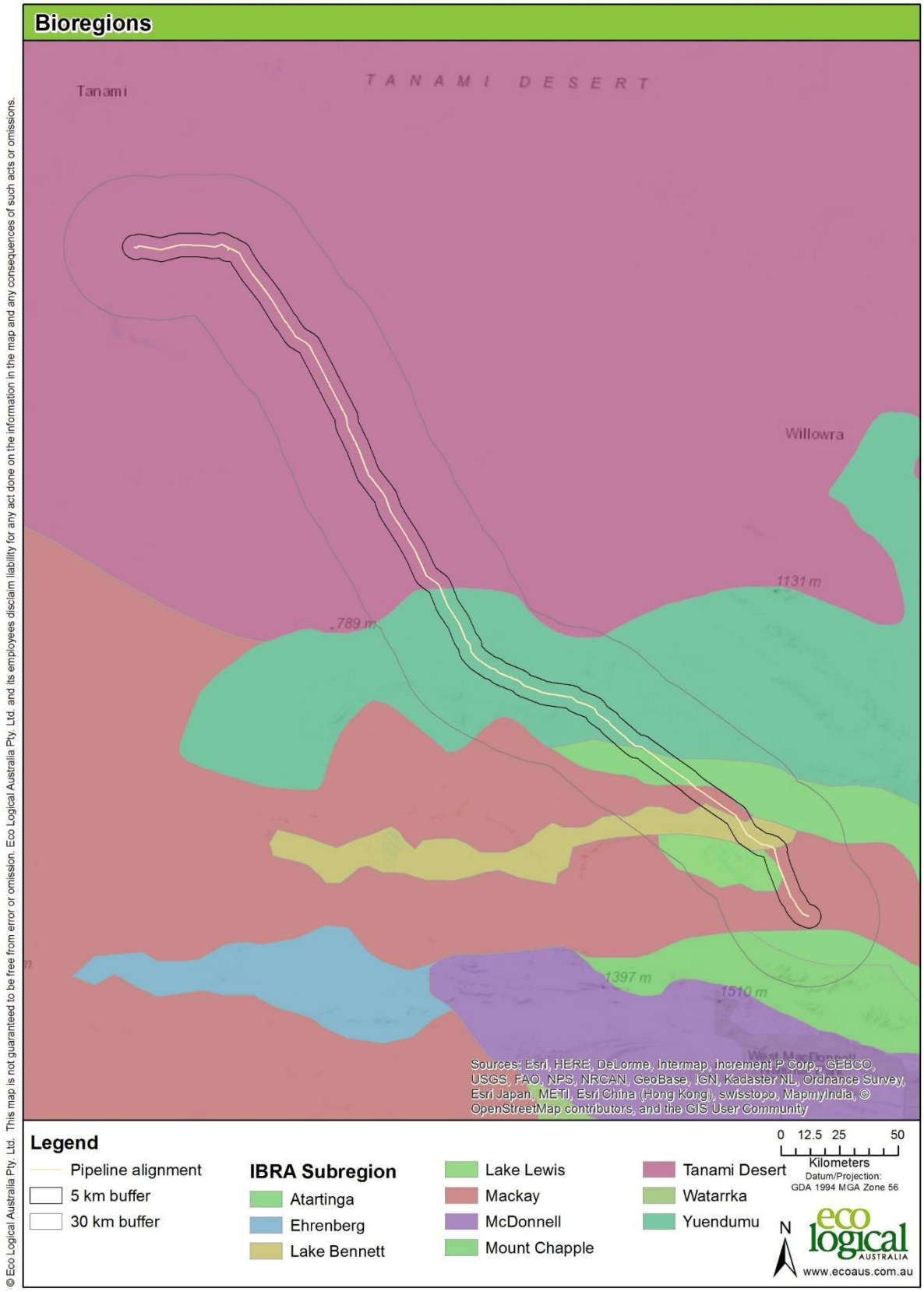


Figure 7: Location of pipeline alignment in relation to bioregions

Table 10: Key characteristics of bioregions (Bastin and ACRIS Management Committee, 2008)

	Description	Climate	Biodiversity	Key management issues
Burt Plain	The landscape of the Burt Plain bioregion is characterised by plains and low rocky ranges. Vegetation is predominantly mulga and other acacia woodlands with short grasses and forbs, and spinifex grasslands. The predominant land use is cattle grazing, with some Aboriginal land. Communities include Aileron, Barrow Creek, Ti Tree and Yuendumu.	The climate of the Burt Plain bioregion is arid with predominantly summer rainfall. Spatially averaged median (1890–2005) rainfall is 243 mm (April to March rainfall year).	For the Biodiversity Working Group indicator, 'Threatened species', there are 3 threatened plant species, 18 threatened mammal species, including 8 extinct species, 5 threatened bird species, 1 threatened reptile species. A systematic regional biodiversity survey is currently under way in this bioregion	There are no known regional issues of concern.
Great Sandy Desert	The Great Sandy Desert bioregion is characterised by red sand plains, dunefields and remnant rocky outcrops. Vegetation is predominantly spinifex grasslands, low woodlands and shrubs. Tenure comprises unallocated crown land, conservation reserves and Aboriginal land, with the main industries being tourism, mining and mineral exploration. Major population centres are Telfer (Western Australia) and Yulara (NT).	The Great Sandy Desert bioregion has an arid, tropical climate in the north, grading to temperate– subtropical in the south. Rainfall is generally variable and unpredictable. Spatially averaged median (1890– 2005) rainfall is 223 mm (April to March rainfall year).	In the Great Sandy Desert bioregion, there are 1 threatened plant species, 24 threatened mammal species (including 10 extinct species), 3 threatened bird species, 2 threatened reptile species, 1 threatened invertebrate species.	Key features and issues of the Great Sandy Desert bioregion include feral camel numbers have increased in recent years, fire management is an issue, particularly following sequences of wetter years that promote fuel accumulation, about 2.7% of the bioregion in WA is within the conservation estate, there is very little information on change in the rangelands of this bioregion.

	Description	Climate	Biodiversity	Key management issues
Tanami	The Tanami bioregion is found in both Western Australia (WA) and the Northern Territory (NT). Landscapes are mainly featureless sand plains with small areas of alluvial plains, low ridges and stony rises. Vegetation is predominantly spinifex hummock grassland with a tall-sparse shrub overstorey. The land is mostly Aboriginal freehold, with some pastoral leases and conservation reserves in the NT. Pastoralism, gold mining and tourism are important industries. Major population centres are Tennant Creek, Lajamanu and Ali Curung.	The climate of the Tanami bioregion is semiarid with a monsoonal influence. Rainfall is summer dominant and the spatially averaged median (1890–2005) rainfall is 298 mm (April to March rainfall year).	In the Tanami bioregion, there are 1 threatened plant species, 17 threatened mammal species (including 8 extinct species) 6 threatened bird species, 1 threatened reptile species, 1 threatened invertebrate species. There are records for 110 reptiles, 215 bird and about 1200 plant taxa	Key issues and features of the Tanami bioregion feral camels, horses and donkeys are management issues in the southeast of the bioregion; control programs are being developed. *Parkinsonia* is establishing around watering points on pastoral leases on the edge of the bioregion.

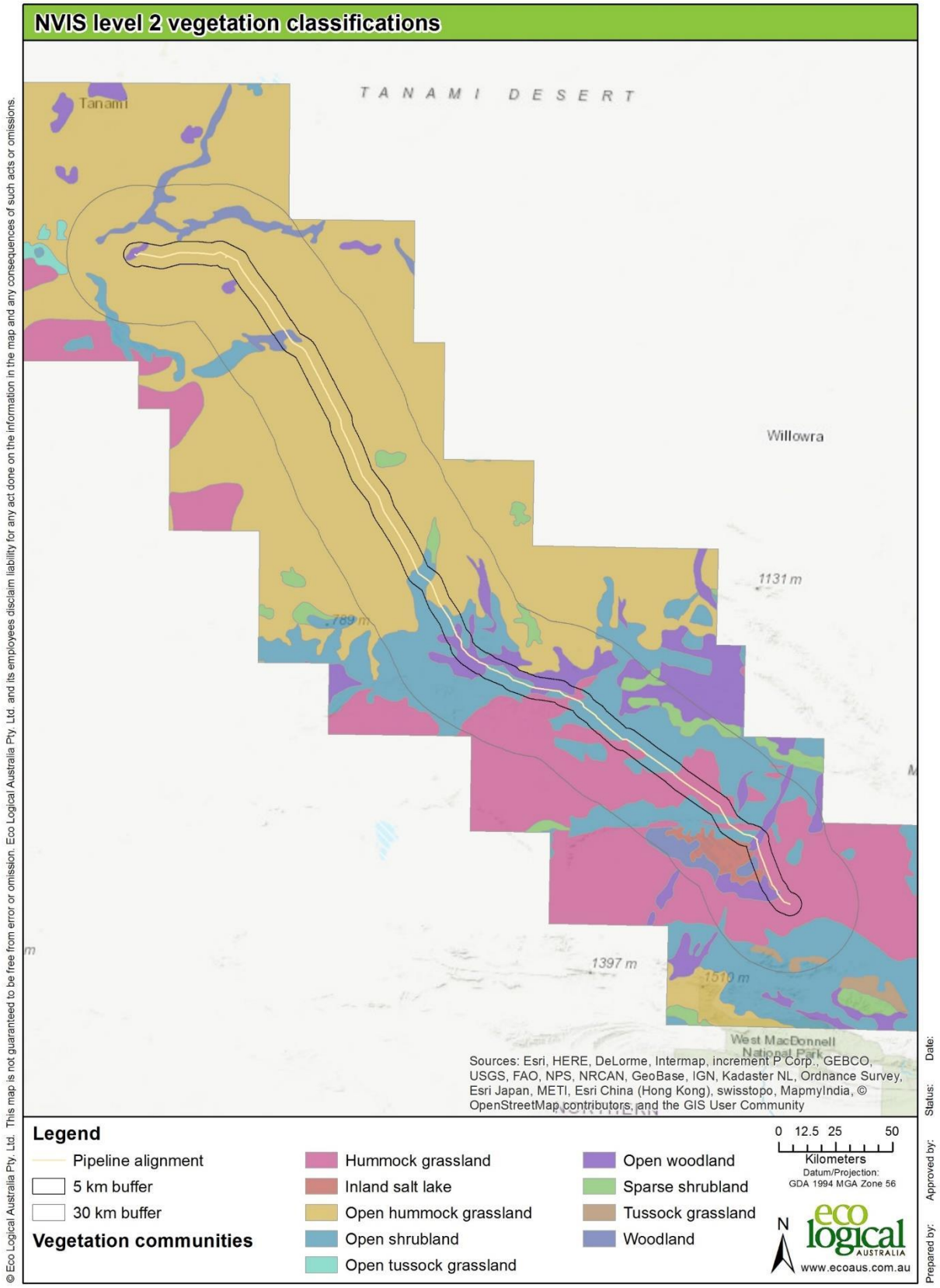


Figure 8: Pipeline alignment and vegetation communities

Table 11: Intersection of vegetation communities with Tanami Gas Pipeline

Main Structural Formation	Description	Indicative proportion of the RoW*
Hummock grassland	*Acacia* mid open mallee woodland*Acacia* mid sparse shrubland\Triodia low hummock grassland	15%
Hummock grassland	*Eucalyptus* low open mallee woodland*Acacia* mid sparse shrubland*Triodia* low hummock grassland	<5%
Hummock grassland	*Eucalyptus* low open woodland*Acacia* mid open shrubland*Triodia* low hummock grassland	<5%
Open hummock grassland	*Eucalyptus* low isolated trees*Acacia* tall sparse shrubland*Triodia* low open hummock grassland	50%
Open shrubland	*Acacia* tall open shrubland*Eragrostis* low tussock grassland	<5%
Open shrubland	*Corymbia* low woodland*Acacia* tall open shrubland*Eragrostis* low open tussock grassland	25%
Open woodland	*Acacia* low open woodland*Acacia* mid sparse shrubland*Enneapogon* low sparse tussock grassland	10%
Open woodland	*Eucalyptus* low open woodland*Acacia* mid open shrubland*Chrysopogon* low open tussock grassland	<5%
Open woodland	*Eucalyptus* low open woodland*Acacia* mid sparse shrubland*Triodia* mid hummock grassland	<5%
Woodland	*Acacia* low open woodland*Melaleuca* mid open shrubland*Triodia* low hummock grassland	<5%

* The Indicative proportion of the route is rounded to the nearest 5%, the actual 30m RoW may change with minor realignments (e.g. due to environmental or cultural heritage constraints)

Threatened flora

A desktop assessment of Northern Territory and federal databases including (the NT Flora Atlas, the Atlas of Living Australia (ALA), and the Protected Matters Search Tool) was conducted by Biodiversity Assessment and Management Pty Ltd (BAAM, 2016), and reviewed by Mattiske Consulting Pty Ltd (Mattiske 2017). The search recovered three species that are listed as threatened under the EPBC Act and/or TPWC Act (Table 12). One of these, the Bog-rush (*Schoenus centralis*), has since been removed from the EPBC Act threatened species list.

In preparing this NoI, the likelihood assessment conducted by BAAM (2016) and Mattiske (2017), were reviewed and adopted. The likelihood assessment concluded the following (see Table 12 for justification):

- Dwarf Desert Spike-rush is likely to occur within the project area
- MacDonnell Ranges Cycad is unlikely to occur

Table 12: Threatened flora species likelihood assessment

Species	Conservation listing	Likelihood of occurrence (reproduced from BAAM 2016)
Dwarf Desert Spike-rush *(Eleocharis papillosa*)	TPWC Act Vulnerable EPBC Act Vulnerable	**Likely**. There are multiple records in the broader region, including in the vicinity of the study area, associated with seasonal swamps (ALA 2016; Figure 9). This species is restricted to seasonal swamps and riverine waterholes and has been found growing in association with Coolabah Eucalyptus microtheca, Samphire Halosarcia spp., Northern Bluebush *Chenopodium auricomum* and *Eragrostis* spp (Duguid et al. 2006). Potentially suitable habitat containing this species is mapped (open woodland community) in the south of the study area.
MacDonnell Ranges Cycad (*Macrozamia macdonnellii*)	EPBC Act Vulnerable	**Unlikely.** Multiple records in the MacDonnell Ranges, however the species it restricted to the MacDonnell Ranges to the south of the project area.

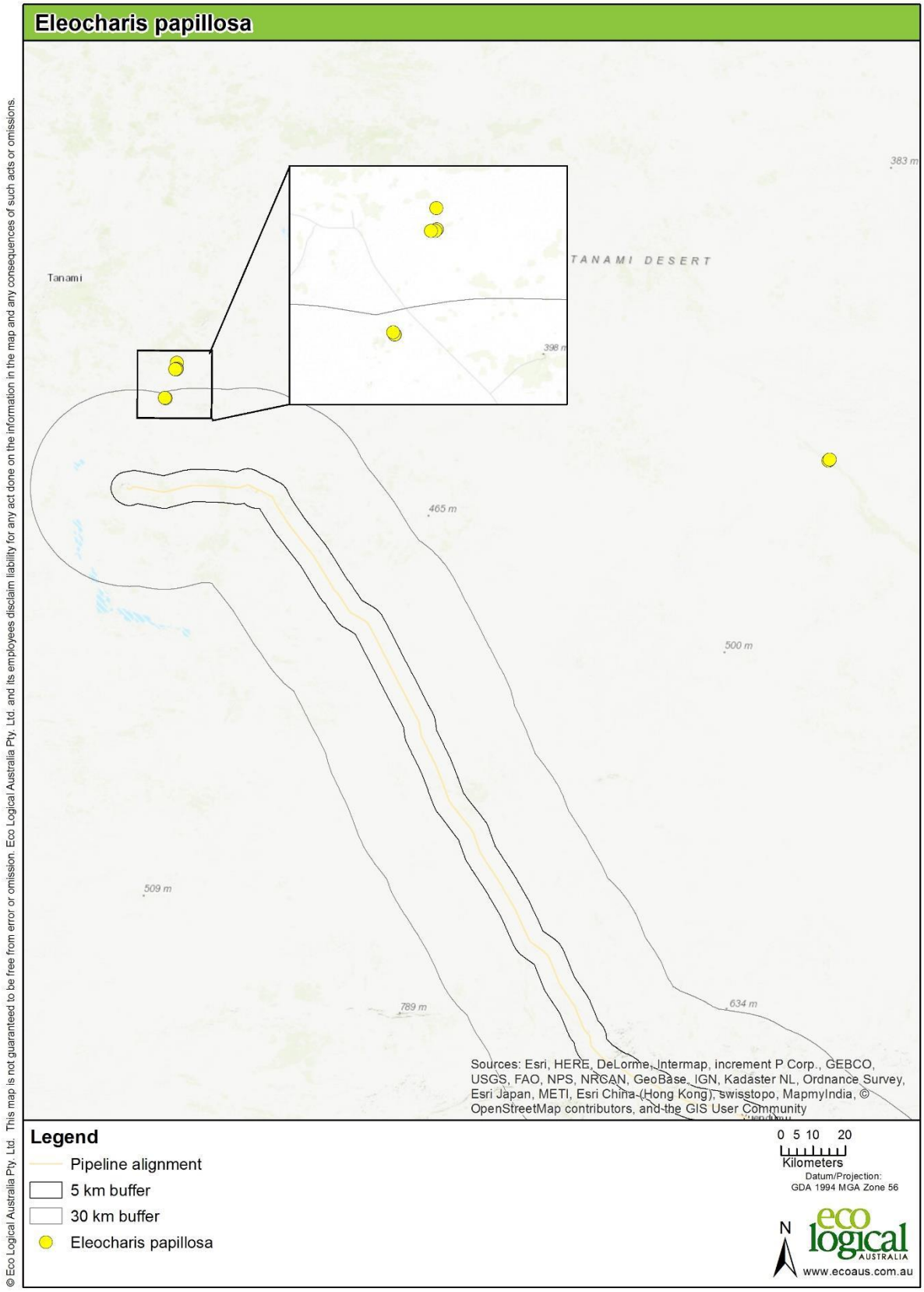


Figure 9: Dwarf Desert Spike-rush distribution

Threatened fauna

A desktop assessment of Northern Territory and federal databases (including the NT Fauna Atlas, the ALA and the Protected Matters Search Tool) was conducted by Biodiversity Assessment and Management Pty Ltd (BAAM, 2016), and reviewed and updated by Mattiske (2017). The search recovered 19 species that are listed as threatened under the EPBC Act and/or the TPWC Act (Table 13). The Curlew Sandpiper (*Calidris ferruginea*) was added to the species considered on the basis of a more recent Protected Matters Search (Appendix B). The likelihood assessment conducted by BAAM (2016) and Mattiske (2017), were reviewed and adopted, or modified (the likelihood of the Pale Field-rat occurring was reassessed as 'unlikely') (Table 13), and an assessment of the Curlew Sandpiper was undertaken. The likelihood assessment concluded the following

- The Brush-tailed Mulgara (*Dasycercus blythi*), Great Desert Skink (*Liopholis kintorei*), Greater Bilby (*Macrotis lagotis*), Grey Falcon (*Falco hypoleucos*), and Southern Marsupial Mole (*Notoryctes typhlops*) were considered likely to occur,
- The Australian Painted Snipe (*Rostratula australis*), Night Parrot (*Pezoporus occidentalis*) and the Princess Parrot (*Polytelis alexandrae*) were considered potentially occurring, and
- The Black-footed Rock-wallaby (*Petrogale lateralis*), Central Rock-rat, (*Zyzomys pedunculatus*), Common Brushtail Possum (Southern NT), (*Trichosurus vulpecula vulpecula*), Crest-tailed Mulgara, (*Dasycercus cristicauda*), Curlew Sandpiper, (*Calidris ferruginea*), Desert Sand Skipper, (*Croitana aestiva*), Golden Bandicoot, (*Isoodon auratus*), Mallee Fowl, (*Leipoa ocellata*), Masked Owl , (mainland Top End), (*Tyto novaehollandiae kimberli*), Pale Field-rat, (*Rattus tunneyi*), Red Goshawk, (*Erythrotriorchis radiatus*), and the Spencers Land Snail, (*Bothriembryon spenceri*) were considered unlikely to occur.

Table 13: Threatened fauna likelihood assessment

Species	TPWC Act listing	EPBC Act listing	Likelihood of occurrence (reproduced from BAAM 2016; modified as per Mattiske 2017)
Brush-tailed Mulgara (*Dasycercus blythi*)	Vulnerable	Not listed	**Likely**. Multiple records have been obtained throughout the alignment (ALA 2016; Figure 10). The presence of Brush-tailed Mulgara was also reported in a recent environmental impact study to the west of the study area (EcOz Environmental Services 2013). This species shelters in burrows during the day (Van Dyck and Strahan 2008). It occurs in mature spinifex grasslands, particularly near paleo-drainage systems or drainage lines in sandplain or sand dune habitats (Van Dyck and Strahan 2008). The various hummock grassland communities mapped in the study area (Figure 4), are expected to contain areas of suitable habitat for this species.
Great Desert Skink (*Liopholis kintorei*)	Vulnerable (as *Egernia kintorei*)	Vulnerable	**Likely**. There are multiple records, including on the pipeline alignment between Tanami and Yuendumu (ALA 2016, Figure 11). This skink digs a complex communal burrow system (Cogger 2014). It is found in in sandplains and adjacent swales with spinifex grassland and scattered shrubs (Wilson and Swan 2010, Cogger 2014), and in the Tanami Desert, in paleodrainage lines on lateritic soils supporting *Melaleuca* shrubs (DotE 2016a). Within the study area, suitable habitat for this species is most likely to be present in woodland vegetation communities, but could also occur in hummock grassland (Figure 8).
Greater Bilby (*Macrotis lagotis*)	Vulnerable	Vulnerable	**Likely**. Multiple records have been obtained throughout the study area (ALA 2016, Figure 12). The presence of Greater Bilby was also reported in a recent environmental impact study to the west of the study area by EcOz Environmental Services (2013). This species shelters in burrows during the day (Van Dyck and Strahan 2008). It occurs principally in association with laterite with drainage lines and to a lesser extent with sandplain and dune systems (Southgate and Carthew 2007). In the study area, suitable habitat for this species is most likely to be present in vegetation communities that contain hummock grassland (Figure 8, Table 11).
Grey Falcon (*Falco hypoleucos*)	Vulnerable	Not listed	**Likely**. Records have been obtained from scattered locations throughout the study area (ALA 2016, Figure 13). This species is associated with areas with scattered trees. It nests in tall trees along drainage lines (Marchant and Higgins 1993). There is potential for the species to occur in any of the vegetation communities throughout the study area; however, the most important potential habitat would include areas with tree-lined drainage channels.

Species	TPWC Act listing	EPBC Act listing	Likelihood of occurrence (reproduced from BAAM 2016; modified as per Mattiske 2017)
Southern Marsupial Mole (*Notoryctes typhlops*)	Vulnerable	Not listed	**Likely**. Records have been obtained 20 km west of the alignment at Sangsters Bore, and in proximity to the alignment southeast of Yuendumu (ALA 2016; Figure 14). This species is found in soft, sandy soils on dunes, sandy plains, and river flats, most commonly on well-vegetated dunes (Van Dyck and Strahan 2008). Most of the vegetation communities mapped in the study area (Figure 8) have potential to provide suitable habitat for this species, but restricted to areas of soft, sandy soils.
Australian Painted Snipe (*Rostratula australis*)	Vulnerable	Endangered	**Potential**. Three records have been obtained from the Yuendumu area (ALA 2016; Figure 15). This species is mainly associated with wetland areas containing low vegetation (Pizzey and Knight 2007). In the arid zone, its sporadic occurrence is effectively restricted to seasonal swamps (Marchant and Higgins 1993). Areas of potential habitat within the study area would be restricted to areas that may be seasonally inundated, and which may form temporary wetlands.
Night Parrot (*Pezoporus occidentalis*)	Critically endangered	Endangered	**Potential**. There is a single, historical record in the vicinity of the study area (ALA 2016; Figure 16). Once thought extinct, this cryptic species is still considered to be extremely rare (DotE 2016b). It occurs in areas with large clumps of spinifex in spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans (Higgins 1999). Despite its rarity, it has potential to occur in a variety of hummock grassland and/or open shrubland communities in the study area (Figure 8).
Princess Parrot (*Polytelis alexandrae*)	Vulnerable	Vulnerable	**Potential**. Records have been obtained from the study area historically (none post-1970, ALA 2016; Figure 8) and sand flats in the arid zone (Pizzey and Knight 2007). It is nomadic, moving into areas within its broad distribution when conditions are favourable (Higgins 1999). Suitable habitat is present in the study area, particularly in the open woodland vegetation communities (Figure 8); however, there are no recent records.
Black-footed Rock-wallaby (*Petrogale lateralis*)	Not listed	Vulnerable	**Unlikely**. Records of this species were obtained in the Tanami Desert region prior to the late 1970s (ALA 2016). It occurs in association with rocky outcrops and ranges and in the broader region is now restricted to the MacDonnell Ranges, which are south of the study area (Van Dyck and Strahan 2008).

Species	TPWC Act listing	EPBC Act listing	Likelihood of occurrence (reproduced from BAAM 2016; modified as per Mattiske 2017)
Central Rock-rat (*Zyzomys pedunculatus*)	Endangered	Endangered	**Unlikely**. This is considered an eruptive species which builds up numbers quickly during boom period (Van Dyck and Strahan 2008). Records of this species were obtained in the Tanami Desert region prior to the 1970s (ALA 2016). It occurs in association with shrubby and grassy areas on rock outcrops and is now restricted to the ranges immediately west of Alice Springs (Van Dyck and Strahan 2008).
Common Brushtail Possum (Southern NT) (*Trichosurus vulpecula vulpecula*)	Endangered	Not listed	**Unlikely**. This species previously occurred in the Tanami Desert; however, there are no recent records (ALA, 2016). It is now restricted to riverine habitats near rock outcrops and ranges (Pavey and Ward 2012), habitats that are not present within the study area.
Crest-tailed Mulgara (*Dasycercus cristicauda*)	Vulnerable	Vulnerable	**Unlikely.** Confirmed records (based on recent taxonomic changes) only occur south-east of Alice Springs.
Curlew Sandpiper (*Calidris ferruginea*)	Critically Endangered, Migratory	Vulnerable	**Unlikely**. In the NT, Curlew Sandpipers have been recorded from most coastal areas and these are important nonbreeding and stop-over areas. They have also been reported at Alice Springs and Newhaven Station (presumed to be migrants passing through). These non-breeding birds forage around coastal brackish lagoons, intertidal mud and sand flats, estuaries, saltmarshes and occasionally on inland freshwater wetlands.
Desert Sand Skipper (*Croitana aestiva*)	Not listed	Endangered	**Unlikely**. Only known from the MacDonnell and Chewings Ranges, west of Alice Springs. Restricted to ranges to the south of the project area.
Golden Bandicoot (*Isoodon auratus*)	Endangered	Vulnerable	**Unlikely.** This species has previously been recorded in the vicinity of the proposed alignment; however, the last record is from The Granites in 1952 (ALA 2016). It is now believed to have been extirpated from the study area. Populations previously occurred in association with wooded hummock and tussock grasslands in central Australia, but is now restricted to other habitats near the coast in northern and north-western Australia (Van Dyck and Strahan 2008).
Mallee Fowl (*Leipoa ocellata*)	Critically endangered	Vulnerable	**Unlikely**. Limited records of this species were obtained in the Tanami Desert region up until the 1960s (ALA 2016). It occurs in association with mallee woodland, with mid slope rocky shrublands as well as sandy tall Eucalypt woodlands. Although a wide-ranging species, it is now considered to have been extirpated from the broader region (Marchant and Higgins 1990).

Species	TPWC Act listing	EPBC Act listing	Likelihood of occurrence (reproduced from BAAM 2016; modified as per Mattiske 2017)
Masked Owl (mainland Top End) (*Tyto novaehollandiae kimberli*)	Vulnerable	Vulnerable	**Unlikely**. Known only from northern NT, habitats unsuitable for the species.
Pale Field-rat (*Rattus tunneyi*)	Vulnerable	Not listed	**Unlikely**. Although old records of the species exist in the region, the species has been extirpated from the southern, arid part of its former range.
Red Goshawk (*Erythrotriorchis radiatus*)	Vulnerable	Vulnerable	**Unlikely**. Known only from far northern NT, habitats unsuitable for the species.
Spencers Land Snail (*Bothriembryon spenceri*)	Vulnerable	Not listed	**Unlikely**. Found in in leaf litter under fig trees and/or rocky areas, no records in vicinity of pipeline and suitable habitats may not occur.

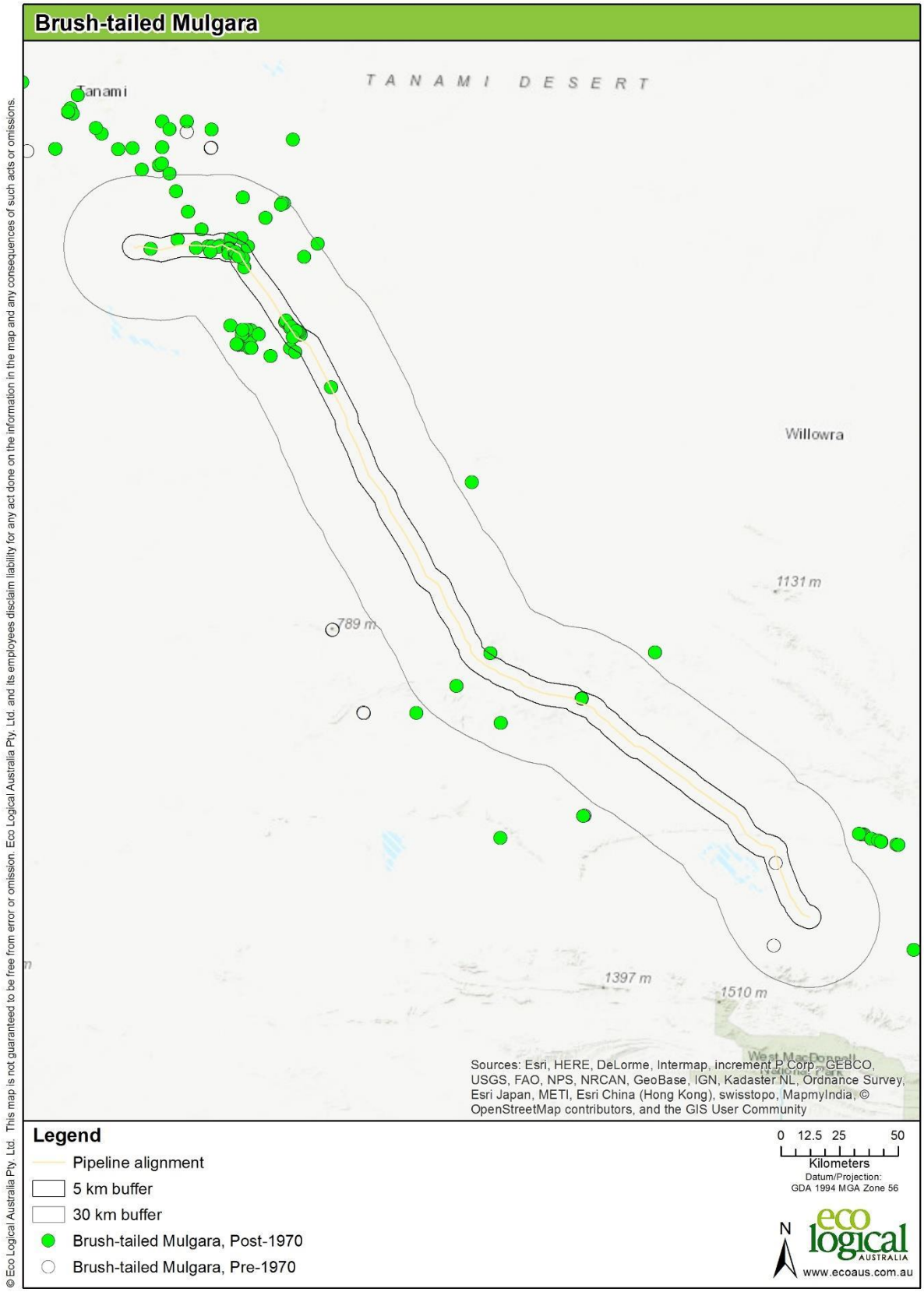


Figure 10: Brush-tailed Mulgara distribution

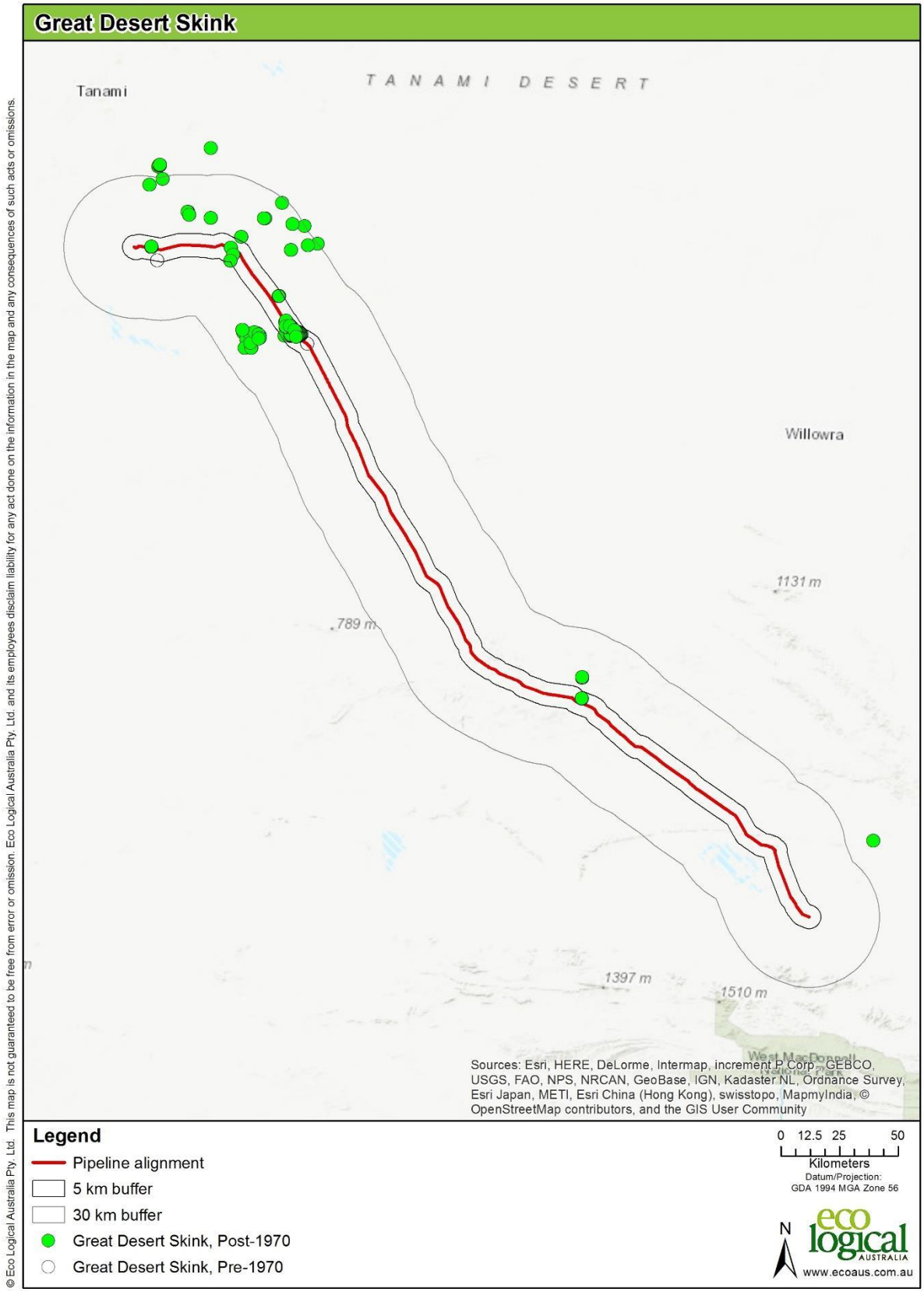


Figure 11: Great Desert Skink distribution

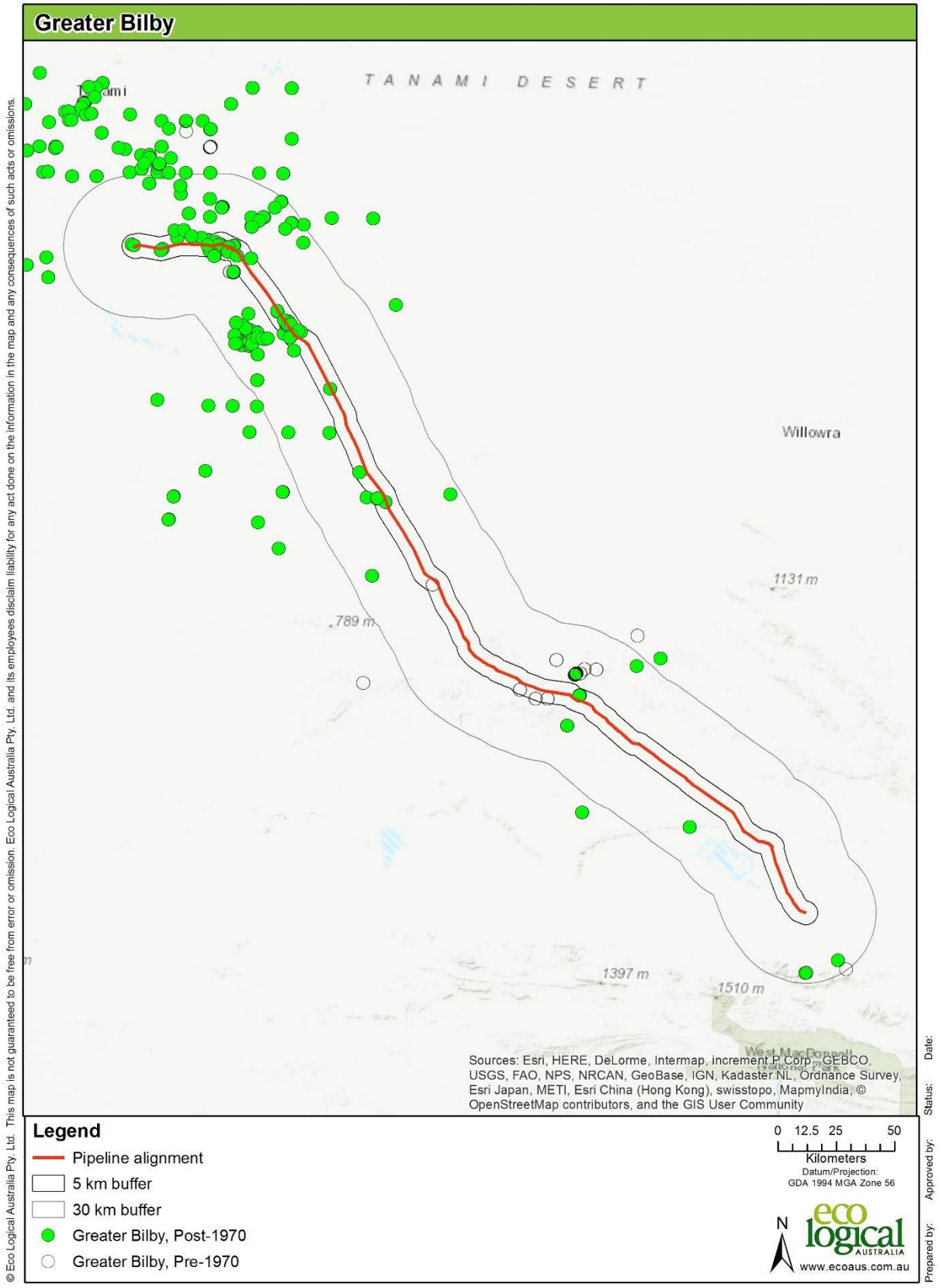


Figure 12: Greater Bilby distribution

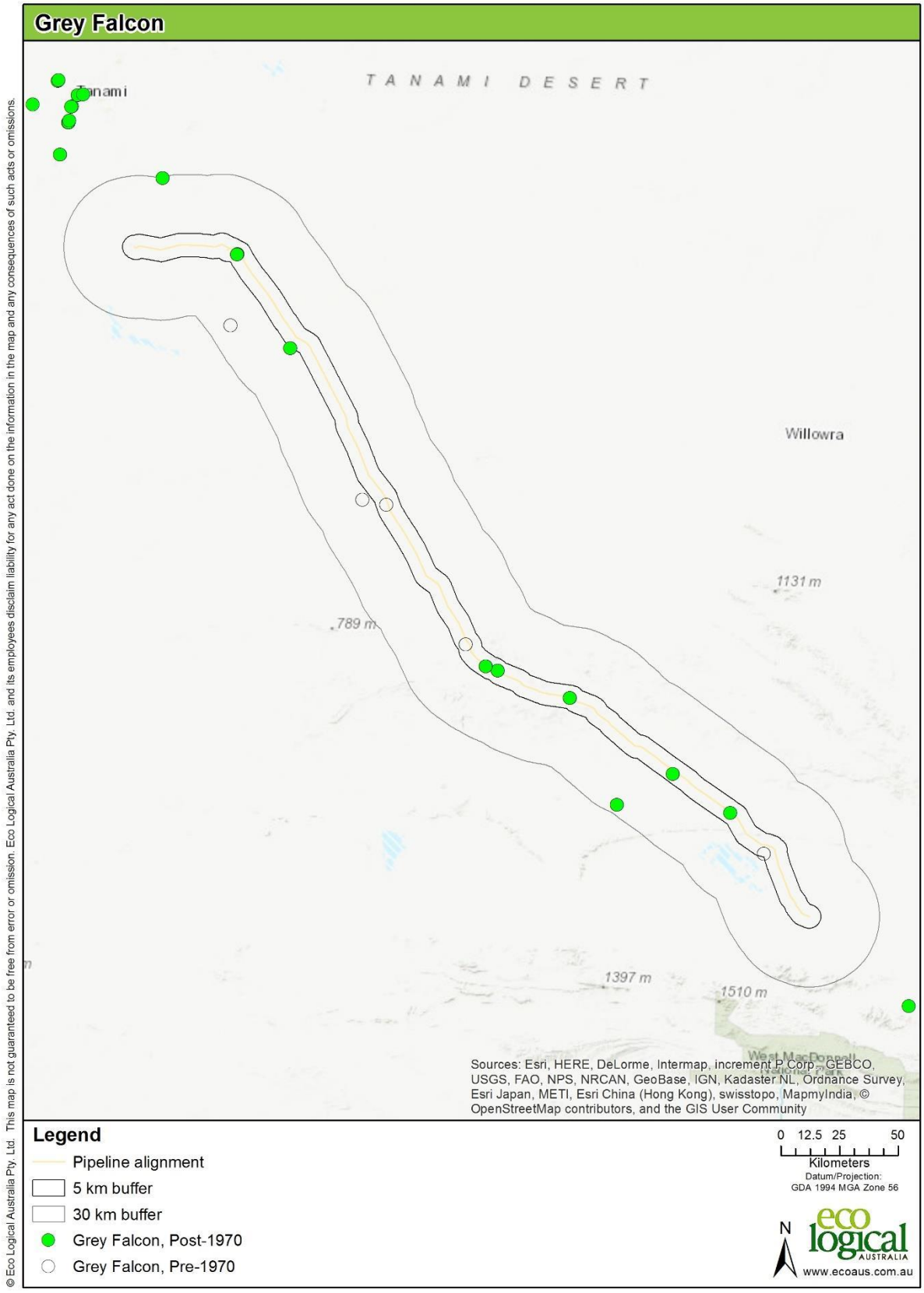


Figure 13: Grey Falcon distribution

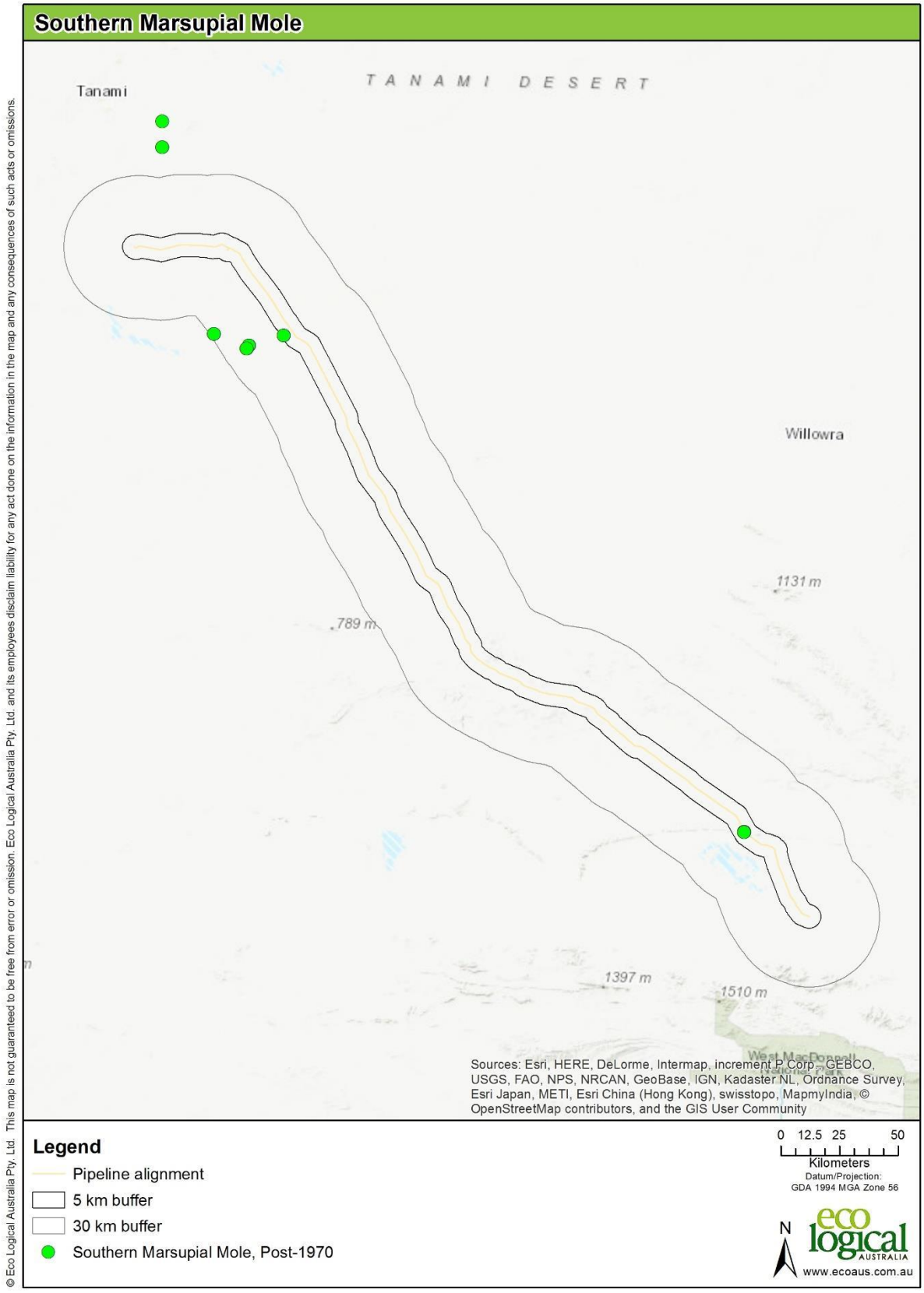


Figure 14: Southern Marsupial Mole distribution

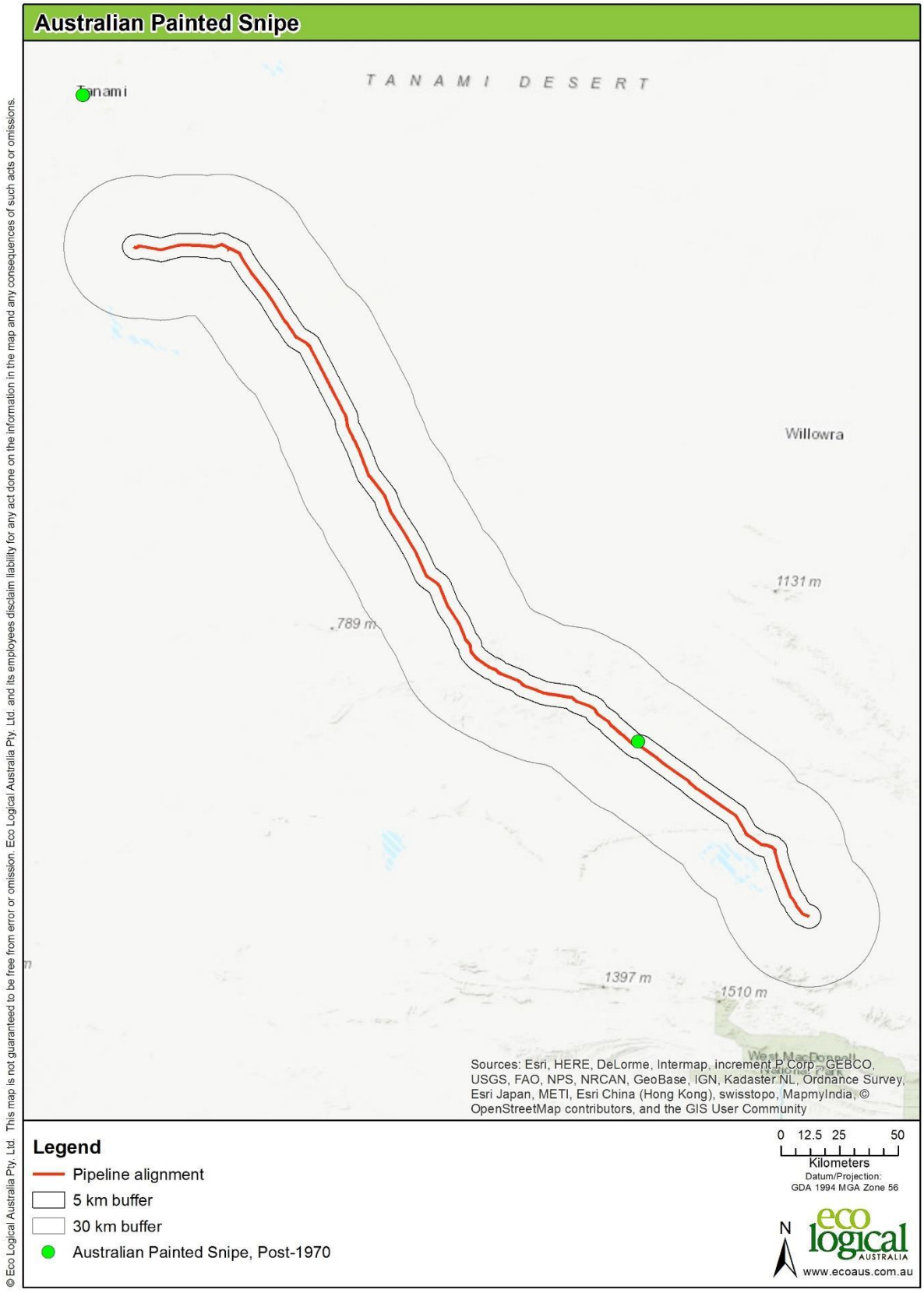


Figure 15: Australian Painted Snipe distribution

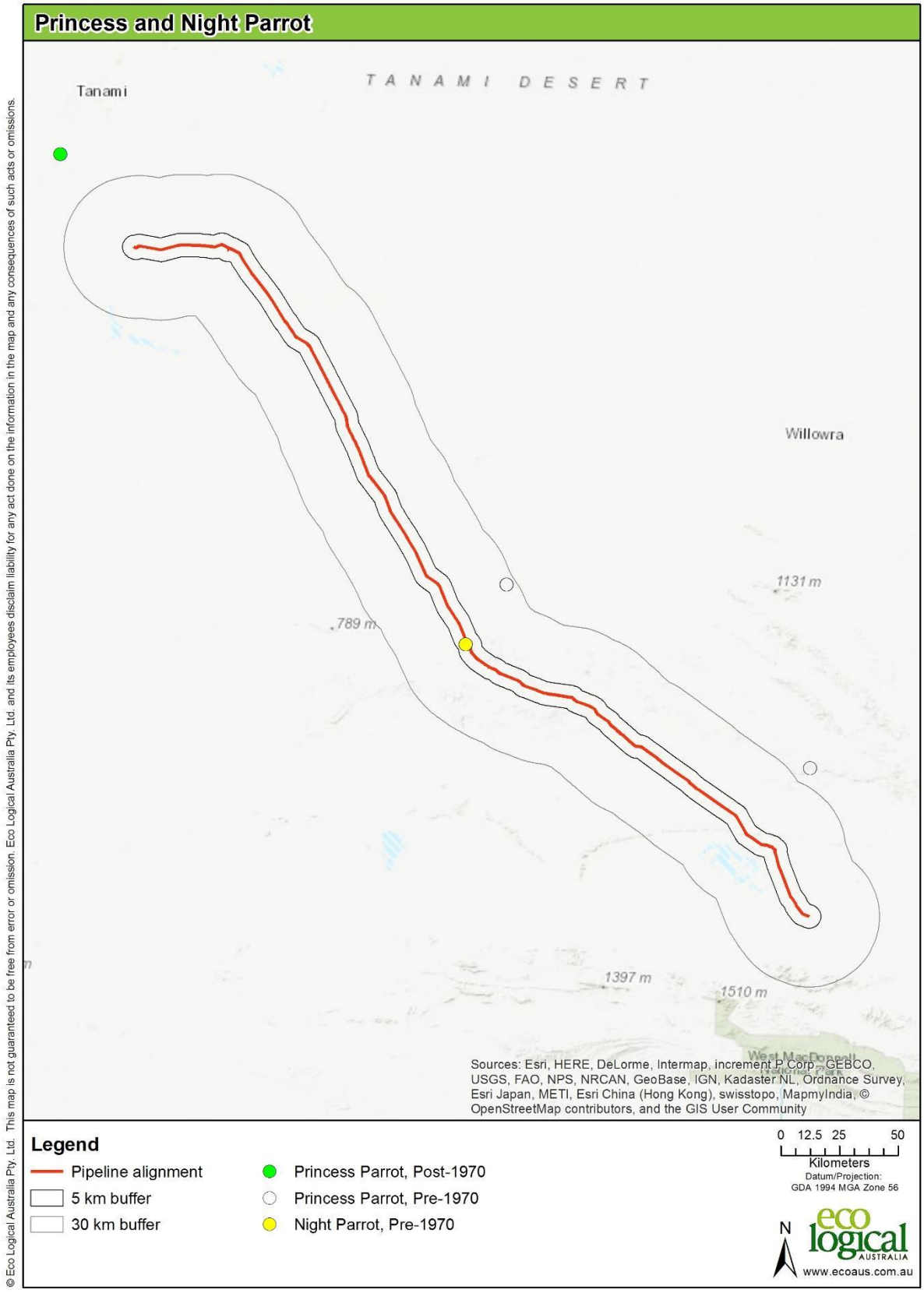


Figure 16: Night and Princess Parrot distributions

Weeds and feral animals

The NT weed dataset includes 11 weed species listed under NT *Weeds Management Act* and/or identified as Weeds of National Significance (WONS) in the project region (Table 14, Figure 17). Their presence will be confirmed during detailed survey.

The NT Fauna database includes records of 10 introduced fauna species, including three that are associated with Key Threatening Processes identified by the Department of the Environment and Energy (Table 15).

Table 14: Declared weeds

Species	Common name	WONS	NT classification*
Alternanthera pungens	Khaki weed		Class B and C
Calotropis procera	Rubber bush		Class B and C
Cenchrus echinatus	Mossman river grass		Class B and C
Cenchrus setaceus	Fountain grass		Class B and C
Parkinsonia aculeata	Parkinsonia	Yes	Class B and C
Prosopis pallida	Mesquite	Yes	Class A and C
Ricinus communis	Castor oil plant		Class B and C
Senna occidentalis	Senna - Coffee		Class B and C
Tamarix aphylla	Athel pine	Yes	Class B and A
Tribulus terrestris	Caltrop - terrestris		Class B and C
Xanthium spinosum	Burr - Bathurst		Class B and C

* Class A: To be eradicated, Class B: spread to be controlled; Class C: not to be introduced to the Northern Territory

Table 15: Introduced fauna in the project area

Species	Associated key threatening process
Camel (*Camelus dromedarius*)	
Cat (*Felis catus*)	Predation by feral cats
Cattle (*Bos taurus*)	
Donkey (*Equus asinus*)	
Fox (*Vulpes vulpes*)	Predation by European red fox
Horse (*Equus caballus*)	
House Mouse (*Mus musculus*)	
House Sparrow (*Passer domesticus*)	
Rabbit (*Oryctolagus cuniculus*)	Competition and land degradation by rabbits
Swamp Buffalo (*Bubalus bubalis*)	

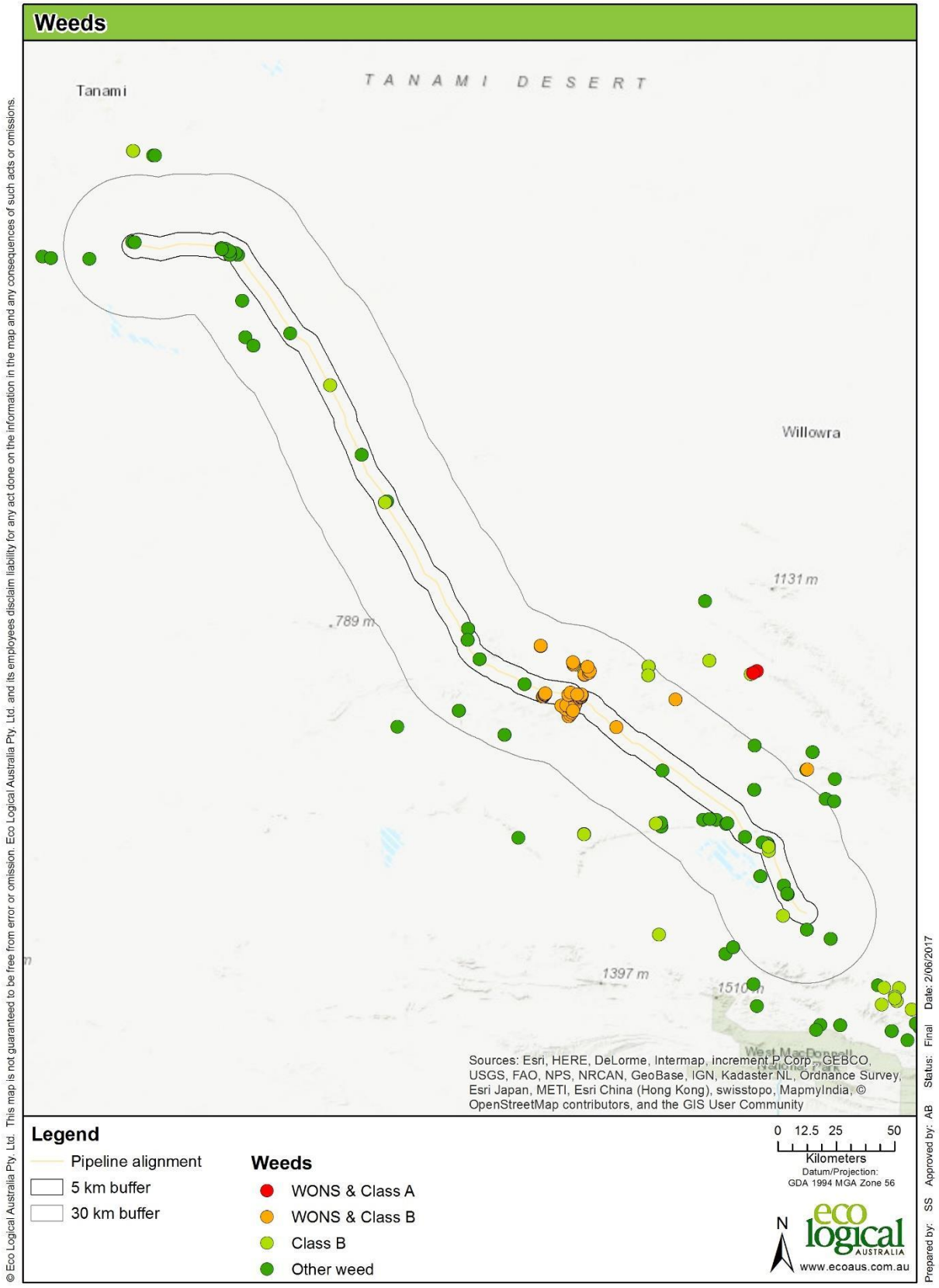


Figure 17: Distribution of NT weed dataset weed locations

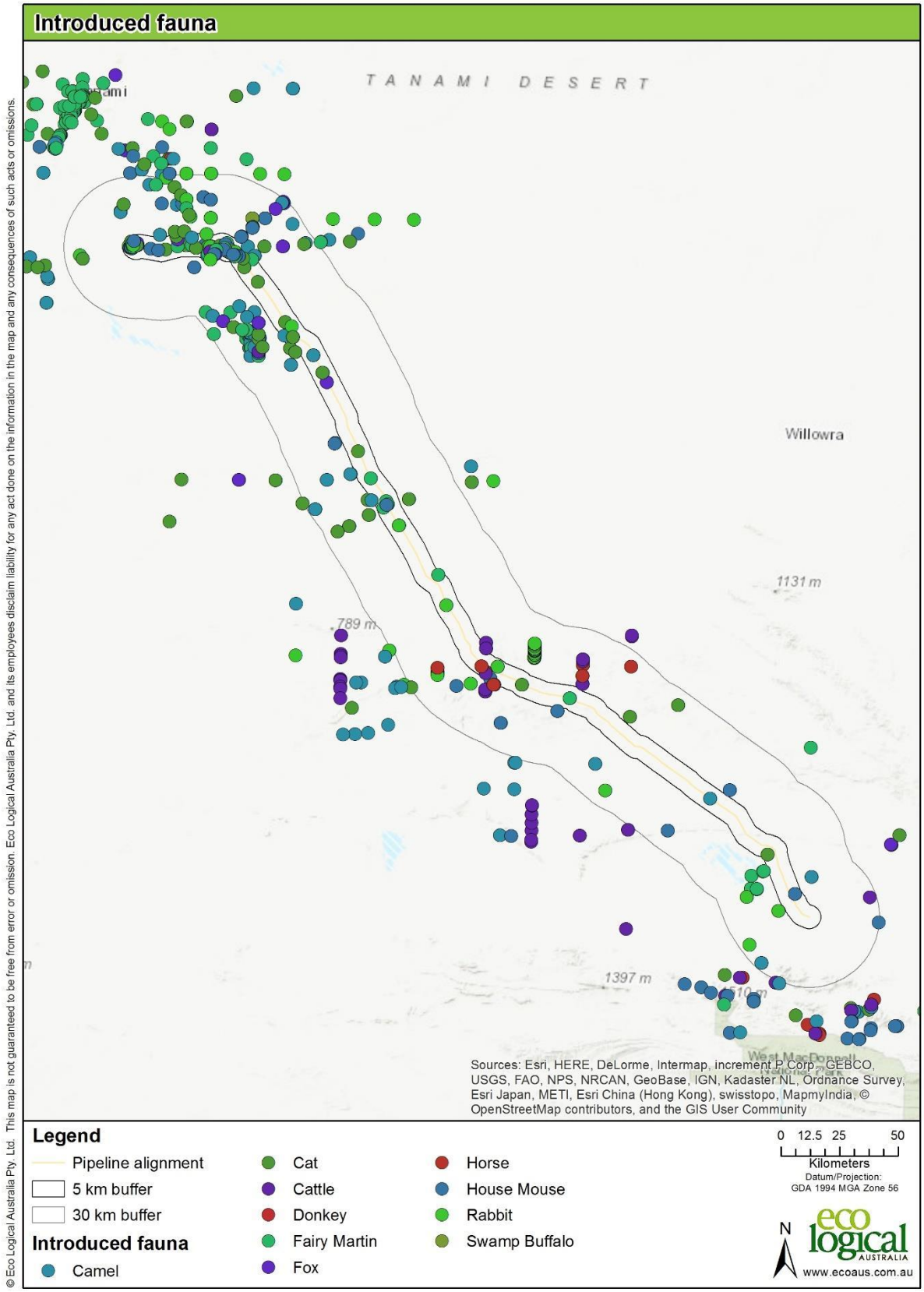


Figure 18: Introduced and pest species in the project area

5.3 Cultural heritage

5.3.1 Aboriginal Sacred Sites

Sites that are sacred to Aboriginal people are known to occur in the region surrounding the proposed pipeline alignment.

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 NT to obtain an Authority Certificate to allow that work to proceed. The Register of Sacred Sites facilitates discussions between custodians of sacred sites and proponents which are aimed at the avoidance and protection of sacred sites. When complied with, the Authority Certificate protects that person from prosecution under the NTASS Act.

DDG has commissioned the Central Land Council to undertake the appropriate consultation with Aboriginal traditional owners to identify sacred sites along the pipeline alignment. When completed, the required processes under the NTASS Act will be commenced with a view to obtaining an Authority Certificate for the pipeline works.

5.3.2 Aboriginal archaeology

Aboriginal archaeological material is protected under the *Heritage Act* and a permit is required to disturb or destroy archaeological sites.

An archaeological survey of the pipeline alignment has not yet been undertaken but will be commissioned as part of further technical studies. Given the location of the pipeline alignment in a region of occupancy by Aboriginal people, it is very likely that archaeological material will occur within the pipeline corridor. This will be documented through the archaeological survey and should any sites not be avoided, the appropriate permits under the *Heritage Act* will be obtained by the proponent.

5.3.3 Historic cultural heritage

Declared heritage places are protected under the *Heritage Act* and a permit is required to disturb a declared site.

No sites on the NT Heritage Register occur the pipeline corridor. The nearest declared heritage place is Iron Building No.1 at Yuendumu.

Sites on the National Heritage Register are protected under the EPBC Act. No sites on the National Heritage Register occur within or near the pipeline corridor.

5.4 Social and economic environment

The major economic activity within the region traversed by the Tanami Gas Pipeline is mining, pastoral enterprise and conservation activity. Mining activity occurs at the Granites and Dead Bullock Soak Mines operated by Newmont Mining. Gold is mined using underground methods and the workforce of approximately 750 permanent and contract employees, operate on a fly-in, fly-out basis. In 2015 the mines contributed nearly $375 million to the Australian economy.

Pastoral enterprises in the region include Mt Doreen and Napperby pastoral stations. Conservation activity is centred around the South Tanami Indigenous Protected Area, managed by the Warlpiri Rangers.

The closest population centre to the Tanami Gas Pipeline is Yuendumu with a population of approximately 800 mostly indigenous people (ABS 2008).

6 Matters of National Environmental Significance

A search of the federal Protected Matters Database (Appendix B), identified threatened and migratory species as the only Matters of National Environmental Significance relevant to the project area (Table 16). Listed threatened species are addressed in Section 5.2.5 and Migratory species are addressed in section 6.1 below.

Table 16: Matters of national environmental significance

Matters of significance	Number relevant to this project
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Importance	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Threated Ecological Communities	None
Listed Threatened Species	9
Listed Migratory Species	11

6.1 Listed migratory species

A desktop assessment of migratory fauna listed in NT and federal databases (including the NT Fauna Atlas, the ALA and the Protected Matters Search Tool) was conducted by Biodiversity Assessment and Management Pty Ltd (BAAM, 2016), and reviewed and updated by Mattiske (2017). These assessments were reviewed and updated based on a new Protected Matters database search and a review of records in the NT Flora and fauna atlases and the ALA (Table 17).

Table 17: Changes to migratory species list from 2016

Species	Change
Rainbow Bee-eater (*Merops ornatus*)	Removed, this species is no longer listed as migratory
Great Egret (*Ardea alba*)	Removed, this species is no longer listed as migratory
Cattle Egret (*Ardea ibis*)	Removed, this species is no longer listed as migratory

Species	Change
Curlew Sandpiper (*Actitis hypoleucos*)	Added, this species was identified by new protected matters search
Glossy Ibis (*Plegadis falcinellus*)	Added, the species was identified through a search of the NT fauna atlas
Pectoral Sandpiper (*Calidris melanotos*)	Added, this species was identified by new protected matters search
Sharp-tailed Sandpiper (*Calidris acuminata*)	Added, this species was identified by new protected matters search
White-winged Black Tern (*Chlidonias leucopterus*)	Added, the species was identified through a search of the NT fauna atlas

The search recovered 19 species that are listed as Migratory under the EPBC Act (Table 18). The Curlew Sandpiper (*Calidris ferruginea*) was added to the species considered on the basis of a more recent Protected Matters Search (Appendix B) and an assessment of the Curlew Sandpiper was undertaken. The likelihood assessment concluded the following:

- The Fork-tailed Swift (*Apus pacificus*) was considered likely to occur,
- The Common Greenshank (*Tringa nebularia*), Glossy Ibis (*Plegadis falcinellus*), Oriental Plover (*Charadrius veredus*), Oriental Pratincole (*Glareola maldivarum*), Sharp-tailed Sandpiper (*Calidris acuminata*) were considered potentially occurring, and
- The Pectoral Sandpiper (*Calidris melanotos*), White-winged Black Tern (*Chlidonias leucopterus*), Barn Swallow (*Hirundo rustica*), Curlew Sandpiper (*Actitis hypoleucos*), Grey Wagtail (*Motacilla cinerea*), Osprey (*Pandion haliaetus*), and the Yellow Wagtail (*Motacilla flava*) were considered unlikely to occur.

Table 18: Likelihood assessment of migratory species

Species	Likelihood of occurrence (reproduced from BAAM 2016; modified as per Mattiske 2017)
Fork-tailed Swift (*Apus pacificus*)	**Likely**. This species is recorded widely across Australia and ranges over large areas in association with weather events (Higgins 1999). It is entirely aerial and would be expected to hunt insects above the study area on occasion; however, the study area is not expected to contain important habitat for this species.
Common Greenshank (*Tringa nebularia*)	**Potential**. Widespread in association with a variety of shallow wetland areas (Pizzey and Knight 2007). There would be limited areas of suitable habitat, mainly in the form of ephemeral wetlands, and none of these areas would be expected to contain important habitat for the species.
Glossy Ibis (*Plegadis falcinellus*)	**Potential**. The Glossy Ibis' preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The Glossy Ibis breeds at only a limited number of locations within Australia, are not within the project area.
Oriental Plover (*Charadrius veredus*)	**Potential**. This species is a visitor mainly to northern Australia, with a limited number of records in central Australia near the study area (ALA 2016). It is found in open grassy plains with areas of bare ground, and sometimes also in ephemeral wetlands (Marchant

Species	Likelihood of occurrence (reproduced from BAAM 2016; modified as per Mattiske 2017)
	and Higgins 1993). The study area is not expected to contain important habitat for this species, as it is positioned on the fringe of the distribution of the species in Australia.
Oriental Pratincole (*Glareola maldivarum*)	**Potential**. This species visits in large flocks, mainly to northern Australia, with a limited number of records in central Australia near the study area (ALA 2016). It is found in open grassy plains with areas of bare ground, and sometimes also in ephemeral wetlands (Higgins and Davies 1996). The study area is not expected to contain important habitat for this species, as it is positioned on the fringe of the distribution of the species in Australia.
Sharp-tailed Sandpiper (*Calidris acuminata*)	**Potential**. In the NT the species mostly occurs in the north coastal regions and around McArthur River and east of Borroloola. There are widely but sparsely scattered inland, records occurring south to the northern Tanami Desert.
Pectoral Sandpiper (*Calidris melanotos*)	**Unlikely**. In the NT, the Pectoral Sandpiper is found at Darwin and Alice Springs (Higgins and Davies 1996). The species breeds outside of Australia. The Pectoral Sandpiper prefers shallow fresh to saline wetlands, the species is usually found in coastal or near coastal habitat but occasionally found further inland.
White-winged Black Tern (*Chlidonias leucopterus*)	**Unlikely**. In the NT, White-winged Black Terns are a widespread annual visitor to coastal area. In Australia, and elsewhere in their non-breeding range, the species mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. They rarely occur on inland wetlands in Australia.
Barn Swallow (*Hirundo rustica*)	**Unlikely**. Mainly recorded in northern Australia; very sporadic in the interior
Curlew Sandpiper (*Actitis hypoleucos*)	**Unlikely**. In the NT, Curlew Sandpipers have been recorded from most coastal areas and these are important nonbreeding and stop-over areas. They have also been reported at Alice Springs and Newhaven Station (presumed to be migrants passing through). These non-breeding birds forage around coastal brackish lagoons, intertidal mud and sand flats, estuaries, saltmarshes and occasionally on inland freshwater wetlands.
Grey Wagtail (*Motacilla cinerea*)	**Unlikely**. A sporadic visitor to Australia, mainly in the north.
Osprey (*Pandion haliaetus*)	**Unlikely**. Effectively restricted to coastal areas; no suitable habitat present in the study area.
Yellow wagtail (*Motacilla flava*)	**Unlikely**. A sporadic visitor to Australia, mainly in the north.

7 Potential impacts and measures to avoid or mitigate

The Tanami Gas Pipeline is to be constructed within the existing disturbance corridor created by the Tanami Road. Impacts arising from habitat fragmentation are therefore not expected to be significant.

The key environmental risks from constructing and operating the Tanami Gas Pipeline are:

- Loss of habitat for threatened species from clearing native vegetation or habitat fragmentation
- Wildlife mortality from vehicle movements, and trench fall during the period in which the pipeline trench is open
- Erosion, runoff and soil compaction from trenching and reinstatement
- Alteration of natural drainage and hydrology particularly during construction across water courses
- Localised pollution from inappropriate waste disposal, particularly liquid wastes.
- Introduction or spread of invasive species along the pipeline corridor
- Altered fire regimes resulting from new ignition sources, planned hazard reduction
- Disturbance or destruction of Aboriginal cultural heritage from land disturbance and activities of the construction workforce.

Table 19 examines the risks in greater detail, together with the potential impacts and approaches to mitigation that will be applied during construction and operation of the Tanami Gas Pipeline. Specific impacts on threatened and migratory species which were assessed as likely or possibly occurring in the survey area (Section 5.2.5) are assessed in Section 7.1.

Table 19: Summary of potential impacts and mitigation for Tanami Gas Pipeline

Aspect (activity)	Environmental factor (receptor)	Potential impact	Mitigation
Vegetation clearing	Vegetation and flora Fauna	Disturbance / loss of individual plants Disturbance / loss of individual animals or their habitat	Flora and fauna survey and avoidance where feasible of known occurrences and important habit for threatened species. Progressive rehabilitation of the RoW, construction camps and temporary access tracks through active measures (Rehabilitation Management Plan) and natural regrowth Revegetation of disturbed areas where they do not respond to the initial rehabilitation treatment, as evaluated by monitoring Potential use of horizontal directional drilling to avoid disturbance of significant riparian vegetation Weed management measures as per Weed Management Plan
	Surface water	Degradation of surface water quality due to erosion of soils and landforms	Sediment controls in place during and post construction Potential use of horizontal directional drilling to avoid disturbance in close proximity to significant watercourses Progressive revegetation of the RoW and other disturbed areas (Rehabilitation Plan) Specific rehabilitation measures for watercourses that are open trenched
	Aboriginal and cultural heritage	Damage to sites outside project area due to clearing beyond project area boundary	Sacred sites identified with Restricted Work Areas Archaeological sites identified through survey Fencing and signage Recording on project GIS Consultation with Aboriginal traditional owners Work procedures (including land access protocol) and induction
	Human Health and safety	Injury/ loss of life due to machinery accident	Safety management plans including work procedures, job hazard analysis, risk assessment and management and emergency response
Excavation/trenching	Fauna	Mortality due to trench fall	Progressive rehabilitation of trench Climbing aids and shelters inside the trench Continuous monitoring of trench by wildlife handlers and removal of affected wildlife Minimisation of trench length open in key fauna areas, as required

Aspect (activity)	Environmental factor (receptor)	Potential impact	Mitigation
	Aboriginal and cultural heritage	Damage to undocumented (buried) sites/ skeletal remains	Archaeological assessment during pegging of RoW and trenching (Cultural Heritage Plan)
	Human health and safety	Injury/ loss of life due to falling into trench	Trench clearly marked
Water use/ groundwater extraction	Vegetation and flora	Disturbance/ loss of groundwater-dependent vegetation	Monitoring of water extraction and adaptive management arrangements where extraction may approach sustainable yield
	Fauna	Mortality due to drowning in water storage areas (Turkeys Nests) Reduced habitat availability due to disturbance/ loss of groundwater-dependent vegetation. Reduced availability of drinking water due to reduced groundwater discharge to surface waterbodies	Fauna egress installed on all Turkeys Nests when in use Monitoring of water extraction and adaptive management arrangements where extraction may approach sustainable yield
	Surface water	Altered surface water hydrology due to reduced groundwater discharge to surface waterbodies, wetlands, etc	Monitoring of water extraction and adaptive management arrangements where extraction may approach sustainable yield
	Aboriginal and cultural heritage	Altered character of ethnographic sites dependent on groundwater discharge	Monitoring of water extraction and adaptive management arrangements where extraction may approach sustainable yield Consultation with Aboriginal traditional owners
	Existing services and infrastructure	Strain on local water supply and availability for other uses	Monitoring of water extraction and adaptive management arrangements where extraction may approach sustainable yield
Physical presence of infrastructure	Vegetation and flora	Degradation of vegetation community due to spread of weeds	Measures incorporated into CEMP and OEMP
	Fauna	Degradation of fauna habitat Increased weed and pest invasion	Measures incorporated into CEMP and OEMP
	Human health and safety	Injury/ loss of life (public) due to trespassing, third party interference with the pipeline and above ground infrastructure	Landholder engagement, communication and agreements – focussing on safe activities within close proximity to pipeline and above ground infrastructure. Signage

Aspect (activity)	Environmental factor (receptor)	Potential impact	Mitigation
Vehicle movements	Flora and vegetation	Degradation of vegetation community/ alteration of community composition due to introduction and/or spread of weeds	Measures included in CEMP and OEMP
	Fauna	Degradation of fauna habitat due to introduction and/or spread of weeds Loss of individuals (mortality due to vehicle strike)	Measures incorporated into CEMP and OEMP Measures in Traffic Management Plan including speed limits – appropriate signage, induction for workforce drivers.
	Existing services and infrastructure	Deterioration of road integrity (Tanami Road)	Agreed arrangements to assist in avoiding deterioration of Tanami Road during construction Measures in Traffic Management Plan
Fire ignition	Vegetation and flora	Disturbance/ loss of flora species and vegetation communities.	Controls incorporated into CEMP, OEMP and Emergency Response Plan, with training and induction for all workers and effective response personnel, equipment and procedures for immediate extinguishing of inadvertent fires
	Fauna	Mortality, disturbance and fragmentation of habitat	
	Aboriginal and cultural heritage	Damage to sites outside project area due to wildfire caused or exacerbated by project activities	
	Air quality	Generation of smoke, dust and ash due to wildfire caused or exacerbated by project activities	
	Existing services and infrastructure	Disruption to utility supply as a result of damage due to wildfire caused or exacerbated by project activities	
	Human health and safety	Injury/ loss of life (public and project workforce) due to wildfire caused or exacerbated by project activities	
Liquid and solid waste disposal	Vegetation and flora	Disturbance/loss of flora species and vegetation communities due to disposal/discharge of hydrostatic pressure testing water	Hydrotest water is discharged consistent with measures in CEMP and within waste discharge licence conditions

Aspect (activity)	Environmental factor (receptor)	Potential impact	Mitigation
	Fauna	Disturbance/ loss/ degradation of habitat due to disposal/ discharge of hydrostatic pressure testing water	
	Surface water	Degradation of surface water quality due to wastewater disposal/ discharge of hydrostatic testing water	
	Groundwater	Contamination of groundwater due to due to wastewater disposal/ discharge of hydrostatic testing water	
	Aboriginal and cultural heritage	Damage to sites outside project area due to wastewater disposal/ discharge of hydrostatic testing water	
	Existing services and infrastructure	Strain on existing waste disposal facilities	Consultation and agreement with local government on acceptance of solid/commercial wastes
	Human health and safety	Illness/ loss of life (public and project workforce) due to contamination of public drinking water supply resulting from improper disposal of waste	Treatment of sewage from construction camps, consistent with requirements of *Public and Environmental Health Act* and the Code of Practice for On-site Wastewater Management
Spills and leaks	Vegetation and flora	Disturbance/ loss of flora species and vegetation communities due to chemical/ hydrocarbon spill/ leak	Measures contained in OEMP including documented inventory of hazardous materials, spill response procedures and equipment, servicing of equipment in workshops
	Fauna	Contamination/ loss of general terrestrial and aquatic fauna and fauna habitat	
	Soils and landforms	Contamination of soil	
	Surface water	Degradation of surface water quality (contamination) due to chemical/ hydrocarbon spill/ leak	
	Groundwater	Degradation of groundwater quality (contamination) due to chemical/ hydrocarbon spill/ leak	

Aspect (activity)	Environmental factor (receptor)	Potential impact	Mitigation
	Human health and safety	Illness/ loss of life (public and project workforce) due to contamination of public drinking water supply	
Atmospheric emissions (including dust)	Air (quality)	Degradation of air quality	Measures contained in CEMP including efficient use of vehicles, vehicle maintenance, periodic inspection of pipeline for leaks.
	Vegetation and flora	Disturbance/ loss of flora species and vegetation communities due to dust deposition	Dust management measures including watering, traffic management, minimising land clearing, active rehabilitation, adherence to speed limits
	Fauna	Degradation of terrestrial nesting/ roosting/foraging habitat due to dust deposition	
Light emissions	Fauna	Disruption to nesting/ roosting/ foraging habitats and/or behaviour	Measures contained in CEMP to limit lighting to critical areas.
	Amenity	Visual impact to public	
Noise and vibration	Fauna	Disruption to nesting/ roosting/ foraging habitats and/or behaviour	Measures in CEMP including screening or enclosing stationary equipment, turning mobile equipment off when not in use (where practicable). Route selection makes it unlikely to impact public / sensitive receptors with excessive noise due to location.
	Aboriginal and cultural heritage	Altered character of Aboriginal sacred sites or heritage places sites caused by vibration impacts (e.g. subsidence)	
	Amenity	Excessive noise levels at nearby public/ sensitive premises	

7.1 Further information on potential impacts on threatened species

7.1.1 Rushes and sedges

Dwarf Desert Spike-rush (*Eleocharis papillosa*) - TPWC Act Vulnerable, EPBC Act Vulnerable

Key ecological traits: This species emerges from seed or underground root tubers and/or rhizomes in response to inundation in temporary freshwater and semi-saline water bodies. Key threats include competition with weeds, particularly couch grass (*Cynodon dactylon*) (Dugid et al. 2006).

Possible impact	Likelihood	Mitigation	Significance of impact
Loss and disturbance of habitat	High – habitat occurring in the 30 m RoW will be lost, and surrounding habitat will be disturbed during the construction period	Proportion of ROW will be allowed to return to native vegetation over time	Low – the 30m wide RoW represents a small proportion of available habitat for each species. Most of the habitat loss will be temporary. Impacts outside the RoW will be of short duration
Change to fire regime resulting from introduction/spread of weeds	Moderate	Construction weed management plan - weed spread can be effectively prevented by suitable controls	Low

7.1.2 Burrowing species

Brush-tailed Mulgara (*Dasycercus blythi*) – TPWC Act Vulnerable

Key ecological traits: The Brush-tailed Mulgara is a nocturnal carnivore, which shelters during the day in burrows constructed under dead spinifex hummocks. Burrows can occur in aggregates in suitable habitat (Department of Sustainability, Environment, Water, Population and Communities, 2011). Key threats for the species are poorly understood, but changes in fire regimes, grazing by introduced herbivores including cattle and rabbits, and predation by introduced predators are all likely threatening processes (Pavey et al. 2006).

Great Desert Skink (*Liopholis kintorei*) – TPWC Act Vulnerable, EPBC Act Vulnerable

Key ecological traits: The Great Desert Skink is an omnivorous species that lives in burrows housing up to 10 individuals. Burrow systems start with a single tunnel and develop over time to a depth of over 1m and up to 10m in diameter (McAlpin, 2001). Burrows generally occur in hummock grass sandplains and inhabit paleodrainage lines characterised by lateritic soils, giant termite mounds, and *Melaleuca* spp. Key threats include modified fire regimes that reduce habitat availability and predation by introduced predators (Pavey and Ward, 2012).

Greater Bilby (*Macrotis lagotis*) - TPWC Act Vulnerable, EPBC Act Vulnerable

Key ecological traits: The Greater Bilby is a nocturnal omnivorous bandicoot, individuals shelter in a series of burrows that may be up to two meters deep. The key threat to the species may be predation by introduced European Foxes (Pavey 2006).

Southern Marsupial Mole (*Notoryctes typhlops*) - TPWC Act Vulnerable

Key ecological traits: The Southern Marsupial Mole is poorly known primarily because the species almost exclusively tunnels 20 to 100 cm below the surface of dunes, sandy plains, and river flats. Key threats to the species have not been determined (Pavey 2015).

Table 20: Potential impacts to burrowing species

Possible impact	Likelihood	Mitigation	Significance of impact
Loss and disturbance of habitat	High – habitat occurring in the 30 m RoW will be lost, and surrounding habitat will be disturbed during the construction period	Proportion of RoW will be allowed to return to native vegetation over time	Low – the 30m wide RoW represents a small proportion of available habitat for each species. Most of the habitat loss will be temporary. Impacts outside the RoW will be of short duration
Trenching equipment killing animals that are burrowed underground	Moderate	Pre-trenching inspection to identify active burrows.	Moderate
Reduction of suitable habitat / habitat fragmentation through soil compaction (Southern Marsupial Mole)	Low – project area is adjacent to existing compacted underground services and road corridor	Proportion of RoW will be allowed to return to native vegetation over time	Low
Mortality resulting from trenchfall	Moderate	Implementation of fauna management plan, incorporating minimising duration of trenching, scheduled inspections, provision of water, shelter and ramps within trench	Low
Mortality from vehicle strike (Brush-tailed Mulgara, Greater Bilby)	Low – minor increase from existing traffic between dusk and dawn	Traffic Management Plan including speed limits – appropriate signage, limitation on speed between dusk and dawn, induction for workforce drivers.	Low
Change to fire regime resulting from introduction/spread of weeds	Moderate	Construction weed management plan - weed spread can be effectively prevented by suitable controls	Low

Possible impact	Likelihood	Mitigation	Significance of impact
Noise and vibration displacing individuals from the work areas	Moderate, limited to a small proportion of locally available habitat, limited duration	Manage though CEMP	Low

7.1.3 Birds

Australian Painted Snipe (*Rostratula australis*) – TPWC Act Vulnerable, EPBC Act Endangered

Key ecological traits: The Australian Painted Snipe is a wading that inhabits shallow ephemeral wetlands (Taylor *et al* 2013). The key threat to the species overall is wetland drainage in the habitat in south eastern Australia. Within the NT, degradation of habitat due to grazing is likely the key threat (Taylor *et al* 2013).

Possible impact	Likelihood	Mitigation	Significance of impact
Loss and disturbance of habitat	High – habitat occurring in the 30 m RoW will be lost, and surrounding habitat will be disturbed during the construction period	NA	Low – the 30m wide RoW represents a small proportion of available habitat for each species, impacts outside the RoW will be of short duration
Changes to regional hydrology reducing habitat availability	Unlikely	NA	Low
Mortality from vehicle strike	Low – minor increase from existing traffic	Traffic Management Plan including speed limits – appropriate signage, limitation on speed, induction for workforce drivers.	Low

Grey Falcon (*Falco hypoleucos*) – TPWC Act Vulnerable

Key ecological traits: The Grey Falcon forage on birds, insects, mammals and reptiles, in lightly-timbered lowland plains, typically on inland drainage systems. They use nests built by other species, usually in tall trees along watercourses, breeding can occur between June and November, but generally only occurs in above average rainfall years. Key threats are not clear (Ward, 2012).

Possible impact	Likelihood	Mitigation	Significance of impact
Loss and disturbance of habitat	High – habitat occurring in the 30 m RoW will be lost, and surrounding habitat will be disturbed during the construction period	Proportion of RoW will be allowed to return to native vegetation over time	Low – the 30m wide RoW represents a small proportion of available habitat for the species. Most of the habitat loss will be temporary. Impacts

Possible impact	Likelihood	Mitigation	Significance of impact
			outside the RoW will be of short duration
Reduction in availability of prey due to construction disturbance of other species	Low - any reduction in prey is expected to be temporary and limited to an insignificant proportion of the species' distribution	N/A	Low
Mortality from vehicle strike	Low – minor increase from existing traffic	Traffic Management Plan including speed limits – appropriate signage, limitation on speed, induction for workforce drivers.	Low
Loss of active nests through clearing	Moderate – would occur only following above average rainfall	Identification of active nests during pre-clearance survey, adjust construction program to avoid disturbance	Low
Loss of suitable nesting habitat	Low – very little suitable habitat occurs within the RoW	NA	Low

Night Parrot (*Pezoporus occidentalis*) – TPWC Act Critically endangered, EPBC Act Endangered

Key ecological traits: The Night Parrot is poorly known and recent records are scarce. It is known that the species shelters and nests in mature Spinifex and that the diet includes seeds of grasses and herbs, particularly those of spinifex (Pavey 2006a). There is a probable record of the species from an undisclosed location in the NT from 2017 (Watson, 2017). Key threats for the species are likely to include habitat degradation caused by altered fire regimes and grazing by stock, and predation by introduced carnivores (Pavey 2006).

Possible impact	Likelihood	Mitigation	Significance of impact
Loss and disturbance of habitat	High – habitat occurring in the 30 m RoW will be lost, and surrounding habitat will be disturbed during the construction period	Proportion of RoW will be allowed to return to native vegetation over time	Low – the 30m wide RoW represents a small proportion of available habitat for the species. Most of the habitat loss will be temporary. Impacts outside the RoW will be of short duration
Mortality from vehicle strike	Low – minor increase from existing traffic	Traffic Management Plan including speed limits – appropriate signage, limitation on speed, induction for workforce drivers.	Low
Change to fire regime resulting from introduction/spread of	Possible	Construction weed management plan - weed spread can be effectively	Low

Possible impact	Likelihood	Mitigation	Significance of impact
weeds (particularly loss of mature spinifex)		prevented by suitable controls	

Princess Parrot (*Polytelis alexandrae*) – TPWC Act Vulnerable, EPBC Act Vulnerable,

Key ecological traits: A gregarious species that occurs in swales between sand dunes (occasionally on slopes and crests). Breeding takes place in hollows in large eucalypts, particularly river red gums *Eucalyptus camaldulensis*. The species feeds primarily on seeds on the ground and in flowering shrubs and trees. Key threats to the species are not clear (Pavey 2006b).

Possible impact	Likelihood	Mitigation	Significance of impact
Loss and disturbance of habitat Fragmentation of habitat	High – habitat occurring in the 30 m RoW will be lost, and surrounding habitat will be disturbed during the construction period	Proportion of RoW will be allowed to return to native vegetation over time	Low – the 30m wide RoW represents a small proportion of available habitat forthe species. Most of the habitat loss will be temporary. Impacts outside the RoW will be of short duration
Loss of active nests through clearing	Moderate	Identification of active nests during pre-clearance survey, adjust construction program to avoid disturbance	Low
Loss of suitable nesting habitat	Low – very little suitable habitat occurs within the RoW	NA	Low
Mortality from vehicle strike	Low – minor increase from existing traffic	Traffic Management Plan including speed limits – appropriate signage, limitation on speed, induction for workforce drivers.	Low
Change to fire regime resulting from introduction/spread of weeds (particularly loss of native seed-bearing grasses)	Possible	Construction weed management plan - weed spread can be effectively prevented by suitable controls	Low

7.2 Further information on potential impacts on migratory species

Common Greenshank (*Tringa nebularia*), Fork-tailed Swift (*Apus pacificus*), Glossy Ibis (*Plegadis falcinellus*), Oriental Plover (*Charadrius veredus*), Oriental Pratincole (*Glareola maldivarum*) - EPBC Act Migratory

In this NoI, potential impacts to migratory species that are likely or have the potential to occur within the project area (including indirect effects adjacent to the project area) have been considered within the context of two key concepts (Department of the Environment (DoE) 2013, 2015a, 2015b):

- Whether impacts to an ecologically significant proportion of the population could result
- Whether impact to important habitat could result.

Where neither of these two features of a migratory species is present, significant impacts are generally not considered likely to occur (DoE 2013). 'Important populations' and 'ecologically significant populations' are defined and have been calculated for shorebirds (Bamford et al. 2008), and the shorebird threshold levels have also been applied to other migratory species in the absence of suitable ecological data (DoE 2015b).

Habitat is considered important for shorebirds if it meets the criteria for internationally important habitat (if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird or a total abundance of at least 20,000 waterbirds), or the criteria for nationally important habitat for migratory shorebirds, i.e. if it regularly supports:

- 0.1% of the flyway population of a single species of migratory shorebird, or
- 2,000 migratory shorebirds, or
- 15 migratory shorebird species.

The size of an ecologically significant population varies based on the species' ecology and the characterises of the population. Generally, 1% of the population is considered internationally important, and 0.1% as nationally important (Bamford et al. 2008, DoE 2015b).

The relevant population thresholds for species occurring the project area are presented in Table 21.

Table 21: Threshold for important habitat and ecologically significant populations for migratory birds

Species	Source	1% of population	0.1% population
Common Greenshank (*Tringa nebularia*)	Bamford et al. 2008	600	60
Fork-tailed Swift (*Apus pacificus*)	DoE 2015b	1,000	100
Glossy Ibis (*Plegadis falcinellus*)	SPRAT profile*	1,440	144
Oriental Plover (*Charadrius veredus*)	Bamford et al. 2008	700	70
Oriental Pratincole (*Glareola maldivarum*)	Bamford et al. 2008	20,000	2,000

* Estimated global population is 1,200,000 with Australian population 12% of the global (=144,000)

None of the wetlands in proximity to the project area meet the criteria to be considered internationally or nationally important shorebird habitat, or ecologically significant populations of the relevant species.

7.3 Proponent's Environment Policy and Environmental Management System

DDG has been engaged in a range of construction and operational projects associated with its assets located across Western Australia, largely comprising the 1500 km DBNGP pipeline and several associated spur lines. Most of the activities have been regulated with respect to approval of

environmental impacts and management under both State and Federal environmental legislation. These approvals have been subject to a range of compliance audits and environmental performance reviews that demonstrate a good record of responsible environmental management. None of the construction and operational activities have resulted in any environmental impacts beyond that which was approved. Copies of audit reports can be made available if requested.

DDG is committed to responsible environmental management of the proposed action and believes that all potential adverse environmental effects can be effectively managed in accordance with the company's Environmental Management System (EMS). All planning, construction and operation activities will be conducted in accordance with the DDG Environmental Policy, which outlines a commitment to sound management of environmental aspects of the proposed action.

DDG has adopted an EMS that includes the DDG Health, Safety and Environment Policy, the Construction Environmental Management Plan (CEMP) and Operation Environmental Management Plan (OEMP), and other subsidiary environmental documentation including DDG environmental procedures. The purpose of the EMS is to ensure proactive planning, sustainable development and continuous environmental improvement.

The key elements of the EMS include:

- A corporate environmental policy
- Assessing environmental risk and identification of legal requirements
- Developing objectives and targets for improvement
- Training, operational control, communication, emergency response, corrective and preventative actions audits and review.

7.4 Environmental Management Plans

A CEMP and OEMP will be prepared and submitted for approval as a requirement of the pipeline licence issued pursuant to the *Energy Pipelines Act*.

At a minimum, the following component plans and procedures will be incorporated within the CEMP and OEMP:

- Terrestrial fauna management
- Flora
- Soils and sediment control
- Reinstatement and rehabilitation
- Waste management
- Watercourse crossing construction
- Groundwater and surface water protection
- Noise and Dust management / Air Emissions
- Weeds management
- Bushfire management
- Traffic management – Separate Plan
- Cultural heritage management.

The component plans and procedures will detail measures to minimise actual and potential impacts. They will outline measures to ensure compliance with all relevant environmental regulations and standards.

The draft CEMP will be developed during the environmental assessment phase.

7.5 Surveys and Monitoring

Prior to construction, ecological surveys will be conducted to ground-truth the available vegetation mapping for the area, and to pinpoint threatened flora and fauna habitat and species' presence. Where suitable habitat is identified, pre-clearance surveys will be conducted immediately prior to disturbance to identify and remove/translocate individuals of threatened species.

Specific environmental monitoring programmes will be established within the CEMP and OEMP and implemented during the relevant phase of the Tanami Gas Pipeline project.

The monitoring programmes will include:

- Information needed to provide a suitable baseline for subsequent monitoring
- The timing and frequency of monitoring
- Adaptive management procedures including triggers, and procedures for management actions or investigations
- Policies for evaluating and amending the monitoring programme.

At a minimum monitoring will focus on avoiding wildlife mortality (open trench), managing ecological impacts, weeds and other invasive species, erosion and sediment control.

Monitoring programs will be finalised during further design and submitted for approval with the CEMP and OEMP.

Post construction rehabilitation monitoring shall be undertaken to assess success of rehabilitation against criteria set out in the CEMP.

8 Proponent's statement on whether significant impacts are likely

Construction and operation of the Tanami Gas Pipeline is likely to lead to localised and mostly temporary impacts to flora and fauna (including threatened species), soils and landform, surface and ground water resources, cultural heritage, public health and safety, amenity, and local services and infrastructure.

While there is the potential for significant impacts to some threatened species this is a precautionary approach based on a lack of ground-truthed data. Once this data has been gathered, detailed design measures will be implemented to avoid impacts as far as possible and other effective mitigation measures will be put in place to minimise unavoidable impacts.

Actual significant impacts are unlikely to result from the proposal because:

- The pipeline alignment closely follows the existing disturbance corridor created by the Tanami Road, avoiding impacts arising from habitat fragmentation
- Construction is limited to a 10 month period
- The area of permanent disturbance is not large (223.5 ha)
- Operationally there will be no ongoing impacts

- A range of avoidance and impact reduction measures have been identified, will be further developed in the detailed design phase (through the CEMP and OEMP), and implemented during construction and operation
- All disturbance areas (except for small areas required for permanent infrastructure) will be rehabilitated post construction
- Much of the disturbance footprint will be allowed to return to woody native vegetation over time
- There are a range of best practise management and mitigation measures that will be employed to further reduce impacts including those contained in the Australian Pipelines and Gas Association: Code of Environmental Practice Onshore Pipelines (2013)
- Additional on-ground surveys will be undertaken prior to construction to reduce any uncertainty and support mitigation measures that will ensure impacts are avoided or minimised.

The pipeline will facilitate the transition from diesel to natural gas at the Granites and Dead Bullock Soak Mines leading to long term co-benefits of reduced air and greenhouse gas emissions intensity at the mines.

9 References

Australian Bureau of Statistics (ABS). 2008. National Regional Profile: Yuendumu (CGC) (Statistical Local Area)

ALA. 2016. The Atlas of Living Australia (information portal). Available at: http://www.ala.org.au/.

Bastin G and the ACRIS Management Committee. 2008. Rangelands 2008 — Taking the Pulse, published on behalf of the ACRIS Management Committee by the National Land & Water Resources Audit, Canberra.

Biodiversity Assessment and Management Pty Ltd. 2016. Tanami Gas Pipeline terrestrial ecology desktop assessment. Report prepared for Advisan.

Bureau of Meteorology (BOM). 2010. Australian Water Resources Assessment: Tanami-Timor Sea Region.

Cogger, H.G. 2014. Reptiles and amphibians of Australia. CSIRO Publishing, Collingwood.

Department of Natural Resources, Environment, the Arts and Sport (DNRETAS). 2017. Lake Lewis and Surrounds – Site of Conservation Significance. Available online at: https://nt.gov.au/environment/environment-data-maps/important-biodiversity-conservation-sites/conservation-significance-list. Accessed May 2017.

Department of the Environment (DotE). 2015. EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species

Department of the Environment (DotE). 2016a. *Liopholis kintorei* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 13 Apr 2016.

Department of the Environment (DotE) 2016b. Pezoporus occidentalis in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 13 Apr 2016.

Department of the Environment and Energy. 2017. Species Profile and Threats Database. http://www.environment.gov.au/sprat

Department of Sustainability, Environment, Water, Population and Communities. 2011. Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act.

Dugid, A., Kerrigan, R., Albrect, D. 2006. Threatened Species of the Northern Territory: Dwarf Desert Spike-Rush (*Eleocharis papillosa*).

EcOz Environmental Services. 2013. Flora and Fauna Report, Dry Season, May 2013, Twin Bonanza Gold Project. Standalone report prepared for ABM Resources NL and compiled as an appendix to an Environmental Impact Statement (Chapter 6 – Biodiversity).

Higgins, P.J. (ed.). 1999. Handbook of Australian, New Zealand and Antarctic Birds. Volume Four - Parrots to Dollarbird. Oxford University Press, Melbourne.

Higgins, P.J. and Davies, S.J. (eds) (1996). Handbook of Australian, New Zealand and Antarctic Birds. Volume Three - Snipe to Pigeons. Melbourne, Victoria: Oxford University Press.

Mattiske Consulting Pty Ltd. 2017. Tanami Gas Pipeline Terrestrial Ecology Desktop Assessment: Tanami Desert, Northern Territory – Flora, Vegetation and Fauna Values. Report prepared for DDG.

Marchant, S and Higgins, PJ (eds.). 1993. Handbook of Australian, New Zealand & Antarctic Birds, Volume 2, Raptors to lapwings. Oxford University Press, Melbourne.

McAlpin, S. 2001. A Recovery Plan for the Great Desert Skink (*Egernia kintorei*) 2001-2011. Report for the Arid Lands Environment Centre.

Pavey, C. 2006a. Threatened Species of the Northern Territory: Night Parrot (*Pezoporus occidentalis*). Department of Environment and Natural Resources.

Pavey, C. 2006b. Threatened Species of the Northern Territory: Princess Parrot (*Polytelis alexandrae*). Department of Environment and Natural Resources.

Pavey, C. 2015. Threatened Species of the Northern Territory: Southern Marsupial Mole (*Notoryctes typhlops*). Department of Environment and Natural Resources.

Ward, S. 2012. Threatened Species of the Northern Territory: Grey Falcon (*Falco hypoleucos*). Department of Environment and Natural Resources.

Pavey, C., Cole J. and Woinarski, J. 2006. Threatened Species of the Northern Territory: Brush-tailed Mulgara (*Dasycercus blythi*). Department of Environment and Natural Resources.

Pavey, C. and Ward, S. 2012. Threatened Species of the Northern Territory: Common Brushtail Possum (Central Australian population) (*Trichosurus vulpecula vulpecula)*. Department of Environment and Natural Resources.

Pavey, C. and Ward, S. 2012. Threatened Species of the Northern Territory: Great Desert Skink (*Egernia kintorei*). Department of Environment and Natural Resources.

Pizzey, G and Knight, F. 2007. The field guide to the birds of Australia. HarperCollins, Sydney.

Southgate, R., Paltridge, R., Master, P. and Carthew, S. 2007. Bilby distribution and fire: a test of alternative models of habitat suitability in the Tanami Desert, Australia. Ecography 30: 759–776.

Taylor, R., Chatto, R., Woinarski, J. 2013. Threatened Species of the Northern Territory: Australian Painted Snipe (Rostratula benghalensis australis). Department of Environment and Natural Resources.

Van Dyck, S. and Strahan, R. 2008. The Mammals of Australia, Volume 3. Reed New Holland, Sydney.

Watson, C. 2017. Night Parrot found in Northern Territory: Acoustic recording reveals call of probable Night Parrot in southern NT. Press release available from: https://www.chriswatson.com.au/blog/night-parrot-found-in-northern-territory

White, M., Albrecht, D., Duguid, A., Latz, P., and Hamilton, M. 2000. Plant species and sites of botanical significance in the southern bioregions of the Northern Territory. Volume 1: significant vascular plants. Report to the Australian Heritage Commission. (Arid Lands Environment Centre, Alice Springs.)

Wilson, S. and Swan, G. 2010. A Complete Guide to the Reptiles of Australia, Third Edition. Reed New Holland, Sydney.

WorleyPersons. 2016. Tanami Gas Pipeline FEED: Project definition report. Report prepared for Power & Water.

Appendix A: NRM InfoNet search result

Appendix B: Protected Matters search results

Territory Natural Resource Management

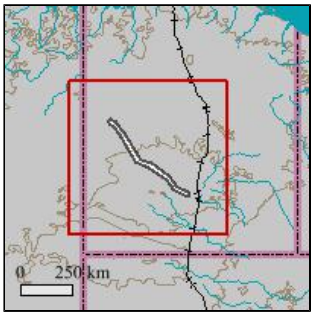
Northern Territory Government

CHARLES DARWIN UNIVERSITY

TGP

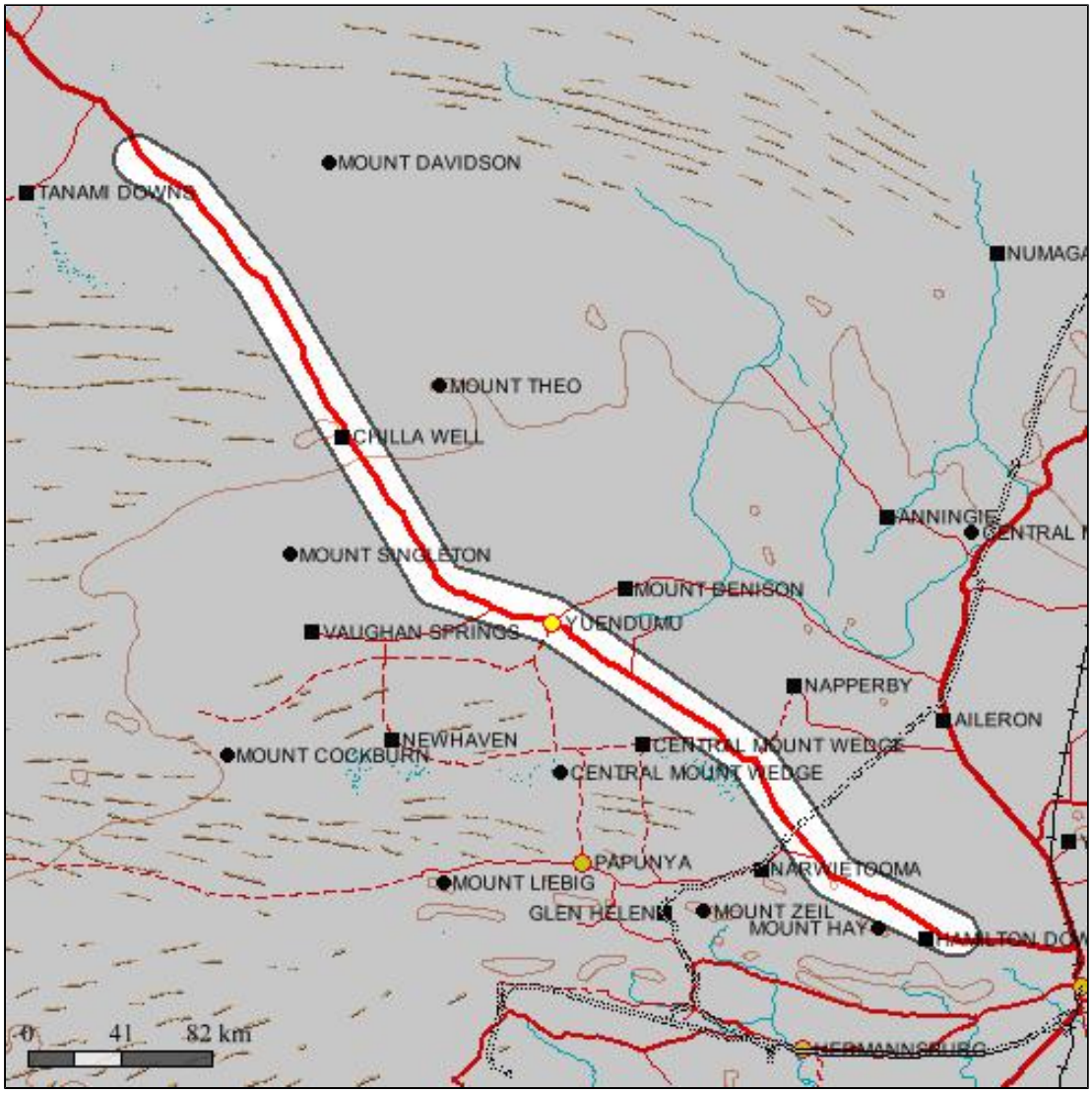
NT NRM Report

TGP



TGP encompasses an area of 10093.3 sq km extending from 20 deg 20.0 min to 23 deg 34.0 min S and 130 deg 4.0 min to 133 deg 28.0 min E.
TGP is located in the Tanami, Burt Plain, MacDonnell Ranges, Great Sandy Desert, bioregion(s)

Location of TGP

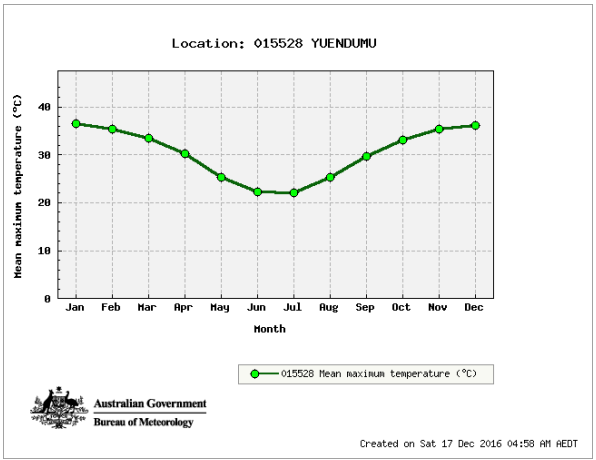


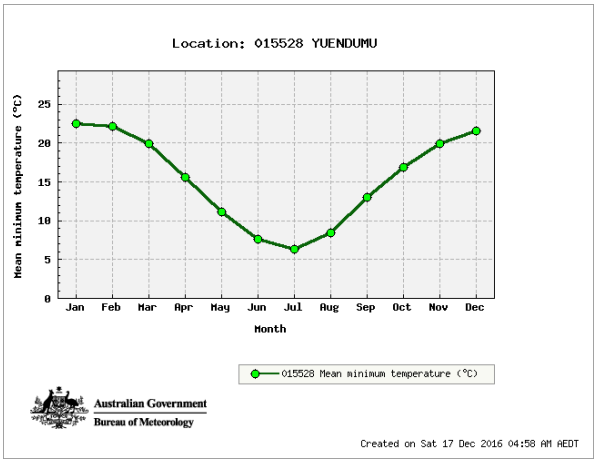
TGP Climate

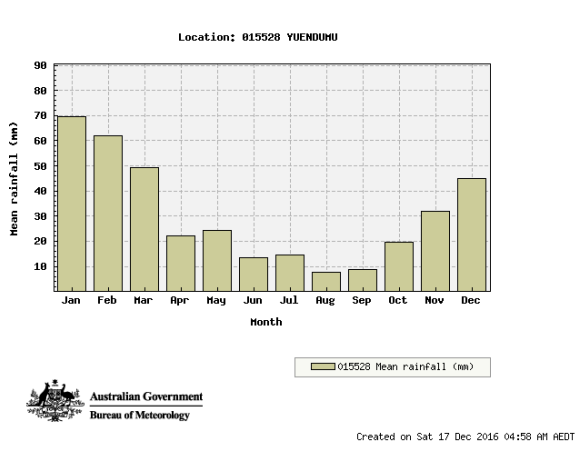
The closest long-term weather station is YUENDUMU (22 deg 15.0 min S, 131.8017E) 32 km SE of the center of selected area

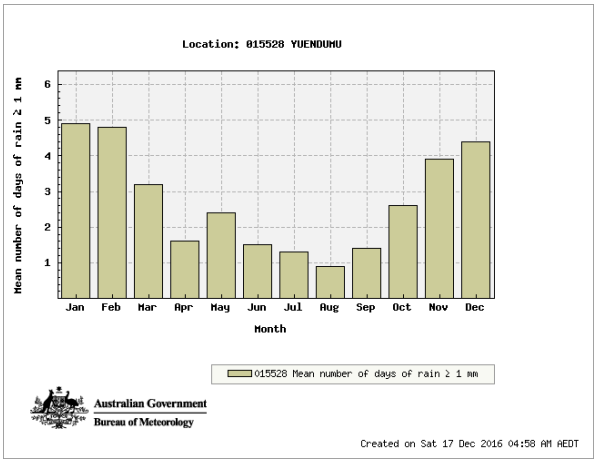
Statistics	Annual Values	Years of record
Mean max temp (deg C)	30.4	48
Mean min temp (deg C)	15.4	47
Average rainfall (mm)	371.1	58
Average days of rain	32.9	64

Climate summaries from Bureau of Meteorology (www.bom.gov.au)



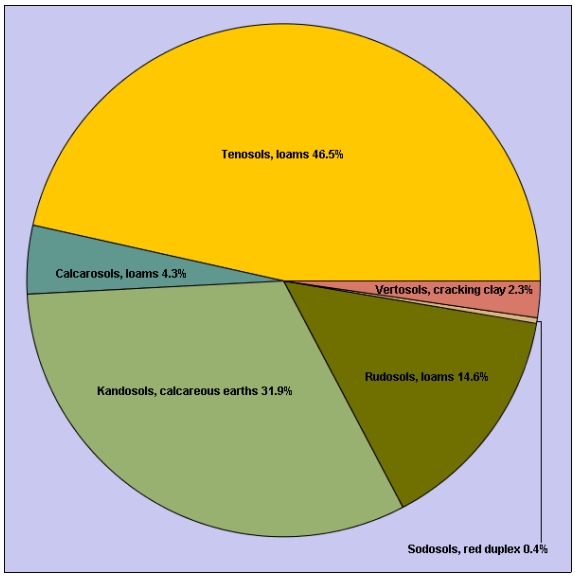






TGP Soils

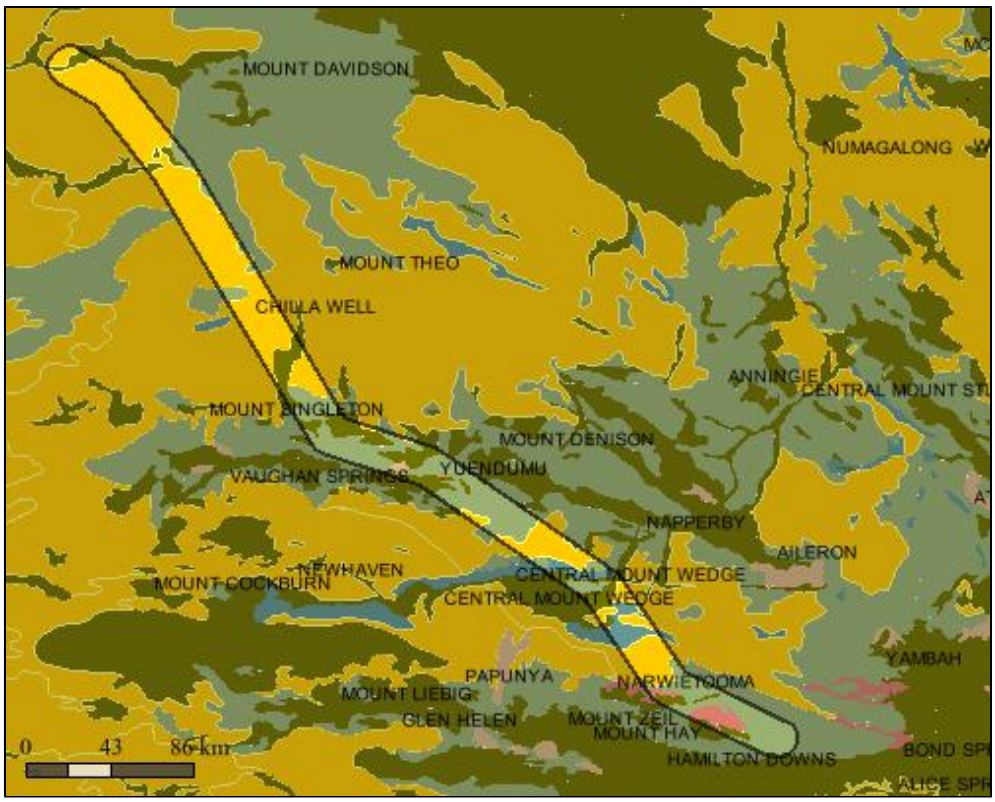
Soil Types



Area of soil types (Northcote Factual Key)

Category	Area sq km	Area%
Tenosols, loams	4694.14	46.51
Kandosols, calcareous earths	3215.18	31.85
Rudosols, loams	1471.28	14.58
Calcarosols, loams	438.84	4.35
Vertosols, cracking clay	234.80	2.33
Sodosols, red duplex	39.07	.39

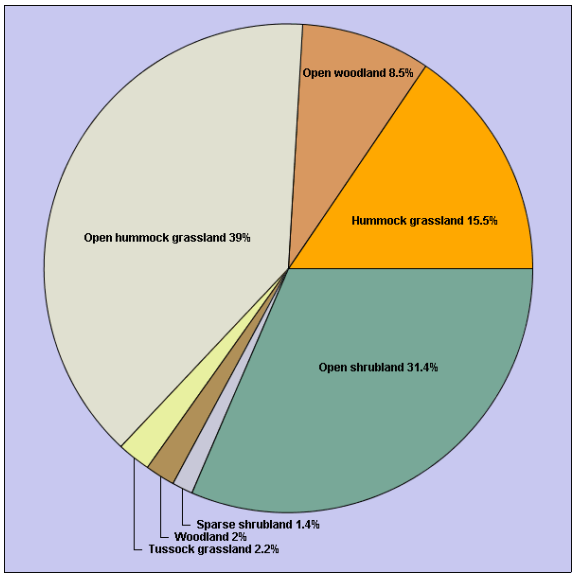
Soil Types



Soils 1:2M Layer is a copy of the NT portion (1:2,000,000 scale dataset) of the CSIRO Atlas of Australian Soils - K.H. Northcote et al. Data scale: 1:2,000,000 ANZLIC Identifier: 2DBCB771205D06B6E040CD9B0F274EFE
More details: Go to www.lrm.nt.gov.au/nrmapsnt/ and enter the ANZLIC identifier in the Spatial Data Search

TGP Vegetation

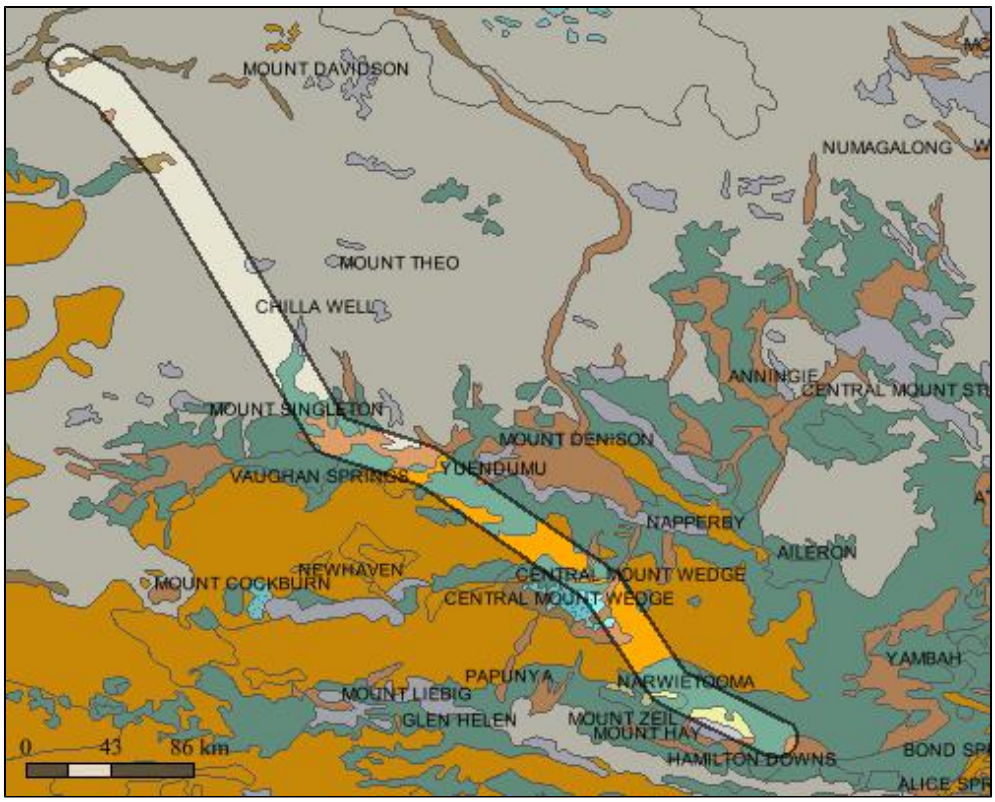
Vegetation Communities



Area of vegetation communities

Category	Area sq km	Area%
Open hummock grassland	3935.26	38.99
Open shrubland	3173.11	31.44
Hummock grassland	1562.96	15.49
Open woodland	861.43	8.53
Tussock grassland	223.13	2.21
Woodland	199.51	1.98
Sparse shrubland	137.27	1.36

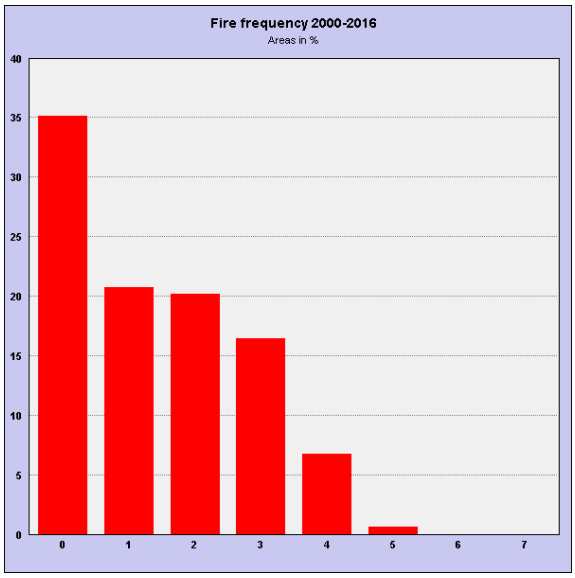
Vegetation Communities



The NVIS 2005 Layer is compiled from a number of vegetation and land unit survey maps that were recoded and re-attributed for the National Vegetation Information System (NVIS)
Data scale variable depending on location. ANZLIC Identifier:2DBCB771207006B6E040CD9B0F274EFE
More details:Go to www.lrm.nt.gov.au/nrmapsnt/ and enter the ANZLIC identifier in the Spatial Data Search

TGP Fire History

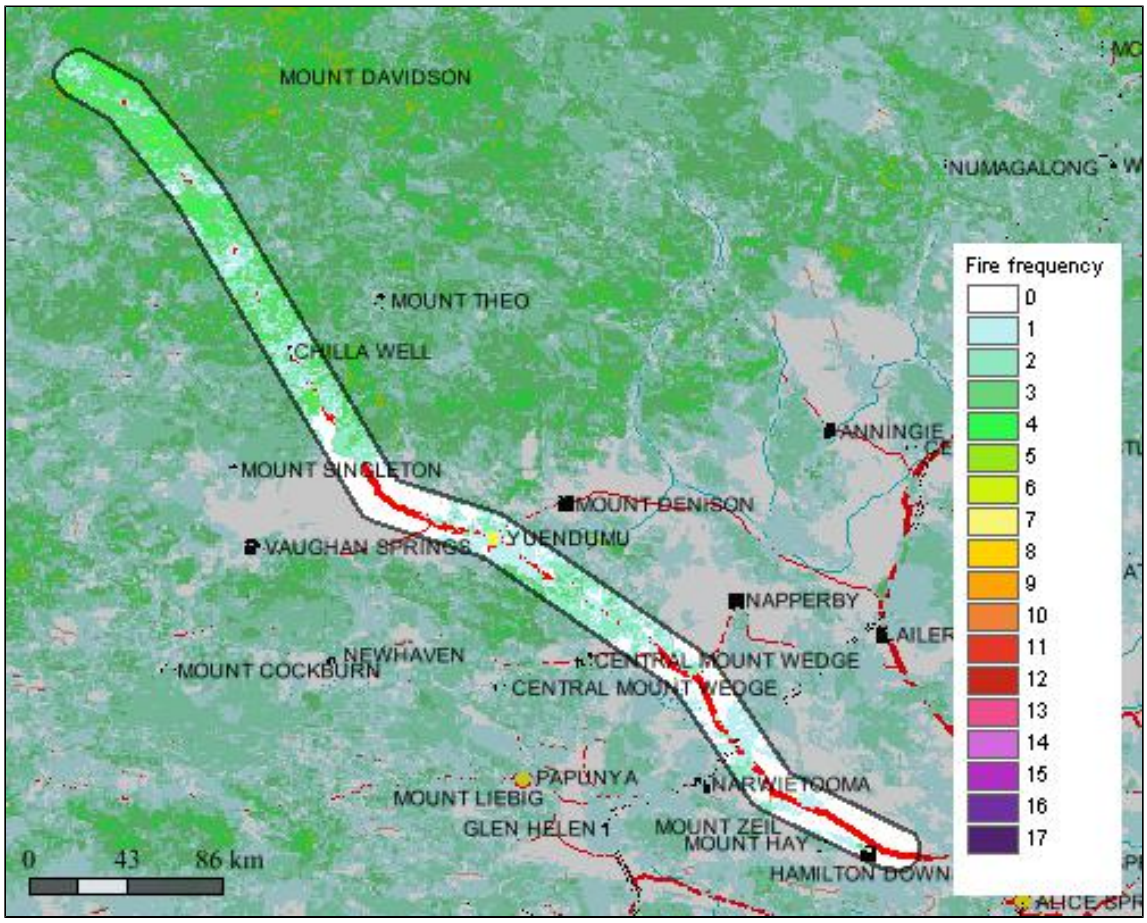
Fire frequency 2000-2016



area burnt for each fire frequency category 2000-2016

Category	Area sq km	Area%
0	3545.96	35.13
1	2093.85	20.74
2	2042.39	20.24
3	1662.59	16.47
4	684.28	6.78
5	63.43	.63
6	.65	.01
7	.15	.00

Fire frequency 2000-2016



The fire frequency(250m) Layer is derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite
Spatial Resolution: 250m x 250m pixels (at Nadir).

TGP Threatened Species

Threatened species recorded in TGP (Records Updated: Sept 2013)

Group	Common Name	Scientific Name	NT Status	National Status	ID	#Observations (Latest)	#Specimens (Latest)	#Surveys (Latest)
Flowering Plants	Bog-Rush	*Schoenus centralis*	VU	.	.	0 (Unknown)	1 (1975)	0 (Unknown)
Reptiles	Great Desert Skink	*Liopholis kintorei*	VU	VU	351205	77 (2006)	35 (1974)	0 (Unknown)
Birds	Grey Falcon	*Falco hypoleucos*	VU	.	.	15 (2001)	2 (1969)	0 (Unknown)
Birds	Australian Painted Snipe	*Rostratula australis*	VU	EN	246428	1 (2001)	0 (Unknown)	0 (Unknown)
Birds	Princess Parrot	*Polytelis alexandrae*	VU	VU	247138	1 (1967)	0 (Unknown)	0 (Unknown)
Birds	Night Parrot	*Pezoporus occidentalis*	CR	EN	247103	1 (1930)	0 (Unknown)	0 (Unknown)
Birds	Masked Owl (northern mainland)	*Tyto novaehollandiae kimberli*	VU	VU	594609	1 (1982)	0 (Unknown)	0 (Unknown)
Mammals	Brush-tailed Mulgara	*Dasycercus blythi*	VU	VU	351695	25 (1995)	12 (1995)	0 (Unknown)
Mammals	Crest-tailed Mulgara	*Dasycercus cristicauda*	VU	EN	351695	40 (2006)	6 (1994)	0 (Unknown)
Mammals	Golden Bandicoot	*Isoodon auratus*	EN	VU	176421	5 (1969)	3 (1936)	0 (Unknown)
Mammals	Greater Bilby	*Macrotis lagotis*	VU	VU	177125	86 (2006)	8 (1991)	1 (2001)
Mammals	Common Brushtail Possum (southern)	*Trichosurus vulpecula vulpecula*	EN	.	177146	11 (1988)	2 (1968)	0 (Unknown)
Mammals	Black-footed Rock-wallaby	*Petrogale lateralis*	.	VU	351635	2 (1969)	2 (1977)	0 (Unknown)
Mammals	Southern Marsupial Mole	*Notoryctes typhlops*	VU	EN	352105	3 (2002)	3 (1983)	0 (Unknown)
Mammals	Ghost Bat	*Macroderma gigas*	.	VU	.	1 (1969)	0 (Unknown)	0 (Unknown)
Mammals	Central Rock-rat	*Zyzomys pedunculatus*	EN	EN	351675	1 (1952)	2 (Unknown)	0 (Unknown)
Mammals	Pale Field-rat	*Rattus tunneyi*	VU	.	.	1 (Unknown)	1 (1982)	0 (Unknown)

EX = Extinct
EW = Extinct in the Wild
ER = Extinct in the NT
EN = Endangered
EN/VU = One Endangered subspecies/One Vulnerable subspecies
VU=Vulnerable
VU/- = One or more subspecies vulnerable EN/- = One or more subspecies endangered

Survey = this category refers to data collected using systematic survey methodology
Specimen = this category refers to museum or other records where a specimen has been collected and lodged
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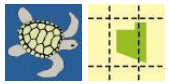
More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

TGP Threatened Species Grid



Threatened species recorded in the grid cell(s) in which TGP occurs (Records Updated: Sept 2013)

Group	Family Name	Scientific Name	Common Name	NT Status	National Status	#Observations	Latest Observation Date	#Specimens	Latest Specimen Date	#Surveys	Latest Survey Record
Cycads	Zamiaceae	*Macrozamia macdonnellii*	MacDonnell Ranges Cycad		VU	0	Unknown	8	2004	0	Unknown
Flowering Plants	Cyperaceae	*Eleocharis papillosa*	Dwarf Desert Spike-Rush	VU	VU	0	Unknown	3	1984	0	Unknown
Flowering Plants	Cyperaceae	*Schoenus centralis*	Bog-Rush	VU		0	Unknown	1	1975	0	Unknown
Flowering Plants	Ranunculaceae	*Clematis decipiens*	Clematis	VU		0	Unknown	1	1995	0	Unknown
Flowering Plants	Apiaceae	*Actinotus schwarzii*	Desert Flannel-flower	VU	VU	0	Unknown	7	2005	0	Unknown
Flowering Plants	Asteraceae	*Minuria tridens*	Minnie Daisy	VU	VU	0	Unknown	2	2003	0	Unknown
Flowering Plants	Asteraceae	*Olearia macdonnellensis*	Daisy-Bush	EN	VU	0	Unknown	5	2000	0	Unknown
Snails	Bulimulidae	*Bothriembryon spenceri*	Spencer's Land Snail	VU		0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Dirutrachia sublevata*	Land Snail	VU		0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Semotrachia elleryi*	Ellery Gorge Land Snail	VU		0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Semotrachia emilia*	Emiles Land Snail	VU		0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Semotrachia euzyga*	Land Snail	EN	EN	0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Semotrachia filixiana*	Land Snail	VU		0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Semotrachia winneckeana*	Winnecke Land Snail	VU		0	Unknown	0	Unknown	0	Unknown
Snails	Camaenidae	*Sinumelon bednalli*	Bednall's Land Snail		EN	0	Unknown	0	Unknown	0	Unknown
Insects	Hesperiidae	*Croitana aestiva*	Desert Sand skipper		EN	0	Unknown	0	Unknown	0	Unknown
Reptiles	Scincidae	*Liopholis kintorei*	Great Desert Skink	VU	VU	115	2008	44	1987	0	Unknown
Birds	Megapodiidae	*Leipoa ocellata*	Malleefowl	CR	VU	6	1950	1	1931	0	Unknown
Birds	Accipitridae	*Erythrotriorchis radiatus*	Red Goshawk	VU	VU	2	1995	0	Unknown	0	Unknown
Birds	Falconidae	*Falco hypoleucos*	Grey Falcon	VU		20	2009	4	1969	0	Unknown
Birds	Rostratulidae	*Rostratula australis*	Australian Painted Snipe	VU	EN	1	2001	0	Unknown	0	Unknown
Birds	Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	VU	CE	1	1995	0	Unknown	0	Unknown
Birds	Psittacidae	*Polytelis alexandrae*	Princess Parrot	VU	VU	2	1967	2	1965	0	Unknown
Birds	Psittacidae	*Pezoporus occidentalis*	Night Parrot	CR	EN	3	2000	0	Unknown	0	Unknown
Birds	Tytonidae	*Tyto novaehollandiae kimberli*	Masked Owl (northern mainland)	VU	VU	1	1982	0	Unknown	0	Unknown
Mammals	Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara	VU	VU	196	2008	32	1995	15	2010
Mammals	Dasyuridae	*Dasycercus cristicauda*	Crest-tailed Mulgara	VU	EN	67	2006	12	1994	0	Unknown
Mammals	Peramelidae	*Isoodon auratus*	Golden Bandicoot	EN	VU	10	1969	3	1936	0	Unknown
Mammals	Thylacomyidae	*Macrotis lagotis*	Greater Bilby	VU	VU	306	2009	34	2003	11	2001
Mammals	Phalangeridae	*Trichosurus vulpecula vulpecula*	Common Brushtail Possum (southern)	EN		24	2009	4	1987	0	Unknown
Mammals	Macropodidae	*Petrogale lateralis*	Black-footed Rock-wallaby		VU	50	2011	32	1991	0	Unknown
Mammals	Notoryctidae	*Notoryctes typhlops*	Southern Marsupial Mole	VU	EN	15	2002	3	1983	0	Unknown

Group	Family Name	Scientific Name	Common Name	NT Status	National Status	#Observations	Latest Observation Date	#Specimens	Latest Specimen Date	#Surveys	Latest Survey Record
Mammals	Megadermatidae	*Macroderma gigas*	Ghost Bat		VU	1	1969	7	1915	0	Unknown
Mammals	Muridae	*Notomys fuscus*	Dusky Hopping-mouse	EN	VU	1	Unknown	0	Unknown	0	Unknown
Mammals	Muridae	*Zyzomys pedunculatus*	Central Rock-rat	EN	EN	5	2001	3	1928	0	Unknown
Mammals	Muridae	*Rattus tunneyi*	Pale Field-rat	VU		1	Unknown	1	1982	0	Unknown

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VU=Vulnerable
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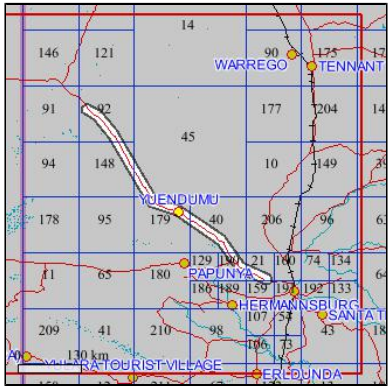
More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Species listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap TGP



TGP Weeds and Potential Weeds

 Introduced plants recorded in the grid cell(s) in which TGP occurs and that have been identified as problem weeds in one or more locations in northern Australia. Occurrence based on Northern Territory Government databases.

Family Name	Scientific Name	Common Name	NT Status	National Status	Other Status	#Surveys	Latest Record
Amaranthaceae	*Alternanthera pungens*	Khaki Weed	*B C*		*DEU NSW SA*	0	Unknown
Boraginaceae	*Amsinckia calycina*	Hairy Fiddleneck			*WA1 WA2 SA*	0	Unknown
Brassicaceae	*Brassica tournefortii*	Mediterranean Turnip			*Gr*	4	2006
Apocynaceae	*Calotropis procera*	Rubber Bush	*B C (S of 16 5 deg S)*		*WA1 WA2 G&M*	0	Unknown
Fabaceae	*Cassia fistula*	Golden Shower			*WeedsAus*	0	Unknown
Poaceae	*Cenchrus biflorus*	Gallon`s Curse			*NSW*	0	Unknown
Poaceae	*Cenchrus ciliaris*	Buffel Grass			*MP Gr G&M DEU*	0	Unknown
Poaceae	*Cenchrus echinatus*	Mossman River Grass	*B C*		*NSW*	1	2001
Poaceae	*Cenchrus setaceus*	African Fountain Grass			*Q3 C&E G&M NSW*	0	Unknown
Poaceae	*Cenchrus setiger*	Birdwood Grass			*DEU*	0	Unknown
Poaceae	*Chloris virgata*	Feathertop Rhodes Grass			*DEU*	3	2006
Cucurbitaceae	*Citrullus lanatus*	Camel Melon			*G&M*	3	2008
Cactaceae	*Cylindropuntia imbricata*	Devil`s Rope Cactus	*B C (S of 18 deg S)*	*WONS*	*WA1 WA2 WA4 Q2 C&E G&M CYP SA*	0	Unknown
Solanaceae	*Datura leichhardtii*	Native Thornapple	*C*		*WA1 WA3 WA4*	2	2005
Poaceae	*Eragrostis cilianensis*	Stinkgrass			*DEU*	0	Unknown
Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed			*DEU*	0	Unknown
Malvaceae	*Malvastrum americanum*	Spiked Malvastrum			*DEU*	39	2007
Poaceae	*Melinis repens*	Red Natal Grass			*DEU*	5	2007
Fabaceae	*Parkinsonia aculeata*	Parkinsonia	*B C*	*WONS*	*MP K2 WA1 WA4 Q2 G&M CYP DEU NSW SA*	0	Unknown
Fabaceae	*Prosopis pallida*	Mesquite	*A C*	*WONS*	*K2 WA1 WA2 WA4 Q2 G&M NSW SA*	0	Unknown
Euphorbiaceae	*Ricinus communis*	Castor Oil Plant	*B C*		*MP CYP NSW*	0	Unknown
Fabaceae	*Senna occidentalis*	Coffee Senna	*B C*		*G&M DEU*	0	Unknown
Fabaceae	*Stylosanthes hamata*	Caribbean Stylo			*DEU*	0	Unknown
Tamaricaceae	*Tamarix aphylla*	Athel Pine	*B C*	*WONS*	*WA1 Q3 C&E G&M NSW*	0	Unknown
Zygophyllaceae	*Tribulus terrestris*	Caltrop	*B C*		*CYP SA*	27	2007
Fabaceae	*Vachellia farnesiana*	Sweet Acacia			*DEU*	40	2007
Asteraceae	*Xanthium spinosum*	Bathurst Burr	*B C*		*WA1 DEU NSW SA*	0	Unknown

Status Codes:
1. NATIONAL STATUS CODES
Alert, Alert List for Environmental Weeds (Please call Exotic Plant Pest Hotline 1800 084 881 if you think you have seen this weed)

Sleeper, National Sleeper Weed
Target,Targeted for eradication. (www.landmanager.com.au/view/index.aspx?id=449837)
WONS, Weeds of National Significance

2. NT STATUS CODES
A, NT Class A Weed (to be eradicated)
B, NT Class B Weed (growth & spread to be controlled)
C, NT Class C Weed (not to be introduced) (www.landmanager.com.au/view/index.aspx?id=449869)

3. OTHER STATUS CODES
C&E, Csurhes, S. & Edwards, R. (1998) Potential Environmental Weeds in Australia. Candidate Species for Preventative Control. Environment Australia, Canberra (www.landmanager.com.au/view/index.aspx?id=394504)
CYP, Draft Cape York Peninsula Pest Management Plan 2006-2011 (www.landmanager.com.au/view/index.aspx?id=371200)
DEU, Plants listed as environmental weeds by the Desert Uplands Strategic Land Resource
Assessment (www.landmanager.com.au/view/index.aspx?id=332123)
G&M, Grice AC, Martin TG. 2005. The Management of Weeds and Their Impact on Biodiversity in the Rangelands. Cooperative Research Centre (CRC) for Australian Weed Management and CSIRO Sustainable Ecosystems. Commonwealth Australia (www.landmanager.com.au/view/index.aspx?id=163572)
Gr, Groves et al. 2003. Weed categories for natural and agricultural ecosystem management. Bureau of
Rural Sciences (www.landmanager.com.au/view/index.aspx?id=388018)
K0, High Priority Weeds not yet established in the Katherine region
K1, High Priority Weeds posing environmental threats in the Katherine region
K2, High Priority Weeds posing existing threats in the Katherine region, as described in the Katherine Regional Weed Management Strategy 2005-2010 (www.landmanager.com.au/view/index.aspx?id=130286)
MP, Northern Territory Parks & Conservation Masterplan (www.landmanager.com.au/view/index.aspx?id=144141)
NAQS, North Australian Quarantine Strategy Target List (www.landmanager.com.au/view/index.aspx?id=449416)
NSW, Declared Noxious Weed in NSW (www.landmanager.com.au/view/index.aspx?id=449983)
Q1, QLD Class 1 Weed (not to be introduced, kept or supplied-
Q2, Class 2 Weed (eradicate where possible, not to be introduced, kept or supplied)
Q3, Qld Class 3 Weed (to be controlled near environmentally sensitive areas- not to be supplied/sold without a permit) (www.landmanager.com.au/view/index.aspx?id=190714)
SA, Declared Plant in South Australia (www.landmanager.com.au/view/index.aspx?id=449996)
WeedsAus, Listed as a significant weed by Weeds Australia (www.landmanager.com.au/view/index.aspx?id=14576)
WA1, WA Weed Class P1 (movement prohibited)
WA2, WA Weed Class P2 (aim to eradicate)
WA3, WA Weed Class P3 (control infestations)
WA4, WA Weed Class P4 (prevent spread)
WA5, WA Weed Class P3 (control infestations on public land) (www.landmanager.com.au/view/index.aspx?id=449884).

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More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Plants listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap TGP

TGP Pest and Potential Pest Animals


Animals with pest potential recorded in the grid cell(s) in which TGP occurs. Occurrence based on Northern Territory Government databases.

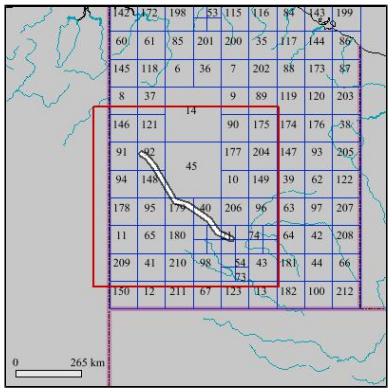
Common Name	Scientific Name	NT Status	National Status	ID	#Observations (Latest)	#Specimens (Latest)	#Surveys (Latest)
Red-tailed Black-cockatoo	*Calyptorhynchus banksii samueli*	N	.	223765	52 (2011)	0 (Unknown)	0 (Unknown)
House Mouse	*Mus musculus*	P	.	187720	139 (2011)	33 (1993)	0 (Unknown)
Dingo / Wild dog	*Canis lupus*	N	.	183280	135 (2011)	97 (1991)	6 (2010)
Fox	*Vulpes vulpes*	P	.	183294	37 (1998)	0 (Unknown)	1 (2010)
Cat	*Felis catus*	P	.	183259	193 (2011)	6 (1991)	2 (2010)
Rabbit	*Oryctolagus cuniculus*	P	.	187331	91 (2011)	1 (1982)	36 (2010)
Donkey	*Equus asinus*	P	.	183287	2 (1984)	0 (Unknown)	0 (Unknown)
Horse	*Equus caballus*	P	.	183315	40 (2009)	2 (1991)	14 (2001)
Camel	*Camelus dromedarius*	P	.	183210	116 (2008)	0 (Unknown)	33 (2010)
Swamp Buffalo	*Bubalus bubalis*	P	.	183245	4 (1982)	0 (Unknown)	0 (Unknown)
Cattle	*Bos taurus*	P	.	183266	41 (2009)	4 (1991)	45 (2004)

NT STATUS CODES:
Int, Introduced species (all non-prohibited vertebrates, and all other exotic species (www.landmanager.com.au/view/index.aspx?id=280771)
N, Native species with pest potential.
P, Prohibited species (all exotic vertebrates except those listed as non-prohibited (www.landmanager.com.au/view/index.aspx?id=450509)

Survey = this category refers to data collected using systematic survey methodology
Specimen = this category refers to museum or other records where a specimen has been collected and lodged
Observation = this category refers to all other incidental recordings where systematic methodology may not have been used consistently.

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Potential pest animals listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap TGP



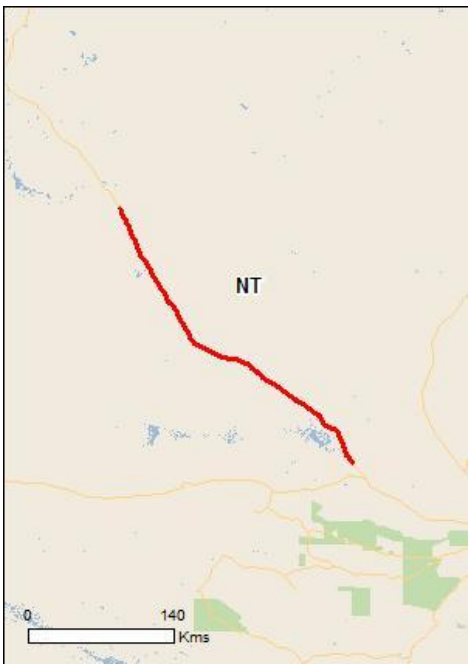
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 31/05/17 12:22:54



Coordinates
Buffer: 10.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	9
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Petrogale lateralis MacDonnell Ranges race Warru, Black-footed Rock-wallaby (MacDonnell Ranges race) [66649]	Vulnerable	Species or species habitat may occur within area
Zyzomys pedunculatus Central Rock-rat, Antina [68]	Endangered	Species or species habitat may occur within area
Reptiles		
Liopholis kintorei Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Southern Tanami	NT

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-23.0591171 132.7342712,-23.0285772 132.7067663,-23.0180911 132.7029806,-22.9985846 132.6871409,-22.9866447 132.6791748,-22.898062 132.6398671,-22.8424929 132.6184121,-22.8256186 132.6126555,-22.815735 132.6141453,-22.8055637 132.6003194,-22.8033779 132.5898847,-22.7993791 132.5818318,-22.7958276 132.5562622,-22.764478 132.5037293,-22.75924 132.4946968,-22.7566868 132.4918501,-22.7528153 132.4891662,-22.7458658 132.4851273,-22.7016928 132.4570024,-22.6884695 132.4477948,-22.6868457 132.445501,-22.665464 132.4105738,-22.5995204 132.3027446,-22.5871155 132.2825007,-22.5683306 132.2575349,-22.5624426 132.2512976,-22.5587881 132.247024,-22.4990656 132.1528396,-22.485705 132.1318247,-22.4740519 132.1162814,-22.4334788 132.0538009,-22.4314542 132.0500839,-22.4304662 132.0464878,-22.4301305 132.0410572,-22.4294342 132.0281371,-22.4275578 132.0235697,-22.4112744 132.0024078,-22.3825157 131.9651563,-22.3764751 131.9572889,-22.3734278 131.9525197,-22.3688101 131.946477,-22.3495482 131.9216406,-22.3423075 131.9163022,-22.3380849 131.9132669,-22.3358041 131.9107524,-22.3099305 131.86907,-22.3071574 131.8655361,-22.2999878 131.8594392,-22.2969152 131.8585621,-22.2902852 131.8546583,-22.28166 131.8403488,-22.2773614 131.8277417,-22.2637891 131.7857217,-22.2593726 131.7752547,-22.2540515 131.7687249,-22.2470556 131.7597122,-22.2451778 131.7502157,-22.235038 131.6656105,-22.2337012 131.6567119,-22.2323573 131.6516259,-22.2309191 131.6413393,-22.2281988 131.633393,-22.2222226 131.6171083,-22.2183713 131.6063638,-22.2053183 131.5637042,-22.2034849 131.5596456,-22.2010735 131.5558916,-22.1938572 131.548569,-22.1895863 131.5433194,-22.1879072 131.5404002,-22.1861311 131.536045,-22.1747625 131.5043642,-22.1675806 131.484344,-22.1629169 131.4713933,-22.1605425 131.4648796,-22.159248 131.4614208,-22.1578914 131.4586712,-22.1565867 131.4565606,-22.1542832 131.4535645,-22.1494154 131.4475361,-22.1460502 131.4427178,-22.1443036 131.4396163,-22.142006 131.4335778,-22.1411459 131.4322982,-22.1388744 131.4234442,-22.1351443 131.4144734,-22.1299525 131.4066625,-22.1240478 131.3962169,-22.1143273 131.3805173,-22.1071165 131.3689803,-22.1036789 131.3650509,-22.0849407 131.3459711,-22.0797555 131.3413485,-22.0737877 131.3381772,-22.0646626 131.3363319,-22.0536289 131.3349087,-22.0496509 131.3336811,-22.0451859 131.3304048,-22.0385068 131.323473,-22.0321793 131.3173709,-22.028126 131.3148087,-21.9680121 131.2874696,-21.9119771 131.2464868,-21.9036601 131.2404542,-21.847472 131.2149716,-21.8283929 131.2060751,-21.8197185 131.1987597,-21.797809 131.1659104,-21.7902328 131.1544554,-21.7841207 131.1488499,-21.7498624 131.131305,-21.7018393 131.1069543,-21.6901719 131.1002846,-21.6462263 131.0713231,-21.6395566 131.0680086,-21.6368029 131.0662769,-21.6091446 131.0466319,-21.5947762 131.0366544,-21.5732388 131.0211115,-21.5650352 131.0148469,-21.5484553 131.0035928,-21.5423152 130.9995291,-21.5382112 130.9976417,-21.4953201 130.9807165,-21.4884022 130.978,-21.4851802 130.9764141,-21.4812094 130.9736458,-21.4711688 130.9651953,-21.4083328 130.9124365,-21.4024511 130.9069804,-21.3975852 130.9041432,-21.3538362 130.886132,-21.3508312 130.8844418,-21.3014334 130.8635804,-21.2794164 130.8518681,-21.2667568 130.8450719,-21.2523709 130.837348,-21.2398847 130.8306478,-21.2251033 130.8227024,-21.1851503 130.8126066,-21.1799701 130.8115197,-21.1756283 130.8098157,-21.1699515 130.8065756,-21.1355627 130.78694,-21.0971719 130.7650145,-21.0764215 130.7531399,-21.0636962 130.7458841,-21.0562594 130.7417139,-21.0438483 130.7347496

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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Statement of Reasons

DDG OPERATIONS PTY LTD – TANAMI GAS PIPELINE

PROJECT

DDG Operations Pty Ltd (the Proponent) submitted a Notice of Intent (NOI) for the Tanami gas pipeline (the Project) to the Northern Territory Environment Protection Authority (NT EPA) on 25 July 2017 for consideration under the *Environmental Assessment Act* (EA Act).

The Proponent proposes to construct and operate a gas pipeline, approximately 439 km long, connecting the existing Amadeus gas pipeline to the Granites and Dead Bullock Soak mines, operated by Newmont Mining in the Tanami desert. The gas pipeline would facilitate transition of 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, generally following the north-eastern side of the Tanami Road but outside of the road reserve. The pipeline is proposed to be buried and would require above ground infrastructure including:

- Tanami metering station (at tie in with the Amadeus gas pipeline)
- two mainline valves located along the pipeline
- Granites Mine tie-in station
- Dead Bullock Soak Mine tie-in station.

A 30 m right-of-way (RoW) and access tracks to the RoW from the Tanami Road would be required for construction, however, the RoW is proposed to be initially established within a 300 m wide pipeline corridor to accommodate deviations in the alignment required to address site constraints for assessment and approval purposes.

The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures as well as mineral and petroleum tenements.

Construction of the pipeline would require clearing of up to 1348.5 ha of native vegetation. The Proponent has reconsidered the need for a permanent access track for the length of the alignment, and proposes that a 5 m wide permanent access track will only be required for the alignment between KP 0-3 and KP 390-439. The area of permanent disturbance will be approximately 40 ha, with the remainder of the alignment (97 %) proposed to be rehabilitated.

A workforce of between 250 and 350 people will be required during the construction period, to be accommodated in a temporary work camp, generally established no greater than 50 km from the work front. Up to four camps could be required at peak of construction.

The peak water requirements for construction are estimated to be 4.54 ML/week and off peak (pre- and post-trenching / backfill) expected to be 2.52 ML/week.

The Proponent referred the Project to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

CONSULTATION

The NOI for the Project has been reviewed in consultation with Northern Territory Government (NTG) advisory bodies and the responsible Minister, in accordance with clause 8(1) of the Environmental Assessment Administrative Procedures.

JUSTIFICATION

Review of the NOI by the NT EPA and NTG advisory bodies identified the potential for environmental impacts associated with the proposed action. Potential impacts are discussed below, relating to the environmental factors of Terrestrial Flora and Fauna; Terrestrial Environmental Quality; Hydrological Processes; and Social, Economic and Cultural Surrounds.

Terrestrial Flora and Fauna

Native vegetation clearing as proposed would remove up to 1348.5 hectares (ha) along the 439 km pipeline length for the RoW, access and turn-around points, materials laydown, worker camps and for permanent facilities. The vegetation in the RoW is comprised of four broad vegetation communities (hummock grassland, open hummock grassland, open woodland and woodland), including 10 vegetation subtypes, which are variations in the Eucalyptus, Acacia and grass species assemblages. The NOI indicates that the communities mapped are not threatened or locally restricted, as they extend well beyond the proposed alignment or occur more broadly in the region. No Threatened Ecological Communities protected under the EPBC Act occur (or have the potential to occur) in the region.

The Proponent identified through flora databases that two plant species listed as threatened under the EPBC Act and *Territory Parks and Wildlife Conservation Act* (TPWC Act) could occur in the broader region. Only one of these species, the dwarf desert spike-rush (*Eleocharis papillosa*), was determined moderately likely to occur in proximity to the Project. This species is restricted to seasonal swamps and riverine waterholes. Potentially suitable habitat containing this species (open woodland community) was mapped in the south of the study area making up less than 15% of the RoW.

The NT EPA is of the opinion that the NOI adequately describes the likelihood of occurrence of threatened flora within the proposed pipeline corridor, and the key threatening processes for the dwarf desert spike rush which include direct clearing of suitable habitat and changed fire regimes resulting from introduction and/or spread of weeds.

The Proponent proposes to avoid significant impacts by conducting targeted pre-construction surveys of the RoW and avoiding known occurrences and important habitat for the dwarf desert spike rush. Where suitable habitat is identified but cannot be avoided, the Proponent has committed to pre-clearance surveys immediately prior to disturbance to identify and remove/translocate individuals. The Proponent has committed to progressively rehabilitate the RoW. It is expected that of the total vegetation proposed to be cleared, 1308.5 ha (97 %) is proposed to be rehabilitated with up to 40 ha remaining permanently disturbed for a five metre wide access track between KP 0-3 and KP 390-439. Rehabilitation criteria, monitoring and reporting requirements and corrective actions will be addressed in an operations environmental management plan (OEMP) which requires approval by the Department of Primary Industry and Resources (DPIR).

The Proponent has committed to preparing a weed management plan based on the presence of weed species confirmed during the detailed ecological survey and to implement standard fire management controls, which are proposed to be incorporated into the Proponent's construction

environmental management plan (CEMP). The NT EPA has made a number of recommendations to the Proponent in relation to its proposed weed management plan to maximise the success of rehabilitation of native vegetation along the pipeline alignment.

The NT EPA is satisfied that with the implementation of commitments made by the Proponent and the actions recommended by the NT EPA, potential impacts and risks to the dwarf desert spike-rush and the broader integrity of native vegetation in the region are unlikely to be significant and can be adequately managed.

A search of protected matters and fauna databases for the broader region recovered 19 fauna species listed as threatened. Following a likelihood of occurrence assessment, it was considered that five species, the great desert skink (*Liopholis kintorei*), greater bilby (*Macrotis lagotis*) (both listed under EPBC Act and TPWC Act), grey falcon (*Falco hypoleucos*), brush-tailed mulgara (*Dasycercus blythi*) and southern marsupial mole (*Notoryctes typhlops*) (all listed under the TPWC Act) were likely to occur in the Project area. The Australian painted snipe (*Rostratula australis*), night parrot (*Pezoporus occidentalis*) and the princess parrot (*Polytelis alexandrae*) were considered to potentially occur due to the presence of suitable habitat.

The key potential impacts associated with terrestrial fauna include temporary and permanent loss of habitat and habitat fragmentation through clearing of native vegetation, wildlife mortality from vehicle movements, and trench fall during the period in which sections of the pipeline trench are open.

For the above species, the NT EPA considers that the NOI adequately assesses the potential for the development to impact on important populations or critical habitat, the potential impacts to particular species, and whether significant impacts are likely. The NT EPA agrees that significant impacts are possible for all species listed except for the Australian Painted Snipe for which no ephemeral wetlands that are considered critical habitat occur along the pipeline corridor.

The NOI establishes an appropriate framework to apply measures to reduce the impacts to listed threatened species. This includes: targeted fauna surveys to determine presence/absence and where present, avoidance of known occurrences and important habitat for threatened species; application of vehicle speed limits; continuous monitoring of the trench and removal of trapped fauna during construction; progressive rehabilitation of the trench and revegetation of 83% of the disturbed area. The NT EPA considers that significant impacts to listed species are likely to be avoided if these mitigation measures are implemented. The NT EPA has made a number of recommendations for specific controls to be incorporated into the management plans for pipeline construction to further minimise potential impacts including specification of maximum open trench length and fauna protection measures, and protocols for fauna teams.

The NT EPA does not consider the buried pipeline a significant impediment to wildlife movement. When the alignment is vegetated, the pipeline route would become a minor service road that is proposed to be unsealed (5 m wide) and infrequently-traversed. The service road may have some adverse impacts on fauna and there is likely to be a cumulative impact due to the proximity of the Tanami Road, which already fragments the landscape along its length. However, the NT EPA does not consider that the service road will add significantly to habitat fragmentation.

The NT EPA considers that the linear disturbance from the pipeline adjacent to an existing road corridor and the short duration of proposed works at any particular point on the alignment limits the risks of the Project to populations of listed fauna.

The NT EPA is satisfied that potential impacts and risks to terrestrial flora and fauna can be adequately managed with the implementation of the mitigation actions proposed in the NOI and

recommended by the NT EPA, and the proposal is likely to meet the NT EPA's objective for Terrestrial Flora and Fauna.

Terrestrial Environmental Quality

There is potential for the quality of the terrestrial environment to be impacted by invasive species; erosion, runoff and soil compaction from trenching and reinstatement; and altered fire regimes. The Proponent has committed to developing management plans with appropriate measures to prevent and mitigate these potential impacts and risks. The NT EPA is satisfied that with the implementation of these measures potential impacts and risks to terrestrial environmental quality can be adequately managed and that the NT EPA's objective for Terrestrial Environmental Quality is likely to be met.

Hydrological Processes

The Proponent's peak construction water requirements, including for dust suppression and pipeline testing, are estimated to be 4.54 ML/week and off peak (pre- and post-trenching / backfill) volumes expected to be 2.52 ML/week. Groundwater is proposed as the primary water supply for construction as there are no permanent water courses along the alignment. Therefore there is potential for impacts to other water users and the environment (groundwater dependent vegetation).

Bore testing was conducted along the Tanami Road in June/July 2017, which indicated a high number of potential existing bores suitable for construction water supply (average 4L/s). Turkey nest dams exist at about half the bores identified for use. Usage for construction requires a maximum of 15 bores along the Tanami Road and existing bores are located at suitable locations along the alignment to limit water transport distances to less than 22.5 km from point of use. No new bores are expected to be required.

Potable water supply is proposed to be either fully sourced from Alice Springs via trucks, or a combination of Alice Springs supply, potable water bores where available and reverse osmosis treatment if required.

Hydrostatic testing (pressure testing) would be undertaken during commissioning of the pipeline. The water used could contain chemical additives such as corrosion inhibitors and biocides. Where this is the case, disposal of this water would be either into one of the mine sites' tailings dams, subject to agreement from the Department of Primary Industry and Resources (DPIR) or into an HDPE lined turkey nest dam for evaporation. The Proponent anticipates that if additives are not required, subject to licensing requirements and landholder approval, hydrotest water would be discharged to the surrounding environment at an appropriate distance from any water courses.

The Proponent has consulted with relevant pastoralists in regards to water use and abstraction, and the Department of Infrastructure, Planning and Logistics as manager of the adjacent road. A hydrological survey was completed for water courses as well as potential and existing bores for the Project. The NOI identified no issues with existing bore sites in terms of groundwater dependant vegetation for those locations reviewed during the survey.

The NT EPA considers that potential impacts and risks to groundwater users and groundwater-dependent vegetation associated with the use of groundwater for construction supply are likely to be localised and limited in duration. Any potential impacts are therefore not considered to be significant and can be adequately managed through the implementation of measures proposed in the NOI and the CEMP. The NT EPA's objective for Hydrological Processes is likely to be met.

Social, Economic and Cultural Surroundings

The closest population is Yuendumu, which is adjacent to the Tanami Road and may be impacted by temporary traffic increases along the Tanami Road during construction. A traffic impact assessment and a traffic management plan will be required by the Department of Infrastructure, Planning and Logistics where pipeline construction activities interact with the Tanami Road. The NT EPA considers that any impacts would be temporary and unlikely to be significant.

Yuendumu sources its water from groundwater in the Ngalia Basin and specifically the Mt Eclipse Sandstone. The water supply for Yuendumu is critical and could be impacted by extra demand. Access to Yuendumu's water supply for pipeline construction is not proposed and any requirement for additional bores would target the Yuendumu Sandstone or Walibiri Dolomite to avoid impacts to the Yuendumu supply.

The Proponent has engaged with the Department of Tourism and Culture with respect to potential impacts to archaeological heritage. The Proponent has committed to archaeological surveys of the proposed RoW prior to construction and preparation of a Cultural Heritage Management Plan. The Proponent has consulted with the Aboriginal Areas Protection Authority and the Central Land Council with respect to Aboriginal cultural aspects of the Project and no concerns have been raised with the NT EPA.

The NT EPA is satisfied that its objective for Social, Economic and Cultural Surroundings is likely to be met.

Conclusion

The NT EPA considers that significant environmental impacts are unlikely due to the narrow, linear nature of the Project, the temporary and local scale impacts along the alignment during construction and limited operational footprint, and the commitment by the Proponent to manage its activities using appropriate measures for minimising and mitigating impacts as outlined in the NOI. The Proponent will develop and implement a detailed CEMP and OEMP. These plans are a requirement under the *Energy Pipelines Act* and will be regulated by the DPIR.

The NT EPA considers that the potential environmental impacts and risks associated with the Project are not significant and that the Project does not require assessment under the EA Act. Comments from NTG advisory bodies have been provided to the Proponent and the NT EPA has provided recommendations to ensure that potential impacts on the environment are minimised and responsibilities under relevant legislation can be met.

DECISION

The proposed action, which was referred to the NT EPA by DDG Operations Pty Ltd, has been examined by the NT EPA and preliminary investigations and inquiries conducted. The NT EPA has decided that the potential environmental impacts and risks of the proposed action are not so significant as to warrant environmental impact assessment by the NT EPA under provisions of the *Environment Assessment Act*. However, the proposed action will require assessment and approvals under the *Energy Pipelines Act* and Regulations to ensure the environmental issues associated with the proposed action are effectively managed.

This decision is made in accordance with clause 8(2) of Environmental Assessment Administrative Procedures, and subject to clause 14A the administrative procedures are at an end with respect to the proposed action.

DR PAUL VOGEL
CHAIR
NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

30 OCTOBER 2017

Appendix B AGIG Environmental Policy and Statement of Commitment

Environment Policy

AGIG's vision is to be the leading gas infrastructure business in Australia by delivering for customers, being a good employer, and sustainably cost efficient. Environmental and social responsibility is a key element of our vision.

AGIG believes that all incidents are preventable and is continually striving to achieve Zero Harm. Environmental stewardship is critical to the success and sustainability of our business.

AGIG believes that we are all individually accountable and empowered to ensure our actions are without undue adverse impact upon the environment.

Our key objectives are to:

- Conduct environmentally responsible operations and minimise environmental impact wherever possible.
- Consider our carbon emissions footprint and its consistency with national policy and regulations.
- Create a culture and environment where every employee is personally committed to managing impacts to the environment.
- Act consistently with AGIG's values, including working in a safe and professional manner.

We will achieve this by:

- Embedding environmental considerations into business decisions and processes.
- Promoting environmental awareness and fostering a culture of respect for ecological values.
- Effectively consulting with our employees, contractors and key stakeholders on environmental matters and establishing an escalation mechanism for matters requiring management intervention.
- Driving a culture where employees and contractors take ownership and are accountable for environmental performance.
- Developing processes and systems to identify, assess and control environmental risks and to ensure the management of risk to as low as reasonably practicable.
- Establishing and maintaining pragmatic and flexible environmental management systems that are tailored to our risks, drives achievement of our vision and are regularly reviewed for currency, relevance and effectiveness.
- Allocating the appropriate resources and providing the necessary information, instruction, training and supervision to enable implementation of the environmental management systems.
- Effectively reporting, recording and investigating environmental incidents and near misses in the workplace and taking proactive measures to prevent recurrence.
- Maintaining preparedness to respond promptly to environmental incidents to mitigate the nature and scale of unintended impacts.
- Setting, monitoring and communicating meaningful performance measures to drive continuous improvement.
- Regularly auditing our operations to monitor compliance with statutory obligations and conducting accurate and transparent reporting on any findings.

Australian Gas Infrastructure Group

ZERO HARM

Statement of Commitment

AGIG's vision is to be the leading gas infrastructure business in Australia by delivering for customers, being a good employer, and being sustainably cost efficient. Public safety, the health and safety of our employees and contractors, and being environmentally and socially responsible are key elements of our vision.

The AGIG management team believes that all incidents are preventable and is continually striving to achieve Zero Harm. It is our intent to demonstrate an ongoing and determined commitment to improving health, safety and environment throughout our organisation.

Underpinning AGIG's vision for Zero Harm and AGIG's values, we the management team are committed to:

- Understanding and valuing the people that make up our workforce and the environment within which we operate.
- Creating a culture that targets zero harm to Health, Safety and the Environment first and where employees and contractors take ownership and are accountable for safety performance.
- Collaborating with government and industry bodies to share information and ideas on best practice for management on risks to Health, Safety and the Environment.
- Providing adequate resources to enable implementation of Health, Safety and Environmental management systems to mitigate the risk of harm to as low as reasonably practicable.
- Empowering our workforce to stop work when they determine that their safety or that of their colleagues, the assets or the environment might be compromised.
- Engaging in regular, meaningful, two way consultation with the workforce on Health, Safety and Environmental matters and providing prompt management feedback on any matters raised.
- Enquiring about risks, mitigation strategies, incidents and near misses to maintain visibility of work practices and addressing any disconnect identified between perceived and actual performance.
- Striving to continuously improve our processes and systems.

Ben Wilson
Chief Executive Officer

Paul May
Chief Financial Officer

Andrew Staniford
Chief Customer Officer

Tawake Rakai
General Manager
Transmission Asset Management

James Smith
General Manager
Transmission Operations

Mark Beech
General Manager
Network Operations

Craig de Laine
General Manager
People & Strategy

Roxanne Smith
General Counsel and
Company Secretary

Jon Cleary
General Manager
Commercial

Appendix C Risk Register

Construction phase

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
Vegetation clearing	Human health and safety	Injury/ loss of life due to machinery accident	5	C	H	Standard safety procedures and controls	Project safety management plans including work procedures, job hazard analysis, risk assessment and management and emergency response	5	D	H	H
Vegetation clearing	Terrestrial flora and vegetation	Disturbance/ loss of flora species and vegetation communities, including regional/downstream impacts due to degradation of habitat caused by sediment deposition, physical modification of watercourse, etc	3	B	I	Native vegetation occurs across entire length of pipeline alignment Pipeline crosses watercourses Standard reinstatement, revegetation or rehabilitation of RoW Arid environment – watercourses unlikely to be in flow	Temporary disturbance footprint allowed to return to native vegetation over time and meet acceptance criteria Use of HDD for sensitive watercourse crossings Flora and Vegetation sub-plan Soils and Sediment sub-plan and Erosion and Sediment Control Plan Rehabilitation Plan Native Vegetation Clearing Procedure	2	C	L	H
		Disturbance/ loss of EPBC and/or NT listed threatened flora species)	3	C	I	Pipeline passes through bioregions and Sites of Botanical Significance known to contain threatened species	As per above Plus any species specific mitigation	2	C	L	H
		Degradation of vegetation community due to spread of weeds	3	A	H	Weed presence (including WONS) known within project footprint and surrounds Known risk for pipeline construction activities	Field survey to confirm weed presence and high risk areas Weed sub-plan	2	C	L	M
Vegetation clearing	Terrestrial fauna	Disturbance/ loss/ degradation of habitat	3	B	I	Native vegetation supporting fauna habitat occurs across entire length of pipeline alignment Pipeline passes through Sites of Conservation Significance and potential habitat for one or more threatened fauna species.	Above mitigation for vegetation and flora as it relates to important fauna habitat, and habitat trees. Clearing will be undertaken in stages to allow for the progressive movement of fauna into areas outside the proposed disturbance area. Plus any species specific mitigation	2	C	L	H
		Fragmentation of habitat	2	B	L	Clearing causes a linear fragmentation (30 m width), representing a minor barrier for fauna species No fencing, or other barriers during operational life of project	Pipeline alignment follows and is close to Tanami Road – existing 'disturbance corridor' No permanent access track between KP3-390 Use of HDD for sensitive watercourse crossings Flora and Vegetation sub-plan Rehabilitation Plan Native Vegetation Clearing Procedure	1	C	N	H
Vegetation clearing	Terrestrial environmental quality	Accelerated erosion and landform instability	3	B	I	Arid environment – rainfall episodic and high intensity. Construction unlikely to occur over period of significant rainfall Standard construction and reinstatement measures Watercourse crossings	Soils and Sediment sub-plan and Erosion and Sediment Control Plan Rehabilitation Plan HDD at sensitive watercourse crossings Native Vegetation Clearing procedure	2	C	L	M
Vegetation clearing	Inland water environmental quality	Degradation of surface water quality due to erosion of soils and landforms	3	D	L	As per above	As per above	1	D	N	H
Vegetation clearing	Social, economic and cultural surrounds	Damage or disturbance to sacred, archaeological and historic cultural heritage sites	3	C	I	Statutory protection of sacred sites, aboriginal archaeological material, and declared heritage places with defined processes to follow to avoid or minimise disturbance Presence of sacred sites and aboriginal archaeological material within and in proximity to project footprint highly likely	Cultural Heritage sub-plan Compliance with NTASS Act and Heritage Act requirements for survey and approvals Workforce induction Cross-cultural awareness training of the construction workforce including specific elements that cover cultural protocols.	3	D	L	H

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
							Ongoing liaison with Aboriginal traditional owners				
Excavation	Human health and safety	Injury/ loss of life (public and/or project workforce) due to falling into trench	5	C	H	Standard work procedures.	Where easily accessible to the public, trench clearly marked by bunting and hazard lights	5	D	H	H
Excavation	Terrestrial flora and vegetation	Degradation of vegetation community due to spread of weeds	3	B	I	Weed presence (including WONS) known within project footprint and surrounds Known risk for pipeline construction activities	Field survey to confirm weed presence and high risk areas Weed sub-plan	2	C	L	H
Excavation	Terrestrial fauna	Mortality of individuals due to capture in trench	3	A	H	Species susceptible to trench fall likely to be present Substantial length of trench is open at any one time Happens on regular basis	Progressive rehabilitation of trench Terrestrial Fauna and Habitat sub-plan Trapped and Injured Fauna Procedure Sufficient fauna handlers for length of open trench	2	C	L	H
Excavation	Terrestrial environmental quality	Accelerated erosion and landform instability particularly watercourse crossings	4	B	H	Arid environment – rainfall episodic and high intensity. Construction unlikely to occur over period of significant rainfall Standard construction and reinstatement measures Watercourse crossings – braided systems	Soils and Sediment sub-plan and Erosion and Sediment Control Plan Rehabilitation Plan HDD at sensitive watercourse crossings Native Vegetation Clearing procedure	2	C	L	H
Excavation	Terrestrial environmental quality	Contamination of soils due to exposure of acid sulphate soils	3	C	I	As above	Soils and Sediment sub-plan and Erosion and Sediment Control Plan	2	D	N	M
Excavation	Hydrological processes	Drawdown of groundwater levels in shallow groundwater areas (< 5 m) due to dewatering associated with trenching.	3	B	I	As above	Surface and Groundwater sub-plan	3	D	L	M
Excavation	Inland water environmental quality	Degradation of groundwater quality due to excavation intercepting shallow aquifer	3	B	I	As above	Surface and Groundwater sub-plan	3	D	L	M
Excavation	Inland water environmental quality	Degradation of surface water quality (contamination/ acidification) due to exposure of acid sulphate soils	3	D	L	As above	Surface and Groundwater sub-plan	2	D	N	M
Excavation	Inland water environmental quality	Degradation of groundwater quality (contamination/ acidification) due to exposure of acid sulphate soils	3	C	I	As above	Surface and Groundwater sub-plan	3	D	L	M
Excavation	Social, economic and cultural surrounds	Damage to undocumented (buried) archaeological sites/ skeletal remains	4	B	H	Past indigenous occupation likely Narrow but long disturbance footprint	Predictive model developed to target areas most at risk. Cultural heritage sub-plan	3	C	I	M
Water use/ groundwater extraction	Terrestrial flora and vegetation	Disturbance/ loss of groundwater-dependent vegetation	2	C	L	Groundwater supply for project Arid environment Short construction period	Surface and Groundwater sub-plan	2	D	N	M
Water use/ groundwater extraction	Terrestrial fauna	Reduced habitat availability due to disturbance/ loss of groundwater-dependent vegetation	2	C	L	Groundwater supply for project Arid environment Short construction period	Surface and Groundwater sub-plan	2	D	N	M
		Reduced availability of drinking water due to reduced groundwater discharge to surface waterbodies, wetlands, etc	2	C	L	Groundwater supply for project Arid environment Short construction period	Surface and Groundwater sub-plan	2	D	N	M

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
Water use/ groundwater extraction	Hydrological processes	Altered surface water hydrology due to reduced groundwater discharge to surface waterbodies, wetlands, etc	2	C	L	Groundwater supply for project Arid environment Short construction period	Surface and Groundwater sub-plan	2	D	N	M
Water use / groundwater extraction	Hydrological processes	Drawdown of groundwater levels within shallow alluvial aquifer and paleochannel aquifer	3	B	I	Groundwater supply for project Arid environment Short construction period	Surface and Groundwater sub-plan	3	D	L	M
Water use/ groundwater extraction	Social, economic and cultural surrounds	Strain on public water supply, decline in water availability to other users such as pastoralists (stock and domestic)	3	C	I	Construction camps located away from major communities. Short construction period	Surface and Groundwater sub-plan Water Sourcing Strategy	2	D	N	M
Water use/ groundwater extraction	Social, economic and cultural surrounds	Altered character of ethnographic sites dependent on groundwater discharge (e.g. waterholes, springs, etc.)	2	C	L	Groundwater supply for project Arid environment Short construction period	As above Consultation with Aboriginal traditional owners	2	D	N	M
Energy/ electricity use	Social, economic and cultural surrounds	Strain on public power supply	-	-	-	No requirement for public power supply. Project would generate own power	NA	-	-	-	-
Vehicle movements	Social, economic and cultural surrounds	Annoyance/ traffic impacts due to increased vehicle movements on public roads	4	B	H	Materials transported through Alice Springs and along Stuart Highway and Tanami Road Construction workforce accommodated on-site at construction camps. Limited number of sensitive receptors	Traffic Management Plan including journey management planning Driving Procedure	3	C	I	H
Vehicle movements	Human health and safety	Injury/ loss of life (public and project workforce) due to traffic accident on public, or project roads	5	C	H	Remote roads servicing pastoral properties and remote communities Existing traffic levels not high	Traffic Management Plan including journey management planning Driving Procedure	5	D	H	H
Vehicle movements	Social, economic and cultural surrounds	Deterioration of road integrity	4	A	E	Tanami Road not sealed for most of project area Unsealed roads known to deteriorate with more frequent traffic or larger loads Stuart Highway sealed and capable of taking project transport without deterioration	Traffic Management Plan Driving Procedure	2	C	L	H
Vehicle movements	Terrestrial flora and vegetation	Degradation of vegetation community/ alteration of community composition due to introduction and/or spread of weeds	3	B	I	Vehicle movements for Project activities only (i.e. not considering unauthorised public use) No weed control or hygiene procedures. Existing weed presence	Field survey to confirm weed presence and high risk areas Weed sub-plan	2	C	L	M
Vehicle movements	Terrestrial fauna	Degradation of fauna habitat due to introduction and/or spread of weeds	3	B	I	Weeds known to exist in project area Linear infrastructure known to facilitate dispersal Pipeline follows Tanami Road and close to existing 'disturbance corridor'	As above	2	C	L	M
		Loss of individuals (mortality due to vehicle strike)	3	A	H	Generally daytime only traffic but dawn and dusk included. Significant vehicle movements limited to short construction phase. Vehicle movements are a known cause of wildlife mortality	Traffic Management Plan Driving Procedure	2	C	L	H
Fire ignition	Human health and safety	Injury/ loss of life (public and project workforce) due to wildfire caused or exacerbated by project activities (e.g. due	5	C	H	Accidental fire ignition caused by the project Immediate attempts to extinguish the fire fail	Bushfire sub-plan Emergency response procedure Native Vegetation Clearing procedures	5	D	H	H

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
		to welding, presence of combustible materials at work site)									
Fire ignition	Social, economic and cultural surrounds	Disruption to utility supply as a result of damage due to wildfire caused or exacerbated by project activities	4	C	H	Accidental fire ignition caused by the project Immediate attempts to extinguish the fire fail	As above	3	D	L	H
Fire ignition	Terrestrial flora and vegetation	Disturbance/ loss of terrestrial flora species and vegetation communities (non-threatened).	3	C	I	Accidental fire ignition caused by the project Immediate attempts to extinguish the fire fail Potential additive effect of grassy weed species such as Buffel Grass	As above	2	B	L	M
		Degradation of vegetation communities caused by sediment deposition, physical modification of watercourse resulting from fire	2	D	N	Accidental fire ignition caused by the project Immediate attempts to extinguish the fire fail	As above	1	D	N	M
		Disturbance/loss of sensitive vegetation types (e.g. riparian)	3	B	I	As above	As above	2	C	L	M
		Disturbance/loss of conservation significant flora species (e.g. EPBC listed threatened species)	3	B	I	As above Threatened flora species in or near the RoW assumed	As above	2	C	L	M
Fire ignition	Terrestrial fauna	Mortality: direct and due to input of silt, ash, etc. caused by wildfire	4	C	H	As above Fire patterns in the region already not optimal for maintenance of many species	As above	3	B	I	M
		Fragmentation of habitat	4	C	H	As above Fire patterns in the region already not optimal for maintenance of habitat quality	As above	3	C	I	M
		Disturbance/ loss of habitat or food sources (due to input of silt, ash, etc. caused by wildfire)	4	C	H	As above	As above	3	C	I	M
Fire ignition	Inland water environmental quality	Degradation of surface water quality due to input of silt, ash, etc. caused by wildfire	2	C	L	As above Water held in the landscape is ephemeral	As above	1	C	N	M
Fire ignition	Social, economic and cultural surrounds	Damage to cultural sites outside project area due to wildfire caused or exacerbated by project activities	4	C	H	Accidental fire ignition caused by the project Immediate attempts to extinguish the fire fail	As above	2	C	L	M
Fire ignition	Air quality and greenhouse gases	Generation of smoke, dust and ash due to wildfire caused or exacerbated by project activities	4	C	H	As above Fire already impacting on air quality in the region (particulates)	As above	3	C	I	M
Liquid (including septic) and solid waste disposal	Human health and safety	Illness/ loss of life (public and project workforce) due to contamination of public drinking water supply resulting from improper disposal of waste	5	C	H	Disposal liquid waste and hydrotest water to land Arid environment	Package treatment plants will treat sewage on-site to health standards Waste Management sub-plan Surface and Groundwater sub-plan	5	D	H	H
Liquid (including septic) and solid waste disposal	Social, economic and cultural surrounds	Strain on existing waste disposal facilities	3	C	I	Solid waste volumes not high but may be beyond capacity of municipal waste facilities at remote communities Disposal liquid waste and hydrotest water to land Arid environment	As above	2	C	L	H
		Disturbance/loss of significant non-threatened flora species and vegetation	2	C	L	As above	As above	1	D	N	M

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
Liquid (including septic) and solid waste disposal	Terrestrial flora and vegetation	communities due to disposal/discharge of hydrotest water and sewage effluent									
		Disturbance/ loss of conservation significant flora species (e.g. listed threatened species) due to disposal/ discharge of hydrotest water sewage effluent	3	C	I	As above Threatened flora species known in project area and region	As above	2	D	N	M
Liquid (including septic) and solid waste disposal	Terrestrial fauna	Disturbance/ loss/ degradation of terrestrial and aquatic habitat (e.g. waterholes) due to disposal/ discharge of hydrotest water and sewage effluent	2	C	L	As above	As above	2	D	N	M
Liquid (including septic) and solid waste disposal	Inland water environmental quality	Degradation of surface water quality due to disposal/ discharge of hydrotest water and sewage effluent	2	C	L	As above	As above	1	D	N	M
		Contamination of groundwater due to due to disposal/ discharge of hydrotest water and sewage effluent	3	C	I	As above	As above	3	D	L	M
Liquid (including septic) and solid waste disposal	Social, economic and cultural surrounds	Damage to sites outside project area due to disposal/ discharge of hydrotest water and sewage effluent	3	C	I	As above. Restricted work areas, archaeological sites and heritage places identified are known	As above	2	D	N	H
Spills and leaks	Human health and safety	Illness/ loss of life (public and project workforce) due to contamination of public drinking water supply	5	C	H	Arid environment Management and storage of hazardous materials to Australian Standards and consistent with MSDS'	Surface and Groundwater sub-plan Hazardous Materials and Spill Response sub-plan Hazardous materials management/handling procedure Emergency response procedures	5	D	H	H
Spills and leaks	Terrestrial flora and vegetation	Disturbance/ loss of terrestrial flora species and vegetation communities due to chemical/ hydrocarbon spill/ leak	3	C	I	Arid environment Sensitive vegetation types: riparian. Threatened flora species known in project area and surrounds Management and storage of hazardous materials to Australian Standards and consistent with MSDS'	As above	2	D	N	H
Spills and leaks	Terrestrial fauna	Contamination/ loss of terrestrial fauna and fauna habitat	3	C	I	As above Threatened fauna species known in project area and surrounds	As above	2	D	N	M
Spills and leaks	Terrestrial environmental quality	Contamination of soil	4	B	H	Arid environment Management and storage of hazardous materials to Australian Standards and consistent with MSDS'	As above	3	D	L	H
Spills and leaks	Inland water environmental quality	Degradation of surface water quality (contamination) due to chemical/ hydrocarbon spill/ leak	3	C	I	As above. Mobilisation of contaminants into aquatic environment unlikely	As above	2	D	N	M
		Degradation of groundwater quality (contamination) due to chemical/ hydrocarbon spill/ leak	3	C	I	As above Arid environment constrains mobilisation of contaminants	As above	3	D	L	M
Atmospheric emissions (excl. dust)	Air quality and greenhouse gases	Degradation of air quality	1	D	N	Exhaust emissions from vehicles and machinery	Air Emissions sub-plan Driving procedure	1	D	N	H

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
Dust emissions	Human health and safety	Annoyance/ reduced amenity/ health impacts	3	A	H	Arid environment Sensitive receptor - Yuendumu Dust during clearing activities, and in open areas and along access tracks during construction Tanami Road unsealed – impacts from existing traffic possible, project transport may exacerbate Localised Dust suppression measures necessary for construction visibility	Air Emissions sub-plan Construction schedule to be planned to minimise the elapsed time between clearing, grading and reinstatement. Landholder/community engagement plan Complaints mechanism	2	C	L	H
		Traffic incident caused by excessive dust generation near public roads	5	C	H	As above	As above	5	D	H	H
Dust emissions	Terrestrial flora and vegetation	Disturbance/ loss of terrestrial flora species and vegetation communities due to dust deposition	2	B	L	As above Threatened flora species known in project area and surrounds	As above	1	C	N	H
Dust emissions	Terrestrial fauna	Degradation of terrestrial fauna habitat (e.g. foraging, nesting) due to dust deposition	2	B	L	As above Threatened fauna species known in project area and surrounds	As above	1	C	N	H
Dust emissions	Inland water environmental quality	Disturbance/loss of aquatic fauna and degradation of aquatic habitats due to dust deposition, including downstream impacts	3	D	L	As above Arid environment – habitats holding water unlikely	As above	2	D	N	H
		Degradation of surface water quality due to dust deposition/ sedimentation	3	D	L	As above	As above	2	D	N	H
Dust emissions	Air quality and greenhouse gases	Degradation of air quality	2	B	L	As above	As above	2	D	N	H
Light emissions	Social, economic and cultural surrounds	Visual impact to public	2	D	N	Remote location. Sensitive receptor - Yuendumu No directional lighting Light emissions may be present but night time work is limited	NA	2	D	N	H
Light emissions	Terrestrial fauna	Disruption to nesting/ roosting/ foraging habitats and/or behaviour	2	D	N	No directional lighting Light emissions may be present but night time work is limited. No threatened bats known or likely to occur	NA	2	D	N	M
Noise emissions and vibration	Social, economic and cultural surrounds	Excessive noise levels at nearby public/ sensitive premises	3	C	I	Remote location Sensitive receptor - Yuendumu Noise may be continuous for 12 hour shifts Limited night time work	Noise and Vibration sub-plan Landholder and community engagement plan Complaints mechanism	2	C	L	M
Noise emissions and vibration	Terrestrial fauna	Disruption to nesting/ roosting/ foraging habitats and/or behaviour	2	B	L	Noise may be continuous for 12 hour shifts Blasting unlikely to be required	As above	2	C	L	M
Noise emissions and vibration	Social, economic and cultural surrounds	Altered character of Aboriginal sacred sites or heritage places sites caused by vibration impacts (e.g. subsidence)	3	C	I	Blasting unlikely to be required	Noise and Vibration sub-plan Cultural Heritage sub-plan Consultation with Aboriginal traditional owners	3	D	L	H

Operations Phase

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
Energy/ electricity use	Social, economic and cultural surrounds	Strain on public power supply	-	-	-	No requirement for public power supply. Project would generate own power	NA	-	-	-	-
Physical presence of infrastructure	Social, economic and cultural surrounds	Visual impact to public	3	A	H	Above ground infrastructure limited in number and scale, and widely spaced Permanent disturbance from RoW limited to permanent access track and above pipeline Proximity to Yuendumu but otherwise not near major communities Close proximity to Tanami Road	Buffer and screening at permanent above ground infrastructure Active rehabilitation measures and natural regrowth of RoW to reduce visual impact of disturbance over time Rehabilitation Plan	2	C	L	H
Physical presence of infrastructure	Human health and safety	Injury/ loss of life (public) due to trespassing, third party interference with the project	5	C	H	Remote location and away from any densely populated area Australian Standards and industry code of practice for construction and operation Well established regulatory regime	Signage Land Users sub-plan Landholder engagement and communication plan Inspections	5	D	H	H
Physical presence of infrastructure	Terrestrial flora and vegetation	Degradation of vegetation community due to spread of weeds and feral animals	3	B	I	Weeds and feral animals known to exist in project area Linear infrastructure known to facilitate dispersal Pipeline follows Tanami Road and close to existing 'disturbance corridor'	Weed sub-plan and procedure Rehabilitation Plan Monitoring of weed presence as component of rehabilitation success.	2	C	L	H
Physical presence of infrastructure	Terrestrial fauna	Degradation of fauna habitat and loss of individuals due to predation by feral animals	2	C	L	As above Increased access to favourable habitat unlikely	No permanent access track between KP3-390 Rehabilitation Plan	2	D	N	M
		Failure of temporary footprint to return to native vegetation / fauna habitat	3	C	I	Arid environments recover slowly and episodically in response to rainfall events	Terrestrial Fauna and Habitat sub-plan Rehabilitation Plan	2	D	N	M
Physical presence of infrastructure	Inland water environmental quality	Degradation of surface water quality due to spread of feral animals	2	C	L	As above	As above	2	D	N	M
Physical presence of infrastructure	Social, economic and cultural surrounds	Altered character of Aboriginal sacred sites due to increased visitation/ damage caused by feral animals	3	C	I	As above	As above	2	D	N	M
Vehicle movements	Human health and safety	Injury/ loss of life (public and project workforce) due to traffic accident on public, or project roads	5	C	H	Project traffic limited to inspection and maintenance regime Remote roads servicing pastoral properties and remote communities Existing traffic levels not high	Work method statements. Fatigue management policy and procedures.	5	C	H	H
Vehicle movements	Social, economic and cultural surrounds	Annoyance/ traffic impacts due to increased vehicle movements on public roads	1	D	N	Project traffic limited to inspection and maintenance regime Limited number of sensitive receptors	NA	1	D	N	H
		Deterioration of road integrity	1	D	N	Tanami Road not sealed for most of project area Unsealed roads known to deteriorate with more frequent traffic or larger loads Stuart Highway sealed and capable of taking project transport without deterioration	NA	1	D	N	H

Environmental aspect (activity)	Environmental factor (receptor)	Potential impact (change/ effect)	Consequence	Likelihood	Inherent risk	Assumptions/ comments	Management controls	Consequence	Likelihood	Residual risk	Certainty
Vehicle movements	Terrestrial flora and vegetation	Degradation of vegetation community/ alteration of community composition due to introduction and/or spread of weeds	3	C	I	Weeds known to exist in project area Linear infrastructure known to facilitate dispersal Pipeline follows Tanami Road and close to existing 'disturbance corridor' No weed hygiene or control measures	Weed sub-plan	2	D	N	M
Vehicle movements	Terrestrial fauna	Degradation of fauna habitat due to introduction and/or spread of weeds	3	C	L	As above	Weed sub-plan	2	D	N	M
		Loss of individuals (mortality due to vehicle strike)	2	B	L	Generally daytime only traffic but dawn and dusk included. Vehicle movements are a known cause of wildlife mortality	No permanent access track between KP3-390 Driving procedure	1	C	N	H
Atmospheric emissions (excl. dust)	Air quality and greenhouse gases	Degradation of air quality	1	D	N	Venting required for inspection, maintenance and repairs	Air Emissions sub-plan	1	D	N	H

1.1 Definitions

Table 1-1: Definition of likelihood

Likelihood / Probability		
A	**Almost certain**	Common repeating occurrence that is ongoing. Is expected to occur with pipeline developments of this scale.
B	**Likely**	Will probably occur at some time and in most circumstances. Known to occur with pipeline developments.
C	**Possible**	Could occur at some time but not often. Sometimes occurs with pipeline developments.
D	**Unlikely**	Could potentially occur at some time. Uncommonly occurs in pipeline developments.
E	**Rare**	Practically impossible. Will only occur in very rare circumstances. Not known to occur in pipeline developments.

Table 1-2: Consequence definitions for social, economic and cultural surrounds factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
No noticeable change to landform or vista as viewed from sensitive premises	Local and seasonal change to landform or vista as viewed from sensitive premises	Local and short-term, or widespread and seasonal change to landform or vista as viewed from sensitive premises	Local and long-term, or widespread and short-term change to landform or vista as viewed from sensitive premises	Widespread and long-term change to landform or vista as viewed from sensitive premises
Noise emissions do not exceed relevant noise guidelines	Seasonal, local increase in noise levels exceeding relevant noise guidelines	Short-term, local increase in noise levels exceeding relevant noise guidelines	Long-term, local increase in noise levels exceeding relevant noise guidelines	Long-term, regional increase in noise levels exceeding relevant noise guidelines
No effect on traffic congestion	Seasonal, local increase in traffic congestion	Short-term, local increase in traffic congestion	Short-term, regional increase in traffic congestion	Long-term, regional increase in traffic congestion
No deterioration of road integrity	Seasonal, local deterioration of road integrity	Short-term, local deterioration of road integrity	Short-term, regional, deterioration of road integrity	Long-term, regional deterioration of road integrity
No change to existing facilities (e.g. waste disposal)	Existing facilities overloaded up to 110% of capacity	Existing facilities under pressure, overloaded between 110-150% of capacity	Existing facilities overloaded between 150-175% of capacity	Existing facilities overloaded beyond 175% of capacity; emergency management required
No competition for existing utility resources	Short-term, isolated exceedance in requirement of water/power to support the project	Short-term, local exceedance in requirement of water/power to support the project	Short-term, regional competing demand for water/power from existing sources	Long-term, regional water shortage/power under-supply
No Historic and/or Cultural Heritage sites disturbed	Some Historic and/or Cultural Heritage sites required to be remediated/	Some Historic and/or Cultural Heritage sites required to be remediated/	Some Historic and/or Cultural Heritage sites required to be remediated/	Some Historic and/or Cultural Heritage sites required to be remediated/ repaired/ rehabilitated,

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
	repaired/ rehabilitated with no permanent damage	repaired/ rehabilitated with permanent damage to a few sites	repaired/ rehabilitated with permanent damage to many sites	permanent damage to most sites

Table 1-3: Consequence definitions for human health and safety factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
No injuries or first aid required	Basic first aid treatment required	Medical attention required	Permanent injury or illness	Loss of life
Temporary annoyance/reduction in amenity to individuals	Seasonal annoyance/reduction in amenity to individuals	Short term effect on wellbeing of individual or community	Short term health effect on individual or long term effect on wellbeing of individual or community	Long term health effects to individual or community
No increase in vehicle accidents	Increase of <2 annual non-fatal vehicle accidents	Increase of 2-5 annual non-fatal vehicle accidents	Increase of 5-10 annual non-fatal vehicle accidents	Increase of >10 annual non-fatal vehicle accidents Fatal vehicle accident resulting from project
No contamination of drinking/irrigation water	Seasonal, local contamination of drinking/irrigation water exceeding health guidelines	Short-term, local, contamination of drinking/irrigation water exceeding health guidelines	Long-term, local contamination of drinking/irrigation water exceeding health guidelines	Long-term, regional contamination of drinking/irrigation water exceeding health guidelines

Table 1-4: Consequence definitions for terrestrial flora and vegetation factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
Minor local loss and/or moderate local degradation of significant (non-threatened) vegetation community	Moderate local loss and/or substantial local degradation of significant (non-threatened) vegetation community	Substantial local loss and/or moderate regional degradation of significant (non-threatened) vegetation community	Moderate regional loss and/or substantial regional degradation of significant (non-threatened) vegetation community	Substantial regional loss and/or substantial regional degradation of significant (non-threatened) vegetation community
No loss of individuals of threatened flora species	Minor local decrease in size of population(s) of threatened flora species	Moderate local decrease in size of population(s) of threatened flora species	Substantial local decrease in size of population(s) of threatened flora species	Moderate regional decrease in size of population(s) of threatened flora species

Table 1-5: Consequence definitions for terrestrial fauna factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
No loss of threatened species habitat Minor local habitat modification[1] and/or lifecycle disruption[2] for a threatened species	Minor local loss of threatened species habitat Moderate local habitat modification[1] and/or lifecycle disruption[2] for a threatened species	Moderate local loss of threatened species habitat Substantial local habitat modification[1] and/or lifecycle disruption[2] for a threatened species	Substantial local loss of threatened species habitat Moderate regional habitat modification[1] and/or lifecycle disruption[2] for a threatened species	Moderate or substantial regional loss of threatened species habitat Substantial regional habitat modification[1] and/or lifecycle disruption[2] for a threatened species
No loss of individuals of threatened fauna species	Minor local decrease in size of population(s) of threatened fauna species	Moderate local decrease in size of population(s) of threatened fauna species	Substantial local decrease in size of population(s) of threatened fauna species	Moderate or substantial regional decrease in size of population(s) of threatened fauna species

[1] Habitat modification can include fragmentation, and alteration of fire regimes, nutrient cycles and/or hydrological cycles; [2] Lifecycle disruptions can include disruption of breeding, feeding, migration, resting behaviour, etc.

Table 1-6: Consequence definitions for terrestrial environmental quality factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
Minor leak or spill contained within bunded area	Minor leak or spill affecting soil around bunded area; minimal response and clean-up required	Leak or spill affecting soil; Clean-up procedures required	Major leak or spill affecting soil beyond storage area, some minor permanent impacts	Leak or spill causing widespread environmental impact to soil in the region, some permanent impacts
Seasonal impact to surface soils. Readily reversible	Shrt term reversible impact to surface soils. May take less than 1 year to remediate or become stable	Long term recovery of surface soils. May take longer than 1 year to remediate or become stable	Impact of deep soil profiles requiring long term recovery. May take a number of years to remediate or become stable	Impact of deep soil profiles requiring long term recovery leaving residual impacts. May take decades to fully remediate or become stable

Table 1-7: Consequence definitions for inland water environmental quality factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
No detectable change to background water quality; no exceedance of background	Local, short-term, minor exceedance of background	Local, long-term OR widespread, short-term, exceedance of background	Local, permanent OR widespread, long-term exceedance of background	Major exceedance of background that is widespread and permanent Widespread, permanent exceedance of background

Table 1-8: Consequence definitions for hydrological processes factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
No detectable change to surface water hydrology or flow regimes	Local, short-term change in surface water hydrology and flow regimes that can be readily remediated Non-significant change in surface water hydrology and flow regimes that are local and short-term, and that can be easily remediated	Significant change in surface water hydrology and flow regimes that is either widespread and short-term, or local and long-term	Significant change in surface water hydrology and flow regimes that is either widespread and long-term, or local and permanent	Significant change in surface water hydrology and flow regimes that is widespread and permanent
Insignificant effect of groundwater drawdown	Near source minor change in recharge patterns at sub-catchment scale	Near source major change in recharge patterns at sub-catchment scale	Local major change in recharge patterns at sub-catchment scale	Regional major changes in recharge patterns

Table 1-9: Consequence definitions for air quality and greenhouse gases factor

1	2	3	4	5
Trivial	Minor	Severe	Major	Catastrophic
No measurable air quality impacts (including dust; PM_{10})	Local short-term and minor exceedance(s) of standards Ground-level concentrations at identified sensitive receptors represents a small increase over the NEPM baseline conditions	Localised long-term change in air quality Ground level concentrations at identified sensitive receptors represent a significant increase over the NEPM baseline conditions or reduce the remaining air-shed capacity for particular key pollutants Occasional exceedance(s) of NEPM over a wide population area	Regional short-term change in air quality Frequent exceedance(s) of NEPM* over a wide population area	Regional long-term change in air quality Continuous exceedance(s) of NEPM over a wide population area

*NEPM - National ambient air quality standards

[2] Key emissions include NO_x, O_3, Sulphur dioxide (SO_2) and dust (PM_{10})

Table 1-10: Certainty level matrix

	Uncertain	Low	Moderate	High	Certain
Description	Perception only; No information or knowledge forms the basis of the opinion.	Perception based; Some Information known on process but not directly relevant to region, or information at a regional level has significant limitations.	Limited information is known; Expert knowledge would lead to this outcome, some differences in opinion.	Information is known; Process has been described and documented at a regional level and experts can verify this position.	Information is known and well represents the specific nature of the process; Described and documented at a regional level and experts would be expected to agree on this position.

Table 1-11: Terms used

Factor	Definition
Long-term	More than 10 years
Short-term	1-10 years
Seasonal	<1 year
Local	Within TGP footprint and the 300 m pipeline corridor
Widespread	Outside and beyond (up to 100 km from) TGP Project footprint
Regional	Across the entire Tanami region
NEPM	National Environmental Protection Measure
Wetland values	Water quality, water supply, flood protection, erosion control, flora and fauna community structure, species diversity and abundance
Species habitat	Includes preferred species habitat, habitat where the species is located and habitat that has the potential to support the species (but the species may not currently occur there)

Appendix D Socio-economic risk assessment

ID #	Project activity	Cause	Risk and impacts	Likelihood	Consequence	Risk with no mitigation in place	Possible mitigation measures	Effectiveness of mitigation	Likelihood	Consequence	Residual risk after mitigation measures
PLANNING AND CONSTRUCTION PHASE											
Culture & Heritage											
1	Early survey works.	Field access for non-ground disturbing works.	Unauthorised entry onto Aboriginal land, causes breach of the Aboriginal Land Act (ALA) and offence to Traditional Owners.	2	A	Low	Compliance with the ALA and issue of individual permits through the CLC permit system.	Complete control of access to Aboriginal land by CLC.	1	B	Low
2		Field access for low impact ground distrurbing works.	Unauthorised entry onto and / or damage to sacred sites that results in anxiety or distress to Traditional Owners / site custodians.	2	B	Low	No low impact ground disturbing works to be undertaken without Sacred Site clearance by Aboriginal Parties.	Complete control of access and establishment of Restricted Work Areas and Exclusion Zones.	1	B	Low
3			Damage to cultural heritage sites, places or objects in breach of the Heritage Act and that results in anxiety or distress to Traditional Owners.	2	B	Low	No low impact ground disturbing works to be undertaken without cultural heritage sites survey by archaeologist.	Low impact activities are undertaken in areas where no cultural heritage sites exist.	1	B	Low
4			Uninvited entry into Aboriginal living areas, e.g. family outstations and so causes anxiety and concern among residents.	3	A	Low	Identification of familly outstations and inclusion of access restrictions in Project land access line list.	All early works personnel comply with land access rules.	1	A	Low
Community, Health and Wellbeing											
5	Mobilisation of Planning Phase workforce.	Communications and level of available information about the TGP Project.	Concern arising from lack of information about the TGP Project.	3	A	Low	Implementation of TGP Project Stakeholder Engagement and Communications Plan - which will include (amongst other things) community engagements, distribution of TGP Project information brochures, etc., and explanations of environmental management.	No concerns expressed about the TGP Project.	2	A	Low
6		AGI Tanami does not negotiate land agreements in good faith, or avoids responsibilities under ALRA and NTA.	Traditional owners and native title holders are not able to exercise Free, Prior and Informed Consent and so are not appropriately protected or afforded appropriate compensation for land use.	1	B	Low	Land negotiations held throughCentral Land Council processes and in accordance with the ALRA and NTA.	Land agreements with Aboriginal interests successfully negotiated and registered.	1	A	Low
Economy & Development											
7	Early survey works.	Employment on field surveys.	Local people miss out on employment opportunities.	3	A	Low	AGI Tanami directly seeks to employ locally and engages local stakeholders to support efforts.	Local people employed on field survey work.	2	A	Low
PLANNING AND CONSTRUCTION PHASE											
Culture & Heritage											
8	Construction activites	Ground disturbance within approved areas, driving in and around the TGP Project area.	Uninvited entry into Aboriginal living areas.	2	A	Low	Identification of familly outstations and inclusion of access restrictions in Project Land Owner Line List. Include restrictions in site inductions. Established communications protocols between Project and Aboriginal stakeholders.	No uninvited entry.	1	A	Low
9			Unathorised entry onto Aboriginal Land.	2	B	Low	Agreement with the Central Land Council regarding the issue of Project permits to access the Aboriginal Land Trust land.	Project workforce access controlled.	1	B	Low

10			Unauthorised entry onto and / or damage to sacred sites that results in anxiety or distress to Traditional Owners / site custodians.	3	C	Significant	All clearance activities undertaken in accordance with Authority Certificates from Aboriginal Areas Protection Authority (AAPA) and / or Sacred Site Clearance Certificate (SSCC) obtained from the CLC. Authority Certificate / SSCC conditions incorporated into Project Construction Management Plans and incorporated into all contracts and subcontracts. Specific conditions set out in a Project Cultural Heritage Management Plan (CHMP).	All project construction activities carried out in accordance with approvals and CHMP. Sacred sites avoided and protected.	1	B	Low
11			Damage to known Aboriginal archaeological cultural heritage sites, places or objects.	3	C	Significant	Implement a Project CHMP based on the outcomes and recommendations from an NT Heritage Assessment survey and report and associatd Work Approval obtained under the NT Heritage Act.	All known cultural heritage sites avoided or managed in accordance with relevant approvals. Control of all risk elements in CHMP through incorporation of controls in project management plans and contractual provisions.	1	B	Low
12			Discovery and disturbance of previously undiscovered cultural heritage sites, places or objects.	3	B	Moderate	Implement a Project CHMP based on the outcomes and recommendations from an NT Heritage Assessment survey and report and associatd Work Approval obtained under the NT Heritage Act.	Any disturbance of previously undiscovered Aboriginal archaeological heritage sites done in accordance with approvals under the NT Heritage Act.	1	B	Low
13			Human remains discovery and disturbance.	3	A	Low	Inclusion of procedures in Project CHMP for potential human remains discovery and management in accordance with legal requirements, approved under legislation.	Any discovery of human remains is managed in accrodance with the NT Coroner's Act.	3	A	Low
14	Transportation of personnel, machinery and materials during construction and installation of the pipeline.		Unauthorised entry onto sacred sites.	2	C	Moderate	Inclusion of access restrictions for workers in Project area in accordance with Sacred Site Clearance Certificate / Authority Certificate implementation.	Complete control of access and establishment of Restricted Work Areas and Exclusion Zones.	1	B	Low
15			Uninvited entry into Aboriginal living areas, e.g. family outstations.	3	A	Low	Identification of familly outstations and inclusion of access restrictions in Project Land Owner Line List. Include restrictions in site inductions. Established communications protocols between Project and Aboriginal stakeholders.	No uninvited entry.	1	A	Low
16	Trenching activities and installation of the pipeline.		Discovery and disturbance of previously undiscovered cultural heritage sites, places or objects.	3	B	Moderate	Inclusion of procedures in CHMP for management of further site discovery during trenching and installation.	Any disturbance of previously undiscovered Aboriginal archaeological heritage sites is done in accordance with approvals under the NT Heritage Act.	1	B	Low
17			Human remains discovery and disturbance.	2	B	Low	Inclusion of procedures in Project CHMP for poential human remains discovery and management in accordance with legal requirements.	Any discovery of human remains is managed in accrodance with the Coroner's Act.	1	B	Low
Community, Health & Wellbeing											

18	Land Agreement Implementation.	Distribution of Land Agreement benefits.	Inter/intra family conflict about the distribution of monetary components of land agreements and the actual expenditure of payments, results in increased incidence of domestic violence, reduced community cohesion, consequent increases in interaction with the criminal justice system and health and other community services.	4	C	High	AGI Tanami to discuss this risk with the CLC, relevant Traditional Owners and other community stakeholders, especially health and police services and community support organisations regarding the timing of land agreement payments and the issues that communities have experienced elsewhere. Seek to develop community based mitigation strategies with beneficiary familiesa and local community support organisations.	Incidence of the risk are lowered, as agreement beneficiaries understand and accept the land negotiation benefit distributions and processes as being fair and reasonable; understand the risks that can arise when payments are made; and, other community stakeholders are aware of the likely timing of payments and are in a position to minimise impacts through implementing support strategies.	3	B	Moderate
19	Mobilisation of construction workforce with local Aboriginal people in employment	Increased wages and benefits circulating in the community.	Local Aboriginal members of the workforce engage in substance abuse resulting in increased anti-social behaviours, including violence, causing consequent increases in negative interaction with the criminal justice system; adopt unsustainable spending habits and suffer subsequent financial hardship. Also, results in employment abandonment, subsequent loss of wages, increased marginalisation, negative impact to personal self esteem.	3	B	Moderate	Provide for onsite and offsite support for local Aboriginal employees through formal and informal means. For example these may include (but not limited to): - the development and implementation of a TGP Project induction and onboarding program designed specifically for local Aboriginal workers. - employment of a dedicated person(s) whose role, among other things, is to work with local Aboriginal employees and other community organisations in developing and implementing community based group and individual strategies to avoid and lessen the risk. - work with local community organisations in developing and implementing the abovementioned strategies.	Local Aboriginal workforce manages increased incomes in ways that avoid personal and family hardships.	3	A	Low
20		Recruitment in the local Aboriginal labour market.	Community conflict over perceptions of unfair employment processes results in reduced community cohesion, possible inter / intra family violence and subsequent outcomes.	4	A	Low	Implement and communicate transparent, merit based local recruitment processes, including providing details on job requirements in close consultation with key local stakeholders.	No incidence of community conflict attributable to perceptions of local recruitment.	3	A	Low
21			Local people miss out on jobs results in negative self esteem, reduces motivation to seek other opportunities.	4	A	Low	Communicate information on job opportunities, including requirements, processess to local stakeholders as part of local recruitment process.	Local people understand job requirements and make informed decisions.	3	A	Low
22		Local workforce employment (Alice Springs and Yuendumu)	Local people employed on the Project are unable to maintain active participation in local community (volunteering) and sporting organisations, results in reduced community amenity and cohesion.	2	A	Low	AGI Tanami to discuss with local organisations and foreshadow likely impacts.	Local community sporting and volunteering organisations are aware of the potential risks and manage accordingly for the absence of individual members.	1	A	Low
23			Local Aboriginal people employed on the TGP Project need to meet important family and / or cultural obligations and are required to take time off work, resulting in loss of employment, impact on the remaining workforce and loss of TGP Project productivity.	3	B	Moderate	AGI Tanami contractors incorporate provisions in employment contracts / policies that allow for local Aboriginal people to take reasonabe cultural or bereavement leave. In parrallel with the above implement a local Aboriginal employment strategy that allows for coverage of local Aboriginal workers on such leave.	Local Aboriginal people are able to meet family and cultural obligations in a way that does not result in loss of employment, impact on the remaining workforce, or cause loss of TGP Project productivity.	3	A	Low
24	Transportation of personnel, machinery and materials during construction and installation of the pipeline.	Pipe transport from Alice Springs railhead along the Tanami Road.	Traffic incidents in and at the outskirts of Alice Springs and on the Tanami Road results in increased road trauma.	2	C	Moderate	Imlementation of Project Traffic Management Plan which includes well designed routes, safe driving requirements, communications and notifications along the routes, for example around the Alice Springs railhead, on the Tanami Road and at Tillmouth Well, Yuendumu and other relevant local communication methods, e.g. notices at roadhouses and the use of social media..	No increase in traffic incidents as a result of the Project.	2	C	Moderate

25		Dust created from pipe transport trucks and other TGP Project vehicles along the unsealed section of the Tanami Road obscures vision of other road users.	Traffic incidents along the Tanami Road results in increased road trauma.	2	C	Moderate	Establish warning signs along the unsealed section of the Tanami Road communicating the risks, commuications with stakeholders along the Tanami Road.	No increase in traffic incidents as a result of the TGP Project.	2	C	Moderate
26		Drive in and Drive Out Workers	Increased risk of road trauma caused by workers using own vehicles traveling between Alice Springs, Yuendumu and Project site.	3	C	Significant	Project provides transport for all workers to and from site. Prohibit use of private vehicles on the project.	No traffic incidents and resultant road trauma arising from the use of private vehicles.	2	C	Moderate
27	Establishment and operation of construction workers camps along the Tanami Road.	Construction camp / local Aboriginal community interaction.	Uncontrolled interactions and un-considered policy surrounding the interactions between construction camps and local communities results in the creation of undesirable and potentially conflicting relations through, for example: - expectations regarding the availablity of fuel, food and other services; - the development of potentially unhealthy or illegal relationships through illegal substance and sex trade; - conflict between project personnel and local Aboriginal community members regarding the above.	3	C	Significant	Develop simple, fit-for-purpose policy covering access to the camps and interactions with local Aboriginal community members and communicate this with the workforce, local communities, and stakeholders.	Clarity among all stakeholders regarding the operations of and access to the camps reduces the likelihood of any negative incidents arising from camp / community interaction.	2	A	Low
28			Increased demand on community emergency / medical services due to onsite incident - e.g. fire, mass casualties which overwhelms onsite response capability and results in a lack of emergency / medical services to respond to other emergencies to local communities.	1	B	Low	Implement TGP Project Emergency Response Plan (ERP) in consultation relevant stakeholders; which includes medical and evacuation protocols.	Any such significant emergency is managed without or with very little impact on community emergency / medical services in the vicinity of the TGP Project.	1	A	Low
29	Non local workforce transit.	Non-local workforce transiting through Alice Springs airport.	Project personnel coming off roster and transiting through Alice Springs airport, including in the event of unscheduled overnight stay requirement in Alice Springs, engage in anti-social behaviour at the aiport or in town which causes disruption to other airport users, interactions with police or airport security and associated consequences.	2	B	Low	Prepare and issue relevant behavioural codes through employment contracts and / or policy instruments, e.g. a Project Code of Conduct.	No reported incidents of Project personnel engaging in anti-social behaviour at Alice Springs airport or in town.	1	A	Low
30	Pipeline construction - clear and grade, trenching, stringing, welding, rehabilitation.	Local residents enter the TGP Project footprint.	People enter into TGP Project areas whether intentionally or otherwise and as a result injure themselves.	3	B	Moderate	Installation of signage and / or gates at ROW access tracks. Consultation with local communities about the risks of unauthorised entry.	Community understands the risks that might arise from entering the project area and can clearly see the warning signs on access tracks.	2	B	Low
31			Community concern about the environmental management of the construction process causes anxiety.	3	A	Low	Implementation of TGP Project Stakeholder Engagement and Communications Plan - which will include (amongst other things) community engagements, distribution of TGP Project information brochures, etc., and explanations of environmental management.	Community understands how the TGP Project will be managed from an environmental perspective and individuals in the community who may have become anxious are less concerned.	2	A	Low
32	Construction phase work rosters.	Long work rosters	Long work rosters and short breaks cause separation from family and potential mental health impacts due to isolation and separation and loneliness.	3	B	Moderate	Onsite wellness infrastructure and services to support staff - e.g, internet access and communuctions, recreation options, mental health awareness advice.	Mental health incidents are avoided / minimised.	3	A	Low
Economy & Development											
33	Project procurement and contracting.	Award of contracts.	Local businesses miss out on contracts with the Project results in loss of economic opportunity.	2	A	Low	Communicate early and often about the potential contract opportunities on the Project, including timing, scopes, technical and commercial requirements etc with local business stakeholders. Provide option of post contract award de-brief to unsuccessful tenderers.	No material concerns raised by business owners or associated stakeholders.	1	A	Low

34			Local businesses make investment decisions, e.g. capital or other expenditure, in expectation of winning work on the Project but are unsuccessful, or project execution is delayed and results in financial stress / loss of business.	3	B	Moderate	Communicate early and often about the potential contract opportunities on the Project, including timing, scopes, technical and commercial requirements etc with local business stakeholders.	Local businesses understand the opportunities and make investment decisions that cause finacial stress / harm or loss of business.	2	A	Low
35		Regional flight congestion.	Fly in, fly out component of the workforce takes up available spaces flights resulting in displacement of other travellers.	2	B	Low	Communicate to airlines and local stakeholders (partiuclarly tourism bodies) expected flight demand profile.	No material negative impact to other airline users.	2	B	Low
36		Overlap between Project workforce requirements and local labour market.	Temporary loss of producitivty as replacement staff are hired by local employers.	2	A	Low	Communicate potenital Project job opportunities to local stakeholders.	Local employers plan to manage any staff changes as a result of the Project.	1	A	Low
37		Increased pressures on local wages.	Increased costs through increased wages and conditions required to retain staff reduces business profitability.	2	A	Low	Communicate potenital Project job opportunities to local stakeholders.	Local employers plan to manage any staff changes as a result of the Project.	1	A	Low
38	Trenching activities and installation of the pipeline.	Temporary loss of access to station roads / tracks during pipeline installation.	Disruption to station activities.	2	A	Low	Project liaison with pastoralists to coordinate project construction activities.	No unplanned disruption to station activities.	1	B	Low
39	Project does not proceed.	Approvals not obtained causes AGI Tanami to withdraw from commitments.	No economic development arising from the TGP Project.	2	B	Low	AGI Tanami uses best endeavours to obtain all approvals. Ongoing stakeholder engagement and communications to provide TGP Project information.	Stakeholders informed of TGP Project progress.	1	A	Low
40			Production losses at the Newmont Mining operated Granites and Dead Bullock Soak goldmines.	1	C	Moderate	AGI Tanami uses best endeavours to obtain all approvals.	TGP Project proceeds as per planned schedule.	1	B	Low
OPERATIONS PHASE											
Culture & Heritage											
41	Operation and maintenance of pipeline.	Access to above ground facilities in remote areas.	Unauthorised entry onto sacred sites.	1	B	Low	Inclusion of access restrictions for operations workers in TGP Project area in accordance with Sacred Site Clearance / Authority Certificate implementation.	Complete control of access and establishment of Restricted Work Areas and Exclusion Zones.	1	B	Low
42			Unathorised entry onto Aboriginal Land or uninvited entry into living areas.	1	B	Low	Individual permit access in accordance with legislation and Land Agreement conditions and local relationship maintenance.	Complete control of access and regular communication.	1	B	Low
43			Damage to cultural heritage sites, places or objects.	1	B	Low	Workers restricted to approved access tracks public roads and pipeline easement and respect of Authority Certificate conditions.	Complete control of access and regular communication.	1	B	Low
Community, Health and Wellbeing											
44	Operation and maintenance of pipeline.	Community concern at lack of information about the TGP Project operations - e.g. public safety concerns.	Community anxiety / negative perceptions about safety and environmental management of the TGP during operations.	2	A	Low	Consult community and explain operations safety and environmental management practices.	No noted anxiety or concerns about operation of the TGP.	1	A	Low
45	Mobilisation of operations workforce.	Project operations recruitment.	Local people miss out on jobs results in negative self esteem, reduces motivation to seek other opportunities.	2	A	Low	Communicatel information on job opportunities, including requirements, processess to local stakeholders as part of local recruitment process.	Local people understand job requirements and make suitable decisions.	1	A	Low
Economy & Development											

46	Procurement and contracting.	Award of contracts.	Local businesses miss out on contract opportunities with the Project results in stress and anxiety by business owners.	2	A	Low	Communicate tender, pre-qualification and contract management requirements and expectations. Communicate opportunities that may be realistically suitable for local businesses. Provide post contract award de-briefings to unsuccessful tenderers.	No material concerns raised by business owners or associated stakeholders.	1	A	Low

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