

NT Link Project

NOTICE OF INTENT



APA Group



NT Link Project

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EXECUTIVE SUMMARY

The NT Link Project

APA Group (APA) proposes to construct an underground gas pipeline between its existing facilities on the Amadeus Gas Pipeline (AGP) near Tennant Creek in the Northern Territory (NT) and the Carpentaria Gas Pipeline (CGP) near Mt Isa in Queensland. This, the NT Link Project, will provide a crucial linkage between the NT's onshore and offshore gas reserves and the east coast gas market.

The NT Link will encourage gas exploration and production of known gas reserves in the NT and the Timor Sea to meet the growing Australian liquefied natural gas (LNG) production and domestic gas demand, including opening up new markets and introducing competition in the gas supply market with far-reaching economic benefits.

The NT Link Project will be a 12-20" diameter, high pressure, bidirectional underground gas transmission pipeline approximately 632 km in length, of which approximately 459 km will be in the Northern Territory (kilometre point [KP] 0 – KP459). Above ground facilities will include Pipeline Inspection Gauge Launcher/Receiver Facilities, connections to the existing pipelines at each end of the alignment, a compressor station near the existing Warrego facility and mainline valves. The project scope currently includes a potential gas processing facility (GPF) at either Tennant Creek or Mt Isa. The GPF will be required to treat gas from the Northern Territory to ensure it meets the specification required for customers in Eastern states.

NT Link construction will be predominately staged out of camps. The location and size of the camps will be dependent on the construction sequencing (which can be influenced by weather and other external factors) with the project expecting to require about -3 -4 camp locations in the Northern Territory with a peak construction workforce of approximately 350-450 people. During initial construction stages and during pipeline commissioning some accommodation will be supplemented by existing local accommodation facilities (e.g. at Mt Isa and Tennant Creek). Construction duration is expected to be about 12-18 months, including pre-construction activities such as the development of camp locations and other ancillary areas.

In addition to the above the construction of the GPF, if required in the Northern Territory, will require a maximum workforce of about 100 – 150 people.

The total cost of the Project is expected to be about \$1.15 billion dollars. Should the GPF proceed then the total cost of the Project would increase to approximately \$1.3 billion dollars.

All construction will be in general compliance with the guidelines provided in the Australian Pipelines and Gas Association (APGA) Code of Environmental Practice (2013) and the 'AS 2885 – Pipelines – Gas and liquid petroleum' series of standards.

Within the study area there are no:

- World heritage properties
- National heritage properties
- Wetlands of international importance (Ramsar sites)
- Listed threatened ecological communities
- Commonwealth Marine Areas
- Nuclear Actions (including uranium mines)
- Coal seam gas or large scale coal mining developments
- Commonwealth lands

A desktop ecological assessment together with a low level aerial survey has been undertaken in the Northern Territory. Based on the findings of these assessments, the Project is considered unlikely to have any significant impact on any EPBC Act listed species. These surveys will be supplemented with additional targeted surveys during project development.

The Proponent

The NT Link project proponent is APT Pipelines Limited (ABN 89009666700), which is a wholly owned subsidiary of Australian Pipeline Trust (APT). APT together with APT Investment Trust form the APA Group. APA Group (APA) is Australia's largest natural gas infrastructure business, owning and/or operating approximately \$19 billion of energy assets.

Its gas transmission pipelines span every state and territory in mainland Australia, delivering approximately half of the nation's gas usage. APA has direct management and operational control over its assets and investments, with the exception of the Wallumbilla to Gladstone Pipeline.

APA also has an ownership interest in - and operates - the Allgas gas distribution network as well as operating the Australian Gas Networks (formerly Envestra Limited) gas distribution networks, which together have approximately 27,000km of gas mains and approximately 1.3 million gas consumer connections. APA also owns other energy infrastructure assets such as gas storage facilities, gas-fired power generation (part-ownership) and a wind farm.

APA also has equity interests in a number of energy infrastructure assets, including SEA Gas Pipeline, Energy Infrastructure Investments, EII2 and the Ethane Pipeline Income Fund. APA is listed on the ASX and is included in the S&P ASX 50 Index (www.apa.com.au).

Since APA was listed on the ASX, it has grown significantly - through both acquisition (including the purchase of the Berwyndale to Wallumbilla Pipeline, the South West Queensland Pipeline and the Wallumbilla to Gladstone Pipeline) and development of assets. APA's core function is the development of gas transportation facilities, with significant projects currently under development or recently completed in Victoria and Western Australia.

APA's Infrastructure Development division provides full turnkey Project delivery services for all APA's growth projects. Currently the Infrastructure Development division delivers approximately \$400 million p.a. of growth assets for APA - which owns and operates all of the pipelines it has constructed.

The Notice of Intent

The purpose of this Notice of Intent (NOI) is to:

- Commence the Project's assessment process under *Environmental Assessment Act* (EA Act) (NT) and the associated Environmental Assessment Administrative Procedures
- Provide the NT Environment Protection Authority (EPA) with sufficient information to decide whether assessment of the proposal is required by Public Environmental Report (PER) or Environmental Impact Statement (EIS)

The scope of this NOI relates only to the portion of the Project within the NT. The contents follow those set out in the draft Guideline for the Preparation of a Notice of Intent (EPA, May 2015). It describes the Project and its components and reviews the existing environment within which the Project would be constructed and operated. From this information a summary is then provided of the potential impacts of the NT Link Project on the environment. Separate approvals are being sought in parallel with the Qld Government for the portion of the pipeline within that State and the requirements for approval under Commonwealth laws are also being considered.

The information presented above describes the Project's context and its potential environmental impacts. The key findings of this appraisal are:

- The project scope is limited to the construction of a buried steel pipeline with associated above ground facilities. Many of the impacts on the natural environment will be short term and limited in extent and magnitude, and related to construction activities. The final operational footprint will be relatively small.
- The average rainfall in this area relatively low with the majority of the area is classified as semi-arid and therefore not as likely to be impacted by monsoonal weather patterns as is the case further north in the NT
- The ecological studies to date have not found any matters that may cause a significant impact on any Matter of National Environmental Significance (MNES)
- The project will not involve any novel or untested processes or technologies
- APA has extensive experience in the design and construction execution of pipelines and the environmental management strategies required to successfully construct and operate a pipeline such as this

Based on this evaluation, APA concludes that the Project has the potential to impact on only a limited number of environmental elements i.e. land, water, air and ecology/ biodiversity. The remaining aspects of the environment are unlikely to be significantly impacted particularly with the inclusion of the proposed mitigation measures, as appropriate. The scope of potential impacts on land, water and ecology/ biodiversity is limited in magnitude, duration, frequency and extent such that no significant residual impacts are likely to occur as a result of the Project. As such, to ensure the timely assessment of impacts and effective regulatory approvals, a proportional level of assessment under the *Environmental Assessment Act* would be appropriate. APA seeks that the portion of the Project within the NT is assessed through a Public Environmental Report to the extent there are potentially significant impacts.



1. INTRODUCTION

1.1 Background

APA Group (APA) proposes to construct an underground gas pipeline between its existing facilities on the Amadeus Gas Pipeline (AGP) near Warrego, 40 km northwest of Tennant Creek in the Northern Territory (NT), and the Carpentaria Gas Pipeline (CGP) near Mt Isa in Queensland (Qld). This, the NT Link Project, will provide a crucial linkage between the NT's onshore and offshore gas reserves and the east coast gas market. Figure 1 shows the indicative NT Link pipeline alignment.

The east coast gas market is set for a significant transformation with three LNG export Projects totalling \$70 billion of investment commencing operations in Queensland. The LNG Projects are forecast to drive a tripling in east coast gas demand. The demand for gas from the LNG Projects, in addition to the issues around coal seam gas development in NSW and Victoria, is causing pressure on gas supplies which is likely to prevail in the medium term.

In the NT, current gas supply from the Bonaparte and Amadeus Basins is sufficient to meet existing demand for the medium term, but new supply is required to support growth opportunities and future market demand in the region. The NT Government has estimated that the NT has in excess of 200 trillion cubic feet (TCF) of conventional and unconventional gas reserves, both on-shore and off-shore. This is an abundant supply which is potentially available to meet, and exceed, the supply constraints facing the gas market in the south east of Australia and the NT's future demand. This provides an emerging opportunity which could make linking the NT with the south east gas market commercially viable and add substantial new reserves to be available for the demand centres in eastern Australia.

The Commonwealth Government's White paper on Developing Northern Australia proposes a number of initiatives aimed at building a strong, prosperous economy. Infrastructure will play a key role in supporting growth. The Northern Territory government's proposed North East Gas Interconnector (NEGI) is identified in the White paper as a project with the potential to provide efficiencies in the Australian gas market. APA's NT link project is being proposed as a solution for the NEGI. A copy of the White paper is available at: <https://northernaustralia.dpmc.gov.au/white-paper>

1.2 Purpose and Scope of the Notice of Intent

The purpose of this Notice of Intent (NOI) is to:

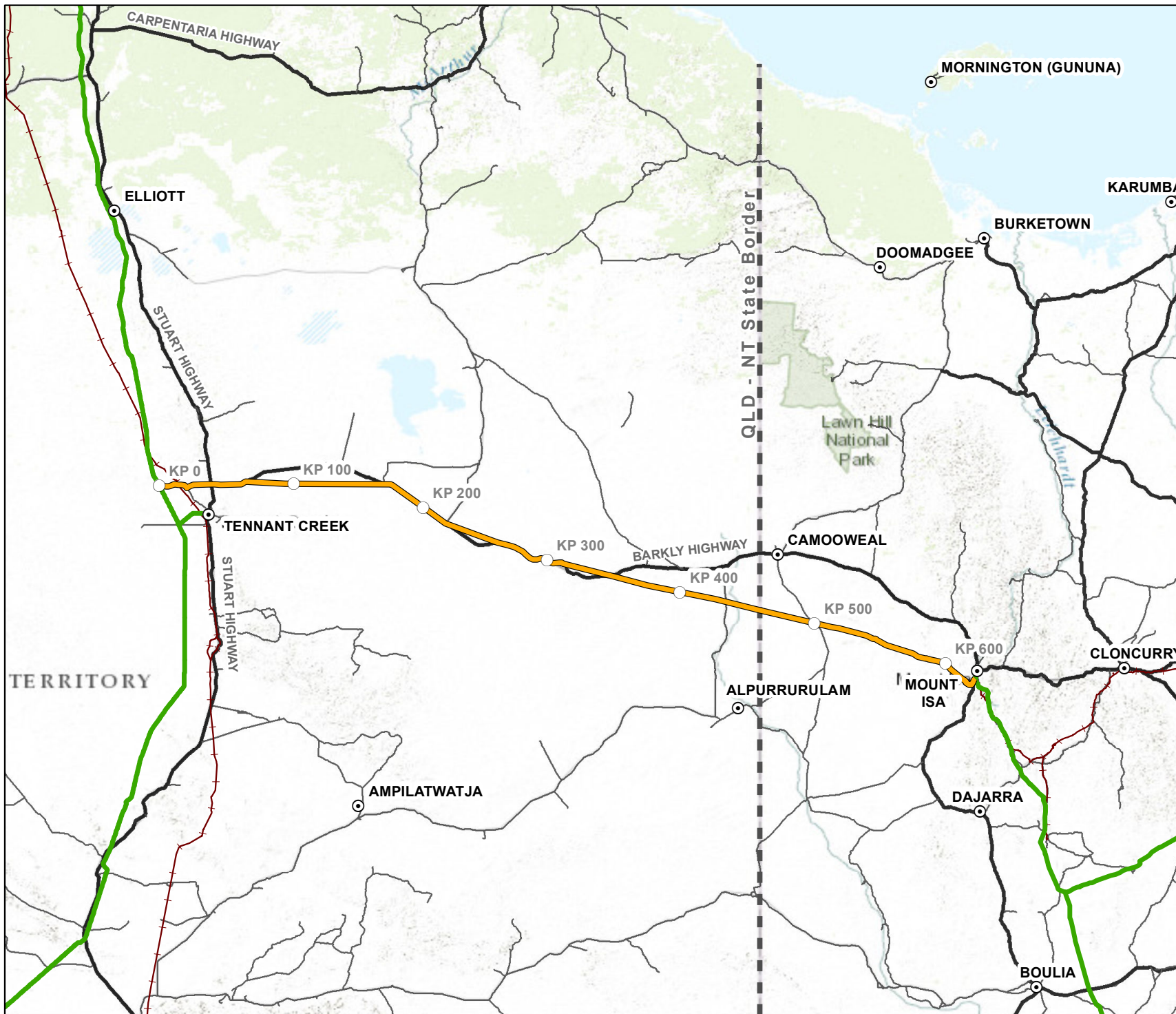
- Commence the Project's assessment process under Environmental Assessment Act (EA Act) (NT) and the associated Environmental Assessment Administrative Procedures
- Provide the NT Environment Protection Authority (EPA) with sufficient information to decide whether assessment of the proposal is required by Public Environmental Report (PER) or Environmental Impact Statement (EIS)

The scope of this NOI relates only to the portion of the Project within the NT. The contents follow the requirements set out in the draft Guideline for the Preparation of a Notice of Intent (EPA, May 2015). The NOI describes the Project and its components and reviews the existing environment within which the Project would be constructed and operated. From this information a summary is then provided of the potential impacts of the NT Link Project on the environment. Separate approvals are being sought in parallel with the Queensland Government for the portion of the pipeline within that State.

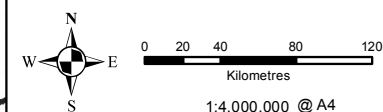
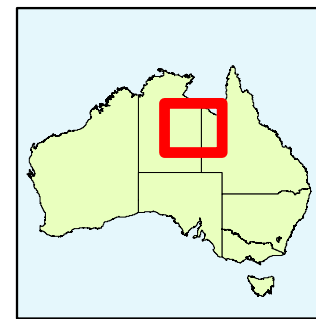
Following this introduction, the NOI presents:

- An overview of the Project, general information about APA Group as proponent, and the Project's location and context
- The key legislative requirements and frameworks for the Project's environmental assessment and approvals
- A detailed description of the Project including access, construction, commissioning, operations and workforce requirements; as well as an overview of the alternatives considered to avoid and minimise potential impacts
- A summary of the existing environment
- A description of likely potential impacts and mitigation measures
- An evaluation of the above information to assess whether any significant impacts are considered likely.





- Pipeline KPs
- ⊙ Towns
- APA Pipelines
- Indicative Alignment
- Railways
- Principal Road
- Secondary Road
- State Border



NT Link

Figure 1 - Indicative Alignment

DATE: 17/06/2015

DATA SOURCE: APA Group, Geoscience Australia (© Commonwealth of Australia 2015) Cadastre and mining data supplied by State Government agencies. NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994



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2 PROJECT DETAILS

The NT Link Project comprises a high pressure natural gas transmission pipeline between Tennant Creek and Mount Isa (Queensland). APA, as the Project proponent, commenced feasibility studies for the NT Link Project in February 2014, and are also shortlisted in the Northern Territory's North East Gas Interconnector (NEGI) Request for Final Proposal (RFFP).

APA has selected a Study Corridor approximately 632km in length, 459km within Northern Territory and 172km within Queensland. The corridor represents a balance between taking the shortest route while avoiding physical, environmental and cultural constraints as much as possible. APA has commenced interactions with landowners in the Northern Territory (with Department of Mines and Energy consent) to discuss the NT Link Project and seek land access for surveys. Consultation with all relevant stakeholders will continue as the Project progresses.

2.1 Contact Details

2.1.1 APA Group

The NT Link project proponent is APT Pipelines Limited (ABN 89009666700), which is a wholly owned subsidiary of Australian Pipeline Trust (APT). APT together with APT Investment Trust (APTIT) form the APA Group (APA). Information about APA is presented in Table 1, and summarised below.

APA is Australia's largest natural gas infrastructure business, owning and/or operating approximately \$19 billion of energy assets. Its gas transmission pipelines span every state and territory in mainland Australia, delivering approximately half of the nation's gas usage (Figure 2). APA has direct management and operational control over its assets and investments, with the exception of the Wallumbilla to Gladstone Pipeline.

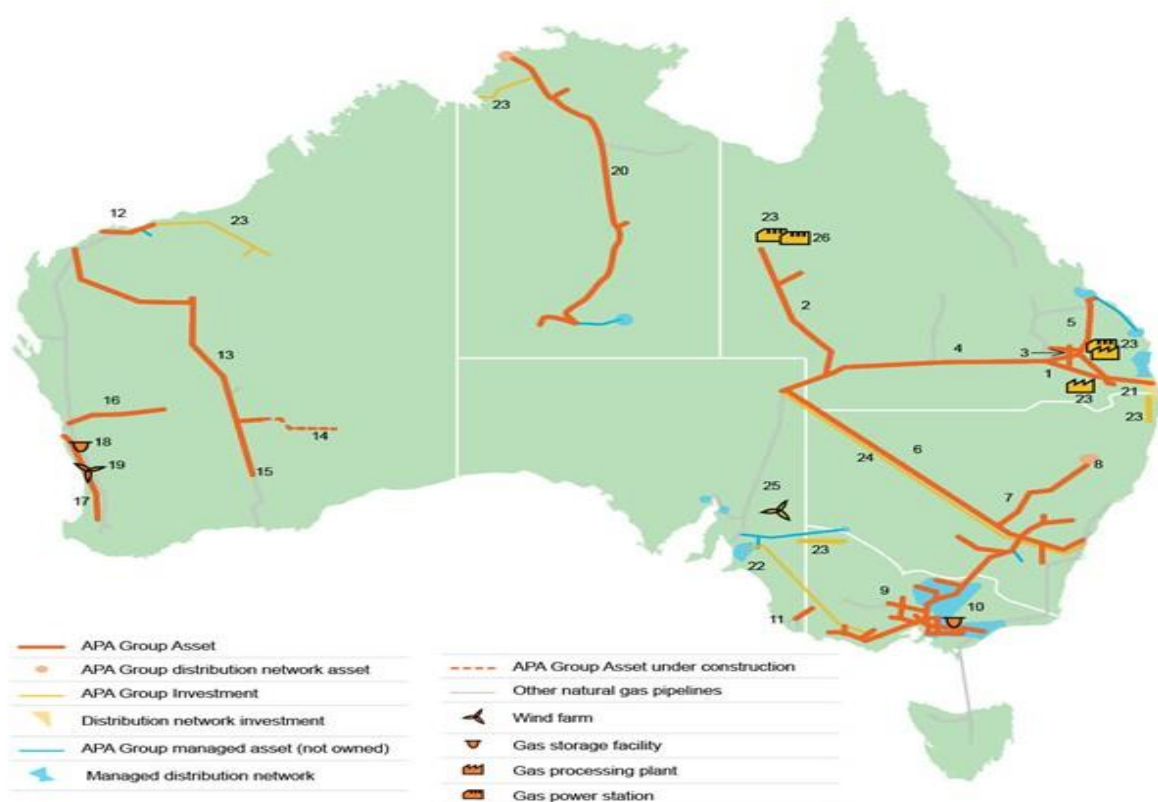
APA also has an ownership interest in, and operates, the Allgas gas distribution network as well as operating the Australian Gas Networks (formerly Envestra Limited) gas distribution networks, which together have approximately 27,000km of gas mains and approximately 1.3 million gas consumer connections. APA also owns other energy infrastructure assets such as gas storage facilities, gas-fired power generation (part-ownership) and a wind farm.

APA also has equity interests in a number of energy infrastructure assets, including SEA Gas Pipeline, Energy Infrastructure Investments, EII2 and the Ethane Pipeline Income Fund. APA is listed on the ASX and is included in the S&P ASX 50 Index (www.apa.com.au).

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APA's Infrastructure Development division provides full turnkey Project delivery services for all APA's growth projects. Currently the Infrastructure Development division delivers approximately \$400 million p.a. of growth assets for APA, which owns and operates all of the pipelines it has constructed.

Figure 2 APA Assets



APA GROUP ASSETS AND INVESTMENTS

ENERGY INFRASTRUCTURE

Queensland	
1	Roma Brisbane Pipeline
2	Carpentaria Gas Pipeline
3	Berwyndale Wallumbilla Pipeline
4	South West Queensland Pipeline
5	Wallumbilla Gladstone Pipeline
New South Wales	
6	Moomba Sydney Pipeline
7	Central West Pipeline
8	Central Ranges Pipeline
Victoria	
9	Victorian Transmission System
10	Dandenong LNG facility
South Australia	
11	SESA Pipeline
Western Australia	
12	Pilbara Pipeline System
13	Goldfields Gas Pipeline (88.2%)
14	Eastern Goldfields Pipeline (under construction)
15	Kalgoorlie Kambalda Pipeline
16	Mid West Pipeline (50%)
17	Parmelia Gas Pipeline
18	Mondarra Gas Storage Facility
19	Emu Downs wind farm
Northern Territory	
20	Amadeus Gas Pipeline

ENERGY INVESTMENTS

21	GDI (EII) (20%) Allgas Gas distribution network in Queensland
22	SEA Gas Pipeline (50%)
23	Energy Infrastructure Investments (19.9%) Gas pipelines, electricity transmission, gas-fired power stations and gas processing plants
24	Ethane Pipeline Income Fund (6.1%)
25	EII2 (20.2%) North Brown Hill wind farm
26	Diamantina and Leichhardt Power Stations (50%)

ASSET MANAGEMENT

Commercial and / or operational services to:	
-	Australian Gas Networks (Formerly Envestra)
-	GDI (EII) - Allgas (20%)
-	Energy Infrastructure Investments (19.9%)
-	Ethane Pipeline Income Fund (6.1%)
-	SEA Gas Pipeline (50.0%)
-	EII2 (20.2%)
-	other third parties

Table 1: Proponent Details

Item	Details
Business name:	APT Pipelines Limited
Company number:	009 666 700
Address of registered office:	Level 19, 580 George St SYDNEY NSW 2000
Primary contact person	Sam Pearce General Manager – Corporate Development & Investments Project Director, NT Link
Postal address	Level 19, 580 George St SYDNEY NSW 2000
Telephone number:	1800 831 344
Primary contact:	NTLinkinfo@apa.com.au
Name of parent company	Australian Pipeline Trust (APT) (APT with APTIT form the APA Group)

Final arrangements for the APA Group entity that will apply for approvals and the pipeline licence are yet to be finalised and will be formally notified to the Government of the Northern Territory.

2.1.2 Principal Consultant

The principal consultant acting on behalf of APA is CNC Project Management Pty Ltd (CNC). Contact details for CNC are provided in Table 2.

Table 2: CNC Contact Details

Item	Details
Business name	CNC Project Management Pty Ltd
Primary contact person:	Steve Fox
Postal address	Units 10-12 'Marquesas', 247 David Low Way, Peregrine Beach Queensland 4573
Phone	07 5471 3111
Email	info@cncprojects.com.au

2.1.3 Joint Venture Partners

The APA NT Link Project does not involve any joint venture partners.

2.2 Location

2.2.1 Latitude and Longitude

The commencement point (19° 26' 49.770" S, 133° 51' 5.689" E) is in the vicinity of Warrego, Tennant Creek (northwest of the township) along the Amadeus Pipeline at APA's Warrego Compressor station. The termination point in the Northern Territory (20° 18' 35.942" S, 137° 59' 47.859" E) is at the Queensland border (south of the Barkly Highway, near Austral Downs Station) Kilometre Point (KP) numbering used in this report commences at the NT terminus of the pipeline (KP 0), approximately 40 km northwest of Tennant Creek. The Queensland boarder is located at approximately KP 459.

2.2.2 Land Tenure and Ownership

A review of the NT Planning Scheme revealed that the Project is area is unzoned.

A total of 17 land parcels are may be transected by the Project (Figure 3). Details of these are listed in Table 3. Other interests in land crossed by the Project are listed in Table 4 and the location of mineral tenures are presented in Figure 4.

Table 3: Cadastre for Properties Crossed by Proposed NT Link Alignment

VOLUME	FOLIO	PLAN NUMBER	PARCEL LABEL	TENURE	PROPERTY
740	673	CP5047	NT Por 408	Perpetual Pastoral Lease	Phillip Creek
754	364	S98/186A-E	NT Por 5476	Crown Lease Term	Alice Springs Darwin Railway
787	851	S821082	NT Por 1075	Perpetual Pastoral Lease	Tennant Creek
792	461	S89/296	NT Por 3723	Freehold	Warumungu Aboriginal Land Trust
-	-	S921090	NT Por 4469	Vacant Crown Land	Wakaya Desert
736	751	S79/1098	NT Por 1484	Perpetual Pastoral Lease	Malcom David Harris
770	820	CP5208	NT Por 773	Perpetual Pastoral Lease	Dalmore Downs
-	-	S72/197	NT Por 1412	Freehold	Australian Telecommunications Commission
699	625	CP4314	NT Por 2	Perpetual Pastoral Lease	West Ranken
-	-	B000065	NT Por 545	-	Controlling Agency - Department of Land, Planning and The Environment
699	624	CP4314	NT Por 4	Perpetual Pastoral Lease	Soudan

-	-	S921090	NT Por 4467	Vacant Crown Land	Controlling Agency - Department of Land, Planning and The Environment
738	69	CP4303	NT Por 298	Perpetual Pastoral Lease	Avon Downs
738	71	CP5053	NT Por 1605	Perpetual Pastoral Lease	Austral Downs
796	982	CP004347	NT Por 1482	Perpetual Pastoral Lease	Gambamora Industries Pty Ltd
780	211	S2003/004	NT Por 4534	Crown Lease Term	Alice Springs Darwin Railway
-	-	S911035	NT Por 2085	No Title Issued	Controlling Agency - Department of Land, Planning and The Environment

Table 4: Other Interests in Land Crossed by the Proposed NT Link Alignment

ROADS	
Legal ID	Name
4-NT-Road	Warrego Road
2-NT-Road	Stuart Highway (including the North South Stock Route)
3-NT-Road	Barkly Highway
5-NT-Road	Tablelands Highway
9-NT-Road	Barkly Highway
10-NT-Road	Georgina River Track (including the Ranken Stock Route)
LOCAL GOVERNMENT AUTHORITIES/COUNCILS	
Council	Barkly Regional Council
TENEMENTS (MINING AND PETROLEUM)	
Tenement ID	Holder
RO1326	Reserved Land
RO24350	Reserved Land
EL30209	Rum Jungle Resources Ltd (Agent - Complete Tenement Management Pty Ltd
EL30211	Rum Jungle Resources Ltd (Agent - Complete Tenement Management Pty Ltd

EL30614	Giants Reef Exploration Pty Ltd (Agent - Emerson Resources Ltd)
EL30516	Giants Reef Exploration Pty Ltd (Agent - Emerson Resources Ltd)
EL23846	Prosperity Resources (Tennant Creek) Pty Ltd (Agent - Austwide Title Mangement Pty Ltd)
EL24158	Prosperity Resources (Tennant Creek) Pty Ltd (Agent - Austwide Title Mangement Pty Ltd)
EL26054	Mandarin Mining Pty Ltd (Agent - Complete Tenement Management Pty Ltd)
EL28777	Giants Reef Exploration Pty Ltd (Agent - Emerson Resources Ltd)
EL29488	Giants Reef Exploration Pty Ltd (Agent - Emerson Resources Ltd)
EL29849	Minemakers Australia Pty Ltd
EL30447	ACH Exploration Pty Ltd (Agent - Persichitti)
RO1326	Reserved Land
RO24350	Reserved Land
RO1326	Reserved Land
RO24350	Reserved Land
RO1326	Reserved Land
RO24350	Reserved Land
EP177	Armour Energy Pty Ltd (Agent - Australian Mining and Exploration Title Services Pty Ltd)
EP178	Armour Energy Pty Ltd (Agent - Australian Mining and Exploration Title Services Pty Ltd)
EP202	Wiso Oil Pty Ltd (Agent - Australian Mining and Exploration Title Services Pty Ltd)
EP204	Wiso Oil Pty Ltd (Agent - Australian Mining and Exploration Title Services Pty Ltd)
EP260	Territory Gas Aust Pty Ltd (Agent - Australian Mining and Exploration Title Services Pty Ltd)
EP261	Territory Gas Aust Pty Ltd (Agent - Australian Mining and Exploration Title Services Pty Ltd)
RO1326	Reserved Land
RO24350	Reserved Land

2.2.3 Proximity to Services including Emergency Services

Tennant Creek is the largest town within the Project area. The proposed alignment passes approximately 25 km north of Tennant Creek around KP 40.

Transport services at Tennant Creek include an airport with flights two times per week to Darwin and Alice Springs respectively. The main runway can accommodate most light aircraft and whilst larger aircraft can be used in an emergency, these may have difficulty parking. The terminal apron can normally accommodate up to three aircraft below 5,700 kg in weight e.g. DHC Twin Otter or Beech King Air type aircraft.

The Stuart Highway (Route 1) provides the main north – south road infrastructure in the Project area, connecting Tennant Creek to Katherine in the north (669 km) and Alice Springs in the south (507 km). The Stuart Highway – Barkly Highway intersection is located at Three Ways close to where the Project intersects the Stuart Highway at KP 40. The Barkly Highway runs eastwards to the NT border (448 km). The Project alignment is proposed to follow the approximate route of the Barkly Highway for much of its route across the NT.

Police, fire and emergency services are located at Tennant Creek. A public hospital with 20 beds and an emergency department is also at Tennant Creek. The proposed alignment passes within approximately 25 km of Tennant Creek at its closest point near Three Ways. An NT Police Station is also located at Avon Downs.

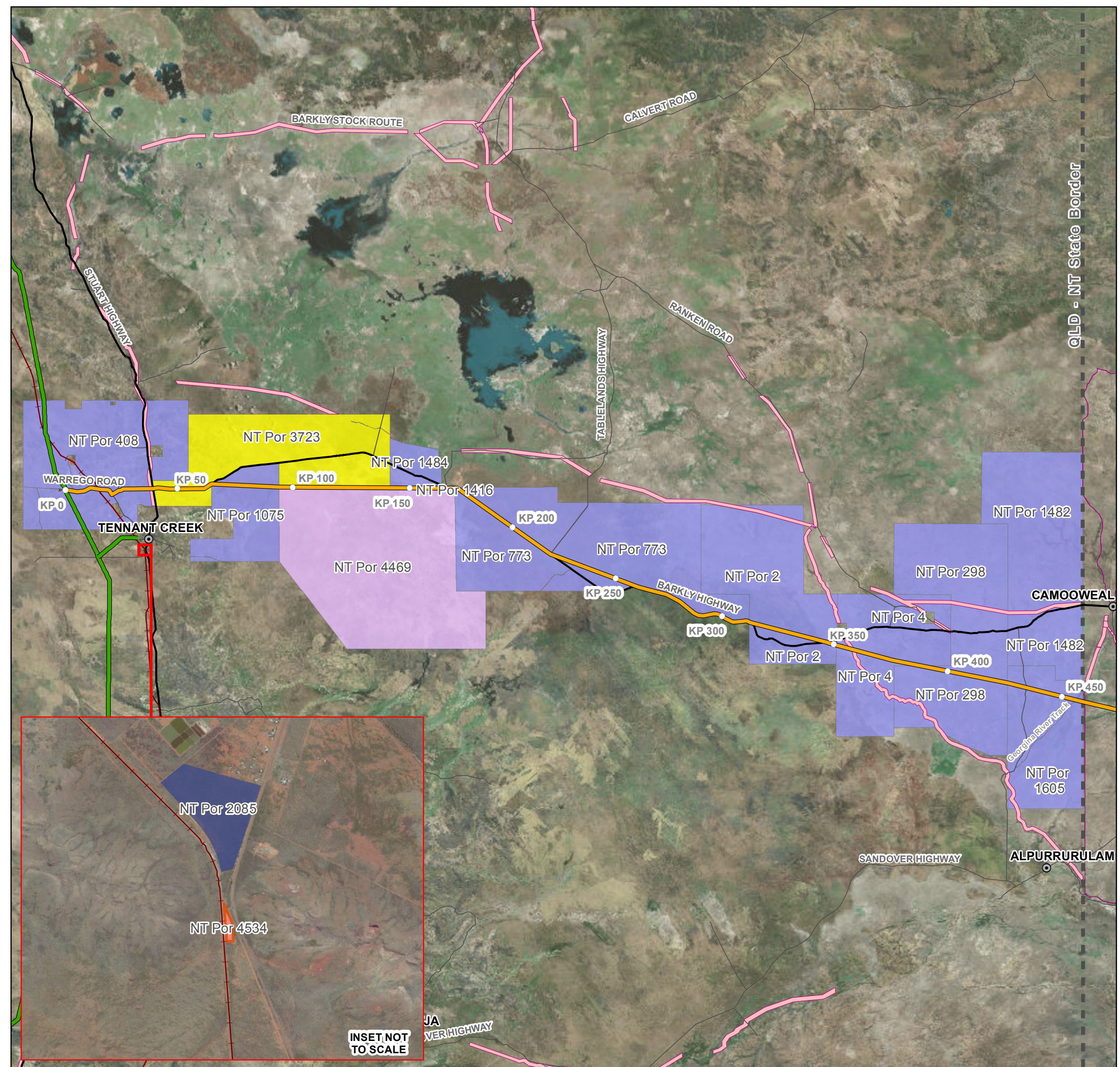
A number of businesses, hotels, restaurants and shops are found in Tennant Creek, along with public recreations (e.g. library, swimming pool, etc). At Three Ways a roadhouse offers food, fuel and motel rooms. Camping and caravan sites are also located nearby.

2.2.4 Regional Context

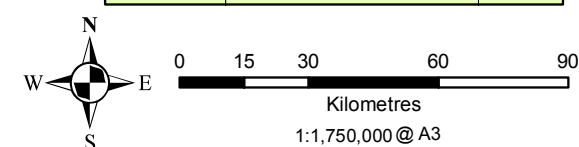
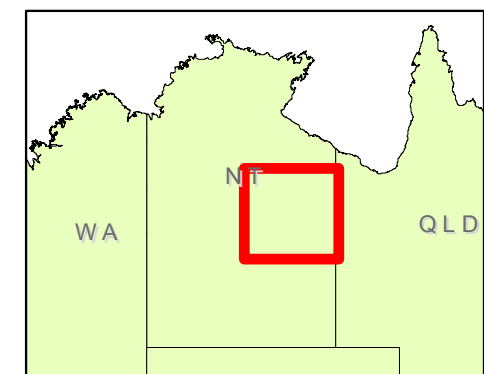
Regionally the Project is situated in a remote area of northern Australia with relatively low population density, services and infrastructure. The Region is administered by the Barkly Regional Council. The Council area is approximately 323,514 km² in size and has population estimated at 8,137 (BRC 2014). Of this population, 3,560 live in Tennant Creek. Land uses within the Project area comprise: cattle grazing, mining, and traditional Indigenous uses.

Three distinct bioregions are crossed by the Project: the hilly areas west of the Stuart Highway, the large, relatively flat but variable red earths section with open woodland in the centre, and the black soil Mitchell grass plains to the east. Seasonal rivers, creeks and swamps are located in the surrounds.

Gas transmission activities occur in the Project area via the existing Amadeus Gas Pipeline which is owned and operated by APA. The Amadeus Gas Pipeline was commissioned in 1986 and supplies gas to the Channel Island Power Station in Darwin.



- Towns
 - Pipeline KPs
 - Indicative Alignment
 - APA Pipelines
 - Railway
 - Principal Road
 - Secondary Road
 - State Border
- TENURE**
- Orange Crown Lease
 - Grey Freehold
 - Dark Blue No Title Issued
 - Light Blue Perpetual Pastoral Lease
 - Light Purple Vacant Crown Land
 - Yellow Aboriginal Freehold Land
 - Pink Travelling Stock Routes



NT Link

Figure 3
Land Tenure

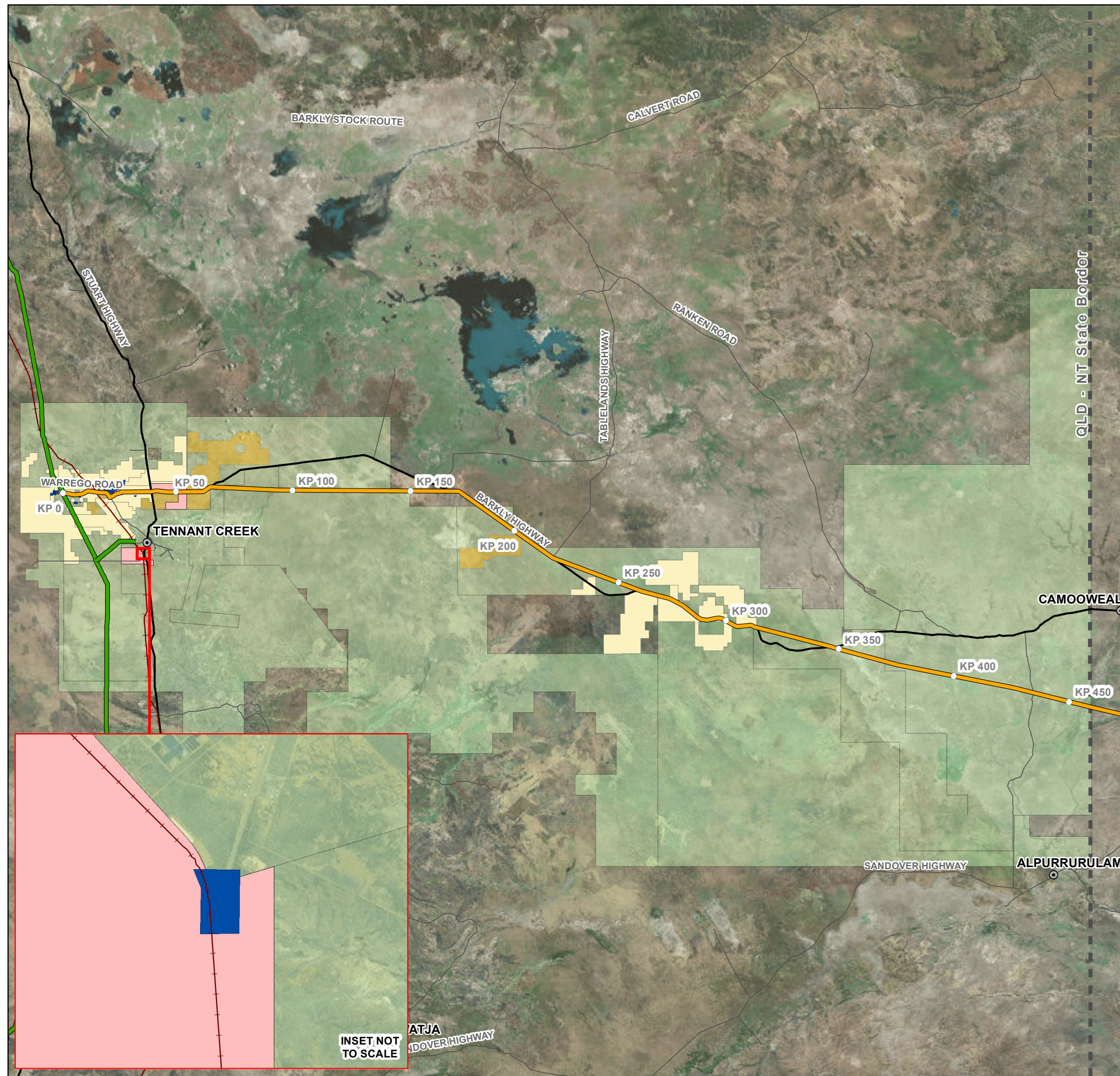
DATE: 02/07/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2015)
Cadastral supplied by State Government agencies
NT Link Indicative Alignment rev 1

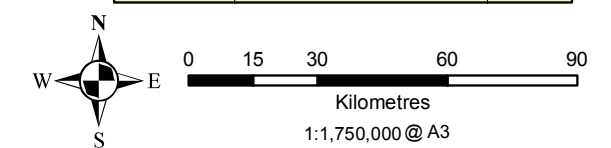
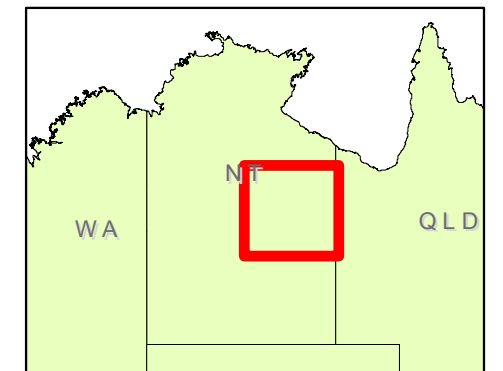
Coordinate System: GCS GDA 1994
Datum: GDA 1994



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- Pipeline KPs
- Towns
- APA Pipelines
- Indicative Alignment
- Railway
- Principal Road
- Secondary Road
- State Border
- Mineral Production Licence
- Mineral Exploration Licence
- Mineral Exploration Licence - ALRA Moratorium
- Mineral Exploration Licence - Applications
- Petroleum Exploration Licence - Applications



NT Link

Figure 4
Mineral and Petroleum Tenements

DATE: 02/07/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2015)
Tenement Boundaries supplied by State Government agencies
NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

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2.2.5 Planning Context

Regional Development Policy

The Commonwealth Government's White paper on Developing Northern Australia proposes a number of initiatives aimed at building a strong, prosperous economy. Infrastructure will play a key role in supporting growth. The Northern Territory Government's proposed North East Gas Interconnector (NEGI) is identified in the White Paper as a project with the potential to provide efficiencies in the Australian gas market. APA's NT Link project is being proposed as a solution for the NEGI.

The NT Government has expressed a strong interest in connecting NT gas supplies to eastern Australia, with the Department of the Chief Minister announcing the North East Gas Interconnector (NEGI) as a Major Project and facilitating the Request for Final Proposal. APA is a shortlisted proponent (one of four) under the NEGI process.

The NT Chief Minister has noted that: "The construction of this gas pipeline is an infrastructure Project of national significance. It's also a matter of urgency for the eastern states which are fast approaching an energy security crisis". An industry briefing was held in Alice Springs on 31 October 2014 to launch and explain the Project to potential proponents and to outline the competitive bid process.

Local Government

The proposed pipeline alignment is located wholly within the Barkly Regional Council area. The Northern Territory *Planning Act* and *Planning Regulations* provide for the appropriate and orderly planning and control of the use and development of land, and for related purposes throughout the Northern Territory. The Act provides for the Northern Territory Planning Scheme.

The Northern Territory Planning Scheme commenced in 2007 and applies to the whole of the Northern Territory, including all areas covered by the proposed NT Link alignment. Part 2 of the Scheme outlines planning principles that demonstrate the Northern Territory Government's commitment to appropriate outcomes of land use and planning.

The Department of Lands, Planning and the Environment (DLPE) manages the planning and development framework incorporating the *Planning Act* and the Northern Territory Planning Scheme - and provides professional and technical support to the Development Consent Authority (DLPE 2013). The areas transected by the proposed alignment are unzoned.

There are no other strategic or special planning measures allocated to the Project area.

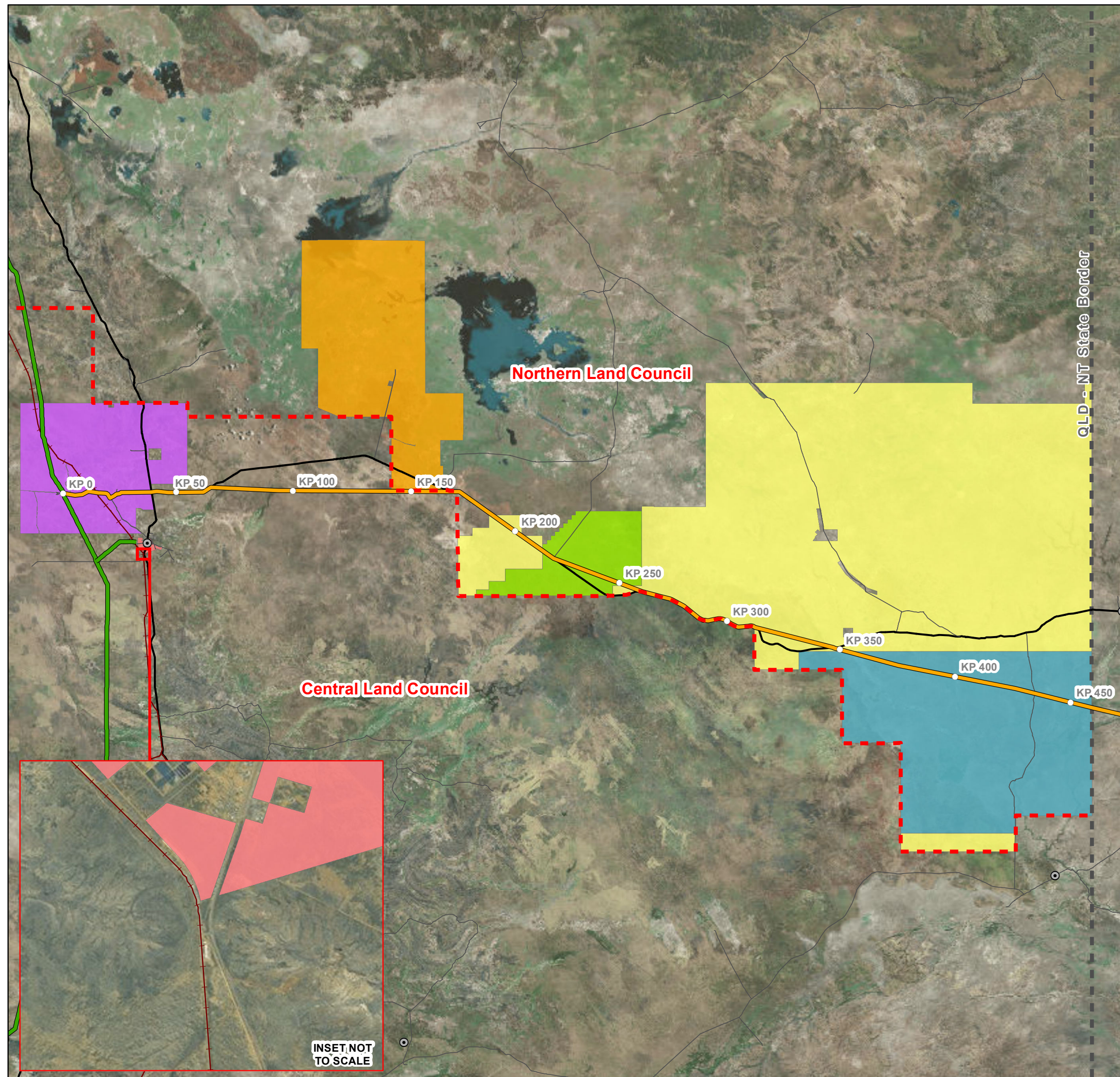
2.3 Native Title

The alignment passes through various Native Title Claim areas, as presented in Table 5 and Figure 5. In addition to these claims, there are lands within the Project footprint on which Native Title may still exist - notwithstanding the absence of any Native Title Claims. APA will work with the relevant Land Councils and undertake negotiations in regard to Native Title.

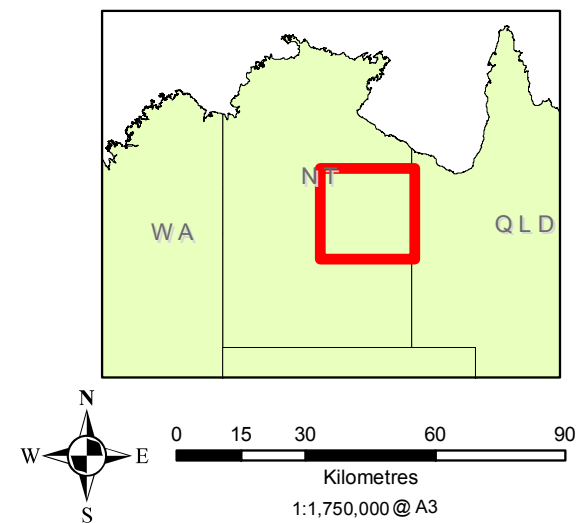
Table 5 Native Title

NATIVE TITLE			
Type	Federal Court File Number	Name	Representative
Claim	NDT50/2014	Phillip Creek Pastoral Lease	Central Lands Council (CLC)
Determination	NDT51/2011	Rockhampton Downs Pastoral Lease	Northern Lands Council (NLC)
Claim	NDT6030/2001	Dalmore Downs	Northern Lands Council (NLC)
Claim	NTD6003/2002	Dalmore Downs South	Northern Lands Council (NLC)
Claim	NTD6016/2002	Burramurra	Northern Lands Council (NLC)
Determination	NTD8/2006	Tennant Creek No.2 (Patta Warumungu Aboriginal people)	Central Land Council (CLC)

The pipeline also passes through freehold land granted under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth), to the Warumungu Aboriginal Land Trust (CLC representative area). APA will work with the CLC to undertake negotiations in regard to such Aboriginal land, in the form of a lease over the land.



- Pipeline KPs
 - Towns
 - APA Pipelines
 - Indicative Alignment
 - Land Council Boundary
 - Railway
 - Principal Road
 - Secondary Road
 - State Border
- Native Title Claims**
- Burramurra - NTD6016/2002
 - Dalmore Downs - NTD6030/2001
 - Dalmore Downs South - NTD6003/2002
 - Phillip Creek Pastoral Lease - NTD50/2014
- Native Title Determinations**
- Rockhampton Downs Pastoral Lease - NTD51/2011
 - Tennant Creek No. 2 - NTD8/2006



NT Link

Figure 5
Native Title Claims

DATE: 02/07/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2013)
Tenement Boundaries supplied by State Government agencies
NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

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3 REGULATION

This section outlines the legislation relevant to the proposal and the approvals, licences or permits required for the Project to proceed.

3.1 Northern Territory Legislation

3.1.1 Environmental Assessment Act

The *Environmental Assessment Act* (EA Act) and subordinate Environmental Assessment Administrative Procedures set out the framework for assessing proposed development projects that may have a significant impact on the environment. The outcome of this process is to advise on the suitability of development approvals authorised by other legislation. In the case of the NT Link Project, the Project would be primarily authorised under the *Energy Pipeline Acts* (see 3.1.2 below). The EA Act is administered by the NT Environmental Protection Authority (NT EPA).

According to this framework, the proponent of a proposed development that may have a significant impact on the environment must refer the proposal to the NT EPA. The NT EPA uses the referral information to determine the level of environmental impact assessment required. This NOI provides APA's referral of the NT Link Project to the NT EPA.

The NT EPA determine the level of assessment required depending on the risks and potential environmental impacts likely to result from the proposal. In particular, the following are considered:

- Type, magnitude, duration, frequency and extent of potentially significant impacts
- Importance and sensitivity of the surrounding biophysical environment
- The processes inherent in the proposal and related inputs and discharges
- Potential for on-site and off-site effects on the environment
- Other issues such as statutory planning requirements, heritage, public health, water resources and resource management

Where it is determined that an environmental impact assessment is required, then two assessment processes are available:

- Assessment through a Public Environmental Report (PER)
- Assessment through an Environmental Impact Statement (EIS)

A PER is used where a proposal is likely to have significant impacts but the number of environmental issues is low and the impacts are limited in magnitude, duration, frequency and extent. An EIS provides a more comprehensive level of assessment and is used for those proposals likely to have a large number of environmental issues, greater risks or impacts. The EIS process is also used where significant impacts could occur on matters protected by international or national legislation or policies, or for proposals which have the potential to be a significant risk or hazard.

Irrespective of whether a PER or an EIS is required, the scope the environmental impact assessment is defined by the NT EPA within a draft Terms of Reference (TOR). The draft TOR is advertised for public and advisory agency comment before being finalised with consideration given any comments received.

The PER or EIS is then drafted and placed on public exhibition for review and comment at advertised locations. Any issues raised as a result of submissions made on the PER or EIS are addressed by the proponent within supplementary documentation and submitted to the NT EPA. The NT EPA then issues an assessment report concluding on the acceptability of the proposal inclusive of any



recommendations for the environmental management of potential impacts. If a proposal is considered acceptable under the EA Act then this information is used to inform the development's approval under other Acts. In the case of the NT Link Project, the assessment report would in part inform the Project's approval decision under the *Energy Pipelines Act* and conditions potentially imposed on the pipeline license for the project, as discussed in the next section.

3.1.2 Energy Pipelines Act

The construction, operation and maintenance of gas pipelines, including access to land for such purposes, is authorised under the *Energy Pipelines Act* (EP Act). The EP Act is administered by the NT Department of Mines and Energy (DME). Applications for a Pipeline Licence under the EP Act are notified to the local government council, each owner and occupier of the land, registered Native Title claimants, and bodies corporate and the respective Aboriginal bodies as well as being publically notified, for example, in a newspaper.

The DME considers whether to grant the licence based on the application documents submitted and any submissions made. The licence can only be granted once the environmental assessment process under the EA Act has concluded and the pipeline has been determined environmentally acceptable, amongst other considerations. Conditions may be attached to a licence including, for example, those which provide for environmental management, safety and system integrity. A security bond is provided to the DME to bind a licensee to the conditions of grant. Works are then carried out according to a Pipeline Management Plan submitted to and approved by DME setting out the how the actions necessary to addresses the licence conditions will be implemented, monitored and audited.

3.1.3 Other Northern Territory Approvals Required

In addition to the key legislative stages required by the EA Act and EP Act respectively, a suite of subordinate approvals will be required by the Project. The processes associated with obtaining these would be conducted in conjunction with the Project's assessment under the EA Act to allow construction to commence in a timely manner. A summary of the additional legislation that is likely to be relevant to the NT Link and the approvals required is presented in Table 6.

Table 6 Other Relevant NT Legislation

Legislation	Relevance
Aboriginal Land Act	A permit to enter Aboriginal freehold lands is required
Biological Control Act	Management and control of regulated/targeted organisms
Building Act	Where structure or building work occurs
Bushfires Act	Management and control of fires (including fire bans) and related dangerous situations

Control of Roads Act	Temporary closures of State Highways and works during construction within road areas
Crown Lands Act	Registering an easement in Crown Land
Electricity Reform Act	Management of crossings of certain electricity infrastructure or installations
Heritage Act	Carrying out works which could disturbance of Indigenous or non-Indigenous archaeological sites
Land Acquisition Act	Access for surveys or works
Mineral Titles Act	Mineral title may be required to obtain rights to bedding materials Works in mineral titles
Northern Territory Aboriginal Sacred Sites Act	Authority Certificate required to indemnify against prosecution for entering or remaining upon, or carrying out work in the area of, sacred sites where conditioned works are carried out in agreed area through consultation with Aboriginal people
Planning Act	Excavation or land filling; clearing native vegetation; construction of a building; upgrading roads or drains and works near roads Subdivision approval
Pastoral Lands Act	Land clearing on pastoral stations (noting that there are limitations on application with respect to pipelines)
Rail Safety (National Uniform Legislation) Act	Safety management of rail crossings
Soil Conservation and Land Utilisation Act	Management of erosion risks

Telecommunications Act	Management of any crossings with certain telecommunications infrastructure
Territory Parks and Wildlife Conservation Act	Taking or interfering with wild plants or animals
Traffic Act	Temporary road closures during construction
Waste Management and Pollution Control Act	Management of any existing contaminated land, waste disposal, acceptable construction hours and noise emissions
Water Act	Water extraction, containment or diversion (noting that there are limitations on application with respect to pipelines) Discharges to water
Weed Management Act	Weed control
Work Health and Safety (National Uniform Legislation) Act	Health and safety / risk management Hazardous Works Hazard plant requirements - Gas Processing Facility (if required)

If a Gas Processing Facility is required, it may require authorisation under the *Work Health and Safety (National Uniform Legislation) Act*.

The project is required to undertake its activities in accordance with Northern Territory Aboriginal Sacred Sites Act and will seek an Authority Certificate from the Aboriginal Areas Protection Authority (AAPA). APA will work in a coordinated manner with each of the AAPA, the Northern Land Council and the Central Land Council to have Sacred Sites assessments and consultation carried out and to develop management and protection measures for any cultural heritage sites identified within the project footprint, both for preliminary survey activities and for development, construction and operation activities discuss any other matters of cultural heritage that are relevant to the Project.

The Project will be required to develop Cultural Heritage Management Plans and to have these plans approved by the Minister's delegate in the Department of Aboriginal and Torres Strait Island Partnerships (DATSIP), or to negotiate and register an Indigenous Land Use Agreement (ILUA) which makes provision in relation to cultural heritage management.

3.2 Commonwealth Legislation

3.2.1 Environment Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection of nationally important features of environmental and heritage value. These features are called Matters of National Environmental Significance (MNES) and comprise:

- World heritage properties (including the Great Barrier Reef Marine Park)
- National heritage places
- Wetlands of international importance (Ramsar sites)
- Listed threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)
- Water resources (where these could be affected by large extractive coal mining or coal seam gas activities)

This Act is administered by the Commonwealth Department of the Environment (DotE). Where a development proposal is likely to have a significant impact on an MNES then the proponent must refer the proposal to the DotE that decide the level of any assessment required. An assessment of the Project's potential to significantly impact any MNES is presented in section 6.11.

3.2.2 Native Title Act

The *Native Title Act 1993* (NT Act) recognises the rights and interests of Indigenous peoples in respect of land from which they have traditionally resided and regulates the conduct of 'future acts', including development. The legislation provides for the determination of native title claims, the treatment of 'future acts' that may impact on native title rights and the requirement for consultation and/or notification to relevant claimants where 'future acts' are involved. The provisions of the NT Act are administered by the National Native Title Tribunal (NNTT). The NNTT is established under the NT Act to work with people to understand Native Title and reach enduring Native Title and related outcomes that recognise everyone's rights and interests in land and waters.

Native Title determinations and claims within the Project footprint have been discussed above in section 2.3.

3.2.3 Aboriginal and Torres Strait Islander Heritage Protection Act

The purpose of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1994* (ATSIHP Act) is to preserve and protect from injury or desecration, areas and objects in Australia and in Australian waters that are of particular significance to Aboriginals in accordance with Aboriginal tradition. There are no areas declared under Schedule 1 of the ATSIHP Act within the Project area. The ATSIHP Act also includes provisions to manage the discovery and appropriate management of Aboriginal remains. Should SCC discover anything that they have "reasonable grounds to suspect to be Aboriginal remains" (Section 20(1)), APA will report the discovery to the Commonwealth Environment Minister in accordance with Part 2, Division 3 of the ATSIHP Act..

3.2.4 Aboriginal Land Rights (Northern Territory) Act

The Aboriginal Land Rights (Northern Territory) Act 1976 (Cth) (ALRA) sets out a statutory regime for the grant of inalienable freehold title to Land Trusts to hold title in that land for the benefit of Aboriginal people entitled by Aboriginal tradition to use and occupy that land (Aboriginal land).

The ALRA provides for the granting of an estate or interest in Aboriginal land by a Land Trust, at the direction of the relevant Land Council. The Land Council may not give such direction unless it is satisfied that the traditional Aboriginal owners of the land understand the nature and purposes of the proposed grant, the affected Aboriginal community or group has been consulted and has had adequate opportunity to express its views, and the terms and conditions on which the grant is to be made are reasonable.

Aboriginal land within the Project footprint has been discussed above in section 2.3.



4 DETAILED DESCRIPTION OF NT LINK PROJECT

4.1 Project Overview

The NT Link Project will be a 12-20" diameter, high pressure underground gas transmission pipeline connecting APA's assets in Warrego (near Tennant Creek, NT) and Mica Creek (near Mt Isa, Queensland). The proposed pipeline will be approximately 632 km in length and its purpose is to connect the Amadeus (NT) and Carpentaria (Queensland) Pipelines, enabling gas supplies within the NT to be transported between NT and to east coast customers. Approximately 459 km of the proposed alignment is within the NT.

The pipeline will be trenched for virtually its entire length, using conventional trenching methods, but exceptions will occur at major infrastructure crossings (road and rail lines).

All construction will be in general compliance with the guidelines provided in the Australian Pipelines and Gas Association (APGA) Code of Environmental Practice (2013) and the 'AS 2885 – Pipelines – Gas and liquid petroleum' series of standards.

The Project also includes above-ground infrastructure and temporary construction facilities including those described in more detail in the sections below.

4.2 Below-ground Components

The pipeline will be a welded steel, 12 – 20" (diameter to be decided on the basis of engineering and economic factors still under review), high-pressure, gas pipeline. The pipeline will be buried to a depth to top-of-pipe varying between 600 – 1200mm, depending on geotechnical, general risk assessment and property Safety Management Study (SMS) outcomes. For a detailed description of the processes associated with pipeline construction, refer to section 4.6.

4.3 Above-ground Facilities

Above-ground facilities will be required for the maintenance and management of the gas and the pipeline. Where practicable, above-ground facilities will be co-located.

4.3.1 Gas Processing Facility

A gas processing facility (GPF) is expected to be required. At this stage, it is expected the facility may be located in the NT close to the commencement point of the NT Link pipeline. The function of the GPF will be to process the incoming gas up to a standard required for acceptance into the east coast gas market. The specific location, function and operation of the GPF will be better defined as Project engineering proceeds. This will allow accurate characterisation of its risk profile, noise footprint and waste (gas and vapour) streams. In general terms, the incoming gas will be subject to catalytic stripping and gas upgrading processes, which require heating the incoming gas and separating unwanted gas fractions for disposal.

Disposal of unwanted gas fractions is expected to be via a flare, which acts to break down residual hydrocarbons into a waste stream consisting mostly of CO₂ and water vapour, with trace amounts of ash. There will also be a minor nitrogen segment in the waste stream and all emissions will be fully quantified for the environmental impact assessment.



The GPF will be constructed and operated in general accordance with the guidelines provided within the APGA Code of Environmental Practice (APGA 2013) and is expected to have an operational footprint of approximately 400m x 400m and a construction footprint of up to 500m x 500m.

4.3.2 Pipeline Inspection Gauge (PIG) Launcher / Receiver Facility (or Scraper Station)

Pipeline Inspection Gauging ('Pigging') refers to the practice of using devices known as 'pigs' to perform various maintenance operations, including but not limited to cleaning and inspecting the pipeline.

This is done without stopping the flow of the gas product in the pipeline and is accomplished by inserting the pig into a 'pig launcher' - an oversized section in the pipeline, reducing to the normal diameter. The launcher is then closed and the pressure-driven flow of the product in the pipeline is used to push the pig along the pipe until it reaches the receiving trap - the 'pig catcher'.

The Launcher / Receiver Facility compound will include:

- Two tie-in points to the NT Link pipeline, downstream and upstream.
- Shutdown valve with bypass and associated piping and remote operation communications
- PIG launcher / receiver
- Provision for power supply
- Provision of solar panels and battery chargers
- 24VDC Battery backup supply
- Provision for fibre optic connection to the NT Link Meter Station.

PIG launchers and receivers are small, discrete facilities with a footprint of less than 50m² and a typical launcher / receiver facility is illustrated in Figure 6.

Figure 6: Typical PIG Launcher / Receiver Facility



4.3.3 Connections

The NT Link will connect to existing facilities on the Amadeus Gas Pipeline near Tennant Creek. Pipeline inlet facilities and pipeline outlet facilities at will require approximately 50m x 50m each for permanent access.

Activities that are normally carried to install an inlet connection are summarised in Table 7 below.

Table 7: Typical Inlet Connection Construction Activities

Activity	Description
Clear required area	Where clearing is required, graders and/or bulldozers are used to clear an access track, site facilities area and lay down area – all within the NT Link Construction Corridor. Topsoil is stripped for the width and length of the meter station pad, typically to a depth of 100-150mm. The pad is then filled with imported, free-draining soil and compacted and filled to the design level
Excavate main line, large enough to remove confined space entry requirements	An excavation (minimum 1.5m deep) is dug for the tie in line, hot tap exposure and valve arrangement in accordance with APA Excavation procedures and Permit to Work System. Trench spoil is stockpiled within the Construction Corridor, usually on the non-working side
Install pipe work	Pipe work is to be connected to the hot tap through to the custody transfer point
Complete fitted welds	The tie-in and site field welds are completed in-situ or in the temporary workshop. During welding, a habitat or tent is used to cover the weld and welder, to provide protection from the elements and screen off potential sparks
Non-destructive testing	The pipe welds are inspected using Magnetic Particle Inspection (MPI), X-ray, gamma or ultrasonic equipment
Back fill	Clean sand to be used around and 200mm above the inlet piping. Common fill to be used for remaining fill. Common fill will be weed- and disease-free, and non-acid sulphate soil
Hydrostatic testing	Pipework integrity is verified using hydrostatic testing in accordance with AS2885 Pipelines - Gas and Liquid Petroleum and as described in 4.6.6



Activity	Description
Commission inlet connection	Following successful commissioning, first gas to NT Link can be delivered
Site clean-up and rehabilitation of areas containing temporary infrastructure	Removal of temporary facilities, equipment and surplus materials. Any areas outside that are not to remain permanently will be rehabilitated. Areas which may remain include the access track and meter skid. Where necessary, ground is re-contoured and topsoil re-spread.

4.3.4 Compressor and Main Line Valve Sites

Main Line Valves (MLV) are expected to be located approximately every 75km or so and consist of a discrete above-ground assembly within an approximate 20m x 20m protective compound, with a vent located approximately 50m away within a 5m x 5m protected area.

MLVs are essential components of any gas pipeline, as their main purposes are:

- To allow (remotely operated) gas flow shut-off which is essential for safety purposes in the event of pipeline damage, rupture etc
- To facilitate future access to the pipeline for maintenance purposes

A typical MLV assembly is shown in Figure 7.

Figure 7: Typical MLV Assembly



Compressors are required along lengthy pipelines to boost pipeline pressure and on the NT Link pipeline, two compressor stations are expected to be required, with one anticipated to be close to the pipeline origin and the second (if required at a later date) to be approximately mid-alignment, although this could be in the NT, with locations dependent on design details yet to be completed.

The midline compressor sites will be likely to be combined with a camp site and pipe laydown and have a total (combined) construction footprint of approximately 500m x 700m. Once the camp and laydown area are rehabilitated post-construction, the compressor site will remain, as a 200m x 150m permanent compound. Compressor stations will require a permanent access track.

4.3.5 Construction Camps

Construction workers will be housed in camps near work sites during the construction phase of the NT Link. Key material storage areas may also be located at or near the camp facilities for convenience and to ensure requirements for additional clearing / site preparation works are minimised.

People living in the camps will include the following:

- Construction workforce
- Management and supervisory staff
- Technical and administrative support staff
- Camp catering and maintenance staff
- Safety and medical staff
- Logistics services staff
- Inspection and environmental staff
- Visitors and guests.

Camps will be modular (relocatable) units arranged into conventional construction / field camp configurations.

The camps will reflect current construction workforce standards. These standards include separate quarters for men and women and recreation/ lifestyle services such as recreational rooms and facilities. Camp catering and housekeeping will be in accordance with industry standards, including daily facility and room cleaning, together with access to washers and dryers for personal laundry.

Camps will include a selection of personnel with first-aid training and will also have either medical personnel *in situ*, or will have emergency evacuation plans as required. For medivac purposes, camps will have a suitable helicopter landing site available or pre-arranged access to an existing dedicated landing area.

Camp sites will be developed and camps moved and installed in a timely fashion to allow pipeline and facilities construction.

Camp sites will be combined with temporary Project offices and materials and fuel storage yards wherever appropriate, to reduce the amount of land required. The camps and storage pads will have their own power sources, water treatment and waste management systems. People, equipment and supplies will generally be brought into the camps by road.

Actual camp locations and sizes will be dependent on the construction sequencing - which can be influenced by weather and other external factors - but the overall NT Link Project will need approximately 5 camp locations with a peak construction workforce of approximately 350-450 people for the pipeline and 100-150 people for the gas processing facility (if constructed in the NT). During initial construction stages and during pipeline commissioning some accommodation may be supplemented by existing local accommodation facilities where required.

In addition to the above, the construction of the GPF will require a maximum workforce of approximately 100 – 150 people.

4.3.6 Additional Workspace

As well as the facilities described above, additional workspace areas (AWAs) will be required along the alignment for activities such as the following:

- Temporary parking and maintenance for vehicles and equipment
- Horizontal bores at road crossings which may need a wider area for set up and operations.
- Truck turn-a-rounds – estimated to be needed every 2km or so in remote locations
- Construction in areas of significant side slope (additional safety widths required)
- Vehicle washdown facilities (for biosecurity)
- Temporary water holding facilities (Turkey nest dams) during hydrotesting operations
- Communication towers
- Pipe laydown areas.

The precise location and area required for additional workspace will need construction contractor inputs and so will not be finalised until just before construction commences, however an accurate calculation and suite of anticipated locations will be developed to inform the environmental impact assessment.

4.3.7 Communication Towers

Temporary communication towers may be required in the NT to facilitate communications during construction. The location will be confirmed by the construction contractor during the early works program.

4.3.8 Pipeline Signage

As required by AS2885, the pipeline's below-ground location will be indicated by above-ground signage. The appearance, size and frequency of this signage is mandated by AS2885 and generally consists of signs such as that illustrated in Figure 8 installed at regular intervals along the pipeline line-of-sight.

Figure 8: Indicative Signage



4.3.9 Cathodic Protection Beds

Cathodic protection is a technique to control the corrosion of the pipe by placing it in contact with another, more easily corroded metal in contact with the pipe, to act as the anode of the electrochemical cell. It is anticipated that several cathodic protection beds (each up to approximately

20m x 20m) will need to be established up to 500m from the pipeline. The locations will be identified during detailed design based on locational characteristics. A 3m-wide, permanent access track will be required running from the Construction Corridor to each cathodic protection bed.

4.4 External Infrastructure Requirements

Power will be supplied to construction camps and active construction fronts by skid-mounted, fully bundled diesel generators. These generators will be located in a manner to minimise noise propagation to sensitive receptors and to avoid nuisance caused by exhaust fumes. Fuel supplies for generators and construction equipment will be trucked to the working construction fronts and camps from the most convenient location (i.e. Mt Isa and / or Tennant Creek).

Potable water for drinking, ablutions, cooking and other requirements will be supplied by sub-contractors, or, where possible and by pre-agreement, by the local pastoral leaseholder. For discussion of water needs for pipeline integrity testing, refer to section 4.6.6.

Pipe, valve assemblies and other infrastructure elements will be trucked to the working construction front and stored in the appropriate laydown yard. The most likely scenario is for pipe to be shipped into either the Port of Darwin and / or the Port of Townsville. From Townsville, rail transport would be used to ship the lengths as far as Cloncurry, Duchess or Mt Isa, with road transport from there to the appropriate pipe laydown yard. From Darwin, pipe lengths would be either transported by road or railed to Tennant Creek/Three Ways and then to a laydown along the construction front. Road trains may carry 530-720m of pipe per load, indicating approximately 1,000-1,200 trailer loads may be required to carry the pipe for the entire Project. A Traffic Management Plan would be agreed with the Department of Transport to ensure haulage along NT roads will be safe and efficient.

4.5 Timeframes for the Project

Construction is expected to take approximately 12 – 18 months. It is planned to commence with the establishment of pipe laydown areas and the development of camp locations and other ancillary areas from the second half of 2016 to have construction completed by the end of 2017. Commissioning is targeted for early 2018.

The planned pipeline design life will be 60 years and at or about that time, the condition of the pipeline would be assessed and a decision made on its future. If the pipeline is not replaced, alignment rehabilitation will be conducted at the end of the pipeline design life, in accordance with existing best practice (including AS2885).

The anticipated commencement and completion dates for each stage are shown in Table 8.

Table 8: Anticipated Dates for Project Stages

Activity	Start Date	Duration	Completion Date
Planning and Design	January 2014	36 months	Jan 2017
Procurement	May 2015	24 months	April 2017
Early works and Pre-construction activities	September 2016	6 months	February 2017
Construction	March 2017	9 months	November 2017

Commissioning	December 2017	3 months	February 2018
Operation	February 2018	60 years	2078

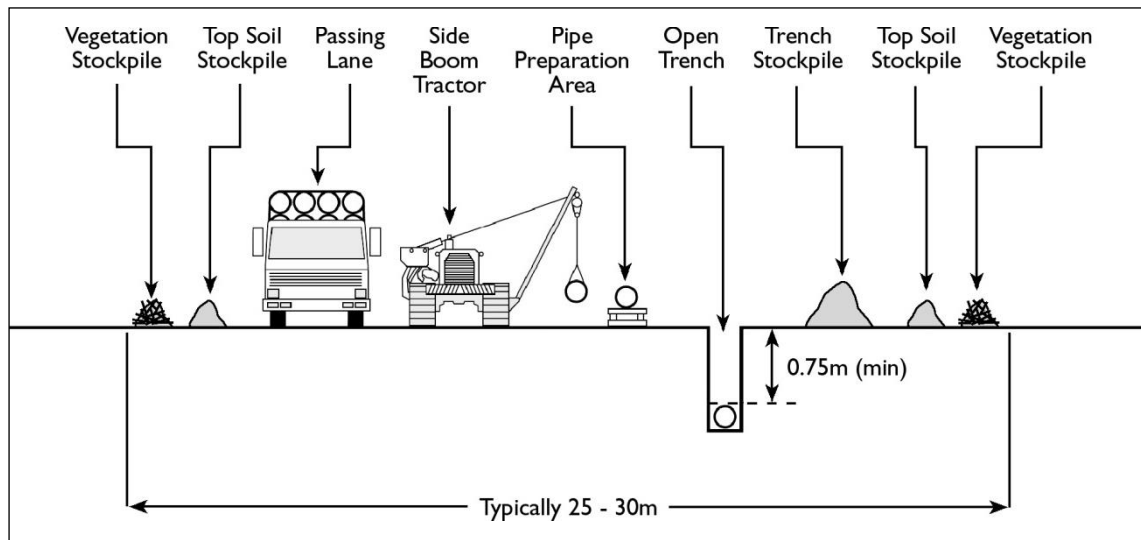
4.6 Construction and Operational Processes

4.6.1 Construction Methods and Timing

All construction will be conducted in general accordance with the applicable standards and codes, particularly 'AS2885 Pipelines – gas and liquid petroleum' and the guidelines within APGA Code of Environment Practice (APGA 2013).

Pipeline construction will typically be carried out within an approximate 30m-wide Construction Corridor, using a production line approach. An indicative cross-section of an active pipeline Construction Corridor is shown in Figure 9 and Figure 10.

Figure 9: Typical Construction Cross-section (not-to-scale)



Source: APIA 2013

Figure 10 Construction of Bonaparte Pipeline, NT



STRINGING THE BONAPARTE PIPELINE 2006

4.6.2 Pipeline Installation

A number of specialised crews pass along the easement, joining and installing the pipeline then backfilling and rehabilitating the Construction Corridor. Typical construction activities expected for the pipeline are described in Table 9.

Table 9: Typical Pipeline Construction Activities

Activity	Description
Detailed survey	Engineering, environmental and cultural heritage surveys are used both in route selection and to determine if any special construction techniques or mitigation measures are required. Once the preferred pipeline route has been determined, the centreline is surveyed and marked and engineering aspects are finalised. Markers are placed to identify the pipeline route and Construction Corridor and important environmental and cultural items from the Construction Line List
Fencing	Fences are severed and construction gates installed to allow access

Activity	Description
Clear and Grade	Graders and bulldozers are used to clear the Construction Corridor to provide for construction activities. This Construction Corridor may be widened if required at watercourse crossings. Cleared vegetation will be stockpiled separately. Topsoil will typically be graded off and stored separately
Stringing	Steel pipe is trucked to the construction site and sections laid end-to-end. The sections are 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 are bent to match changes in either elevation or direction of the route
Welding	Pipe sections are welded together
Non-destructive weld testing	The pipe welds are inspected using x-ray or ultrasonic equipment, as per AS 2885.2
Joint coating	The area around the weld is grit-blasted and then coated with a protective coating to prevent corrosion
Trenching	After the route is cleared, a trench is dug for the pipeline by either a trenching machine or an excavator in accordance with pre-defined depths of burial. The required depths are determined by a risk assessment process and recorded on construction alignment sheets. Trench spoil is stockpiled within the Construction Corridor, usually on the non-working side. Trench spoil is stockpiled separately to topsoil. The trenches will be ramped at regular intervals to allow larger fauna to escape. The period that any part of a trench will be left open will be minimised. Where possible, trenching will be delayed until completion of the welding and joint coating as part of ensuring that the trench will be open for the minimum amount of time
Padding	Where required, padding machines are used to sift the excavated subsoil to remove coarse materials to prevent damage to the pipe coating. The remaining fine material is used to pad beneath and on top of the pipe. In some



Activity	Description
	instances (e.g. rocky soils), imported sand or foam pillows will be used for padding
Lowering-in	Side booms or excavators are used to lower the welded pipe into the trench
Backfilling	Trench spoil is returned to the trench and material compacted to minimise the likelihood of subsidence of material over the pipe
Restoration and Rehabilitation	The Construction Corridor is re-contoured to match surrounding landform, and erosion controls constructed where necessary. Separately stockpiled topsoil is then re-spread evenly across the Construction Corridor. Reseeding or revegetation of the Construction Corridor, using appropriate species (i.e. crops/pasture or indigenous native species of the right provenance), will be undertaken where required to restore vegetation cover. An access track will remain free of woody vegetation
Signage	Information signs indicating the presence of the buried pipeline are erected along the Construction Corridor line-of-sight, as per AS 2885.1

4.6.3 Trenched Watercourse Crossings

The NT portion of the Project is expected to cross numerous ephemeral drainage lines and watercourses. It is currently expected that all watercourse crossings will use an open trench methodology.

Crossings completed by open-cut excavation require excavation of the banks and watercourse bed, to achieve the required minimum safe depth for pipe location at approximately 2m below the stable watercourse bed.

The increased burial depth is required to maintain pipeline integrity by ensuring flow events do not expose the pipeline. There will also be the need to extend this excavation through the riverbank profile for some distance away from the river channel, which is expected to result in a requirement for increased working width in the Construction Corridor to enable safe excavation of the trench and installation of the pipeline.

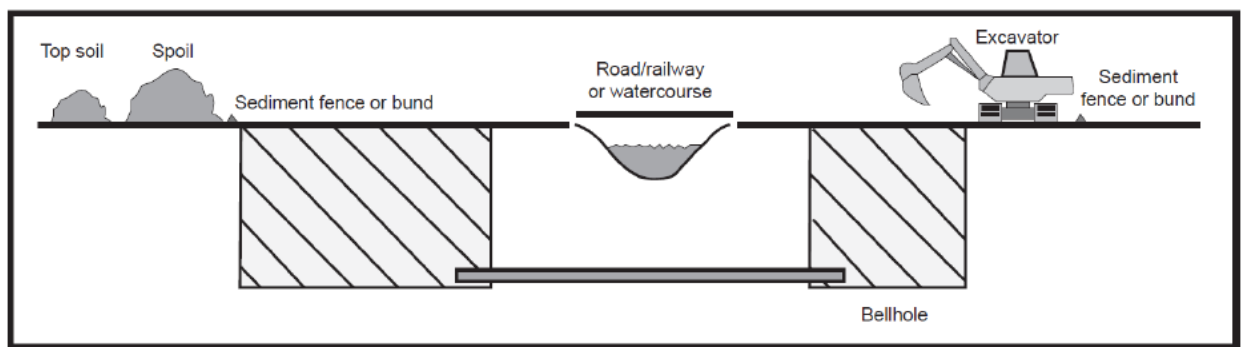
Erosion and sediment control (ESC) measures will be implemented to ensure there are no significant erosion impacts in the vicinity of the crossing, and the ongoing integrity of the crossing architecture will be monitored as part of the ongoing ROW maintenance commitment. ESC measures to be installed will comply with the objectives of the International Erosion Control Association Guidelines (IECA 2008).

4.6.4 Bored Crossings

Application of trenchless technology, such as Horizontal Thrust Bores (HTB), may occur at service crossings depending on negotiations with 3rd-party infrastructure owners and construction decisions and subject to technical practicability (e.g. local geology).

The installation of the pipeline by HTB involves boring a hole at the required depth beneath the surface, then pulling the welded pipe string back through the drill hole. Boring is conducted by a specially designed boring rig, operated by a specialist contractor. A variety of associated equipment and infrastructure is required at the entry and exit points are needed. Smaller, self-contained rigs (e.g. on the back of a semi-trailer) may be used for applications such as road crossings (APGA 2013). A schematic profile of a small-scale HTB operation is shown in Figure 11.

Figure 11: Schematic Profile of a bore crossing (source: APIA CoEP 2013)



All 3rd-party infrastructure crossings will be undertaken in accordance with agreements reached beforehand with facility owners and in compliance with appropriate standards.

4.6.5 Borrow Pits

Borrow pits to win material for temporary access tracks, laydown areas, etc., may be required, with the need dependent on final demand calculations. Should a new borrow pit be required, its establishment will be discussed with the applicable landowner (and owner of the relevant material where that person is not the landholder) and regulators on a case-by-case basis, with approval from the regulatory authorities to be secured prior to the establishment of any new pit.

4.6.6 Pressure Testing

Pipeline integrity is verified using hydrostatic testing, conducted in accordance with AS 2885.5. During hydrostatic testing, the pipeline is capped with test manifolds, filled with water and pressurised up to a minimum of 125% of design maximum operating pressure for a minimum of two hours. A minimum 24-hour duration leak test then follows.

Providing it meets applicable water quality guidelines, any conditions of applicable approvals and surface disposal has landholder approval, hydro-test water is discharged to the surrounding environment, applying the minimum performance standards of the APGA Code of Environmental Practice (2013). Sources of water will be investigated as part of the environmental impact assessment but it is expected that water for pressure testing will be sourced from adjacent properties, with agreement from the applicable landowner. If additional groundwater is needed, extraction approval will be sought from the relevant regulators.

As an indication of the volumes involved, the total volume of a 14" NT Link pipe extending for 632km would be approximately 63ML, indicating this would be the total volume of hydrotest water required if all water was used just once. It is proposed to reuse water by transferring from one to test section to another to reduce the volume of water required.

In general, it is expected that no chemicals will be added to hydro-test water as the pipeline is internally coated and coatings may be affected by aggressive water additives. However, in some locations chemicals may need to be added if there is danger of water with a very high pH affecting the integrity of the internal coating. In such cases - and in accordance with regulatory approvals - the water may be treated to neutralise alkaline elements to an appropriate standard before discharge to the environment. This discharge is a one-off event during commissioning of the pipeline and water is re-used wherever possible for multiple hydrotesting applications.

4.6.7 Access Tracks

Construction access tracks will be required where pipe delivery and construction contractor access to the Construction Corridor is required. Existing tracks will be used wherever possible and any additional clearing for access tracks, which will be quantified as part of the ongoing design refinement, will be conducted in accordance with applicable clearance permit, with the approval of the relevant landowner and in accordance with the standards enunciated in the Project CEMP and the APGA Code of Environmental Practice (COEP) (APGA 2013).

The total number of access tracks for the entire alignment (in both NT and Queensland) is likely to be 60-80, with the final number determined by alignment definition and location of camps and other ancillary works.

In general, station access tracks will be used, and upgraded if required, to get as close to the alignment as possible, with new turn-outs built only to allow Construction Corridor access if / when required.

New access tracks will be rehabilitated at the end of construction, unless the landholder requests they are left for the landowner's use, in which case they will be left in a stable condition.

After construction, a 3m-wide strip within the NT Link Construction Corridor will provide a track for ongoing operational maintenance access where use of Public roads and existing access tracks are insufficient for access to the ROW.

4.6.8 Waste Management

All Project waste will be managed in accordance with a Waste Management Plan based on industry best practice and in accordance with all applicable legislated requirements. Waste management will be based on the waste hierarchy - avoidance, re-use, recycling and disposal. General refuse shall be collected and transported to a Local Government approved disposal site or other appropriately approved site. Any regulated wastes that are generated or otherwise encountered during pipeline construction will be managed in accordance with legislative requirements. Further details are provided in section 6.6.

4.6.9 Pipeline Operations

The NT Link pipeline will be operated under an approved Pipeline Management Plan and in accordance with the requirements of its Pipeline Licence. The pipeline itself will be managed as a part of the existing and well-established APA gas network.

Specific pipeline operations and maintenance activities which will apply include:

- General equipment and facility maintenance
- Filter changes
- Cathodic protection surveys
- Pipeline excavation
- Venting
- Pipeline pigging
- Pipeline patrols
- Easement, facility and equipment inspections
- Breakdown and emergency response exercises.

Fuel and resource requirements for the NT Link operations are expected to be minimal.

Pipeline Construction Corridor patrols will be the primary mode of monitoring the pipeline during operations. Vehicle patrols will be completed by pipeline technicians at least annually and involve visual inspections of the pipeline corridor from a light vehicle. Aerial patrols may be completed more frequently – up to as often as monthly or after significant events such as flooding. Patrols may identify issues such as:

- Third-party encroachments
- Vegetation growth
- Presence of weeds
- Erosion
- Exposed pipe
- Condition of signage and aerial markers.

Additional patrols are envisaged for the initial stages post-construction. These will include monitoring and inspection as a part of the pipeline construction defects liability period for the pipeline construction contractor, as well as inspections by landowners, tenement holders and third-party infrastructure owners for compliance with agreement conditions.

4.7 Rehabilitation

Rehabilitation objectives and completion criteria will be developed as part of the Project's environmental impact assessment with the intention of returning disturbed land to a condition consistent with the existing land use, or other condition agreed with the landholder and the DME. Rehabilitation of disturbed areas will be undertaken as soon as practicable following completion of construction works.

It is proposed that the provision of a 3m-wide access track remains following rehabilitation for the duration of the project life. The track will be located adjacent to the pipeline and will be maintained free of vegetation. Landholders would be able to resume previous land use activities on top of the pipeline providing no excavation activities are undertaken and deep rooting vegetation does not establish.

4.8 Decommissioning

Decommissioning would likely occur approximately 60 years after the commencement of operations, assuming the use of the pipeline was no longer required. The options for decommissioning would be investigated at such time in the future but are considered likely to focus on complying with the recognised pipeline decommissioning requirements in AS 2885 including either its removal (whole or part) or suspension (filling the pipeline with an inert material and leaving it to degrade). A final



decommissioning plan would be agreed with the NT Government as part of the Project's closure and relinquishment of its Pipeline Licence.

4.9 Workforce Requirements During Construction and Operation

NT Link construction will be predominately staged out of camps. The location and size will be dependent on the construction sequencing (which can be influenced by weather and other external factors) and the NT Link is currently expected to require about 5 camp locations with an estimated peak construction workforce of approximately 350-450 people. During initial construction stages and during pipeline commissioning some accommodation will be supplemented by existing local accommodation facilities (e.g. at Mt Isa and Tennant Creek) if appropriate. Construction duration is expected to be about 12-18 months, including pre-construction activities such as the development of camp locations and other ancillary areas.

In addition to the above the construction of the GPF, if required in Queensland, will require a maximum workforce of about 100 – 150 people.

Worker transportation from accommodation to site will be by either company bus or light vehicle (4WD), with all on-site transportation carried out using dedicated Project light vehicles safety-equipped as required by the Project construction risk assessment.

Some local employment opportunities will be provided during the construction stage of the Project and for activities supporting construction, such as the following:

- Traffic control
- Water carts
- Personnel transport to and from site
- Materials and equipment transport to and from site
- Camp management, operation and maintenance
- Fuel, water and gravel supply
- Machine supply and maintenance
- Labour
- Administration.

In addition to local employment opportunities, APA will work with Indigenous stakeholders to identify workforce capacity, skills and experience in an attempt to match skills and capacity to employment on the Project.

Operational employment will number approximately 1-2 people, augmented by existing personnel in Mt Isa and Tennant Creek.

4.10 Economic Indicators

The total cost of the Project is expected to be about \$1.15 billion. Should the Gas Processing Facility proceed the total cost of the Project would increase to about \$1.3 billion.

The Project is expected to provide a number of economic benefits to the NT and Queensland including:

- Economic benefits to the NT as a whole from the increased royalties stemming from higher NT gas usage
- Contribution to increased output in the Project area resulting in local and regional economic growth



- Contribution to increased household income through potential increase in consumption and potential increase in savings and investment
- Contribution to employment, particularly in construction
- Potential local and regional manufacturing opportunities stemming from availability of a cost-effective energy source
- Generate a total Project income benefit of \$100 million in the Project area
- Economic benefits to all eastern Australian manufacturers relying on gas, as well as increased direct and indirect employment, stemming from the increased certainty regarding gas supplies into the eastern gas grid.

Refer also to section 6.10 for additional discussion of contribution to local/state/national economies

Approximately \$1.15 billion will be invested in the development and operation of the NT Link Project, including:

- \$65 Planning and Design
- \$270 Procurement
- \$15 Early works
- \$540 Construction
- \$10 Commissioning
- \$250 Operation

APA has a dedicated in-house Commercial team responsible for the day-to-day capital management of APA's assets, as well as its subsidiary 'joint venture' investments. In calendar year 2014 (to December 2014), APA undertook approximately \$1.68 billion worth of debt refinancing with varying tenors between 3.25 years and 5.25 years. In December 2014, APA announced debt and equity raisings in excess of A\$6 billion to successfully fund the acquisition of the Wallumbilla Gladstone Pipeline (formerly the QCLNG Pipeline) in Queensland.

Case studies that highlight APA's ability to raise both debt and equity to fund growth opportunities can be provided (on a Commercial in Confidence basis) to the NT Government in support of this NOI if required. Refer also to section 2.1.1 for additional discussion of the similar scale developments which APA has successfully financed.

4.11 Alternatives

APA undertook a preliminary assessment of several possible alignments by evaluating environmental considerations and determining construction cost estimates to identify the optimal connection between the NT and eastern Australia. Options included connections from the NT to Queensland (joining the Carpentaria Pipeline) and South Australia (Moomba), as set out in Table 10.

Table 10: Alignment Options Initially Reviewed

Alignment Option	Length (km - as originally conceived)	Constraints Summary
Tennant Creek to Mt Isa	570	Shortest and most direct connection to APA's existing assets i.e. Amadeus and Carpentaria Pipelines. Key

Alignment Option	Length (km - as originally conceived)	Constraints Summary
		constraint is presence of Royton Timber Reserve south of Mount Isa and the presence of surface rock. Relatively few MNES, Queensland or NT listed species encountered, least water crossings, low flood risk
Aileron Highway direct East to Boulia	735	Intersects 50+km of surface rock; highest proportion of listed flora and 2 conservation reserves; high number of land parcels to be crossed in Queensland; moderate flood risk
Alice Springs to Carpentaria Pipeline	740	Encounters very complex construction conditions for first 75km east of Alice Springs; construction challenge and operational risk presented by unstable, 20m sand dunes in north sector of Simpson Desert; technically complex crossings of braided beds of Georgina and Diamantina Rivers; moderate flood risk
Alice Springs to Moomba (via Simpson Desert)	810	Requires crossing high conservation areas in pristine central Simpson Desert; construction challenge and operational risk presented by unstable, 20m sand dunes; complex access; high flood risk
Alice Springs to Moomba (via Lake Eyre)	940	Extreme length not justified where other economically and environmentally acceptable alternatives are available; high flood risk; 26 listed threatened MNES and Ramsar Wetland along alignment

Based on the results of the options review, APA has selected a connection between its Amadeus Gas Pipeline (at Warrego – north of Tennant Creek) and its Carpentaria Gas Pipeline (at Mica Creek, south of Mt Isa) as the preferred option, principally as it provides the shortest link and minimises the potential for environmental and biodiversity impacts. APA is progressing statutory and environmental approvals for this connection option as set out in this NOI.

A desktop assessment covering a 20 km-wide study corridor was then conducted over the proposed alignment and a fly over. These assessments contributed to further refinements to the proposed

alignment in order to further avoid or minimise disturbance of known physical, environmental and cultural constraints.

Consultation, preliminary design work and further field assessment work are ongoing and the proposed alignment is likely to be further refined at a local scale during the current planning phase (prior to the completion of the environmental impact assessment).



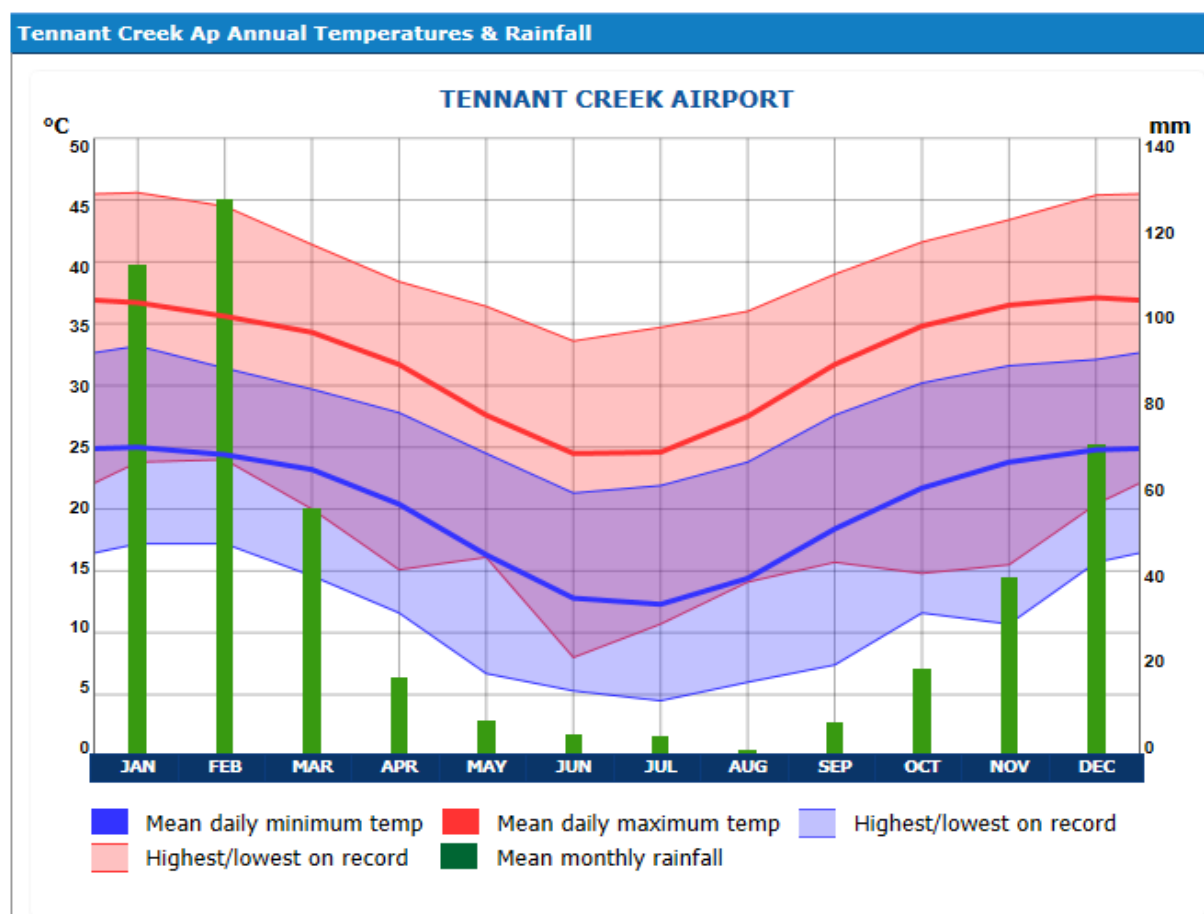
5 EXISTING ENVIRONMENT

5.1 Natural Environment

5.1.1 Climate

Two centres closest to the NT Link Project with long-term climate data are Tennant Creek (near the western origin of the alignment) and Mt Isa, the closest major centre to the Northern Territory border. Monthly climate ranges and averages for rainfall and temperature in Tennant Creek and Mt Isa are shown in Figure 12 and Figure 13, which illustrate the higher mean maximum and minimum temperatures in the summer months of December, January and February. A general trend towards higher rainfall is also evident in these months, however rainfall totals vary significantly from year to year, as shown in the rainfall ranges.

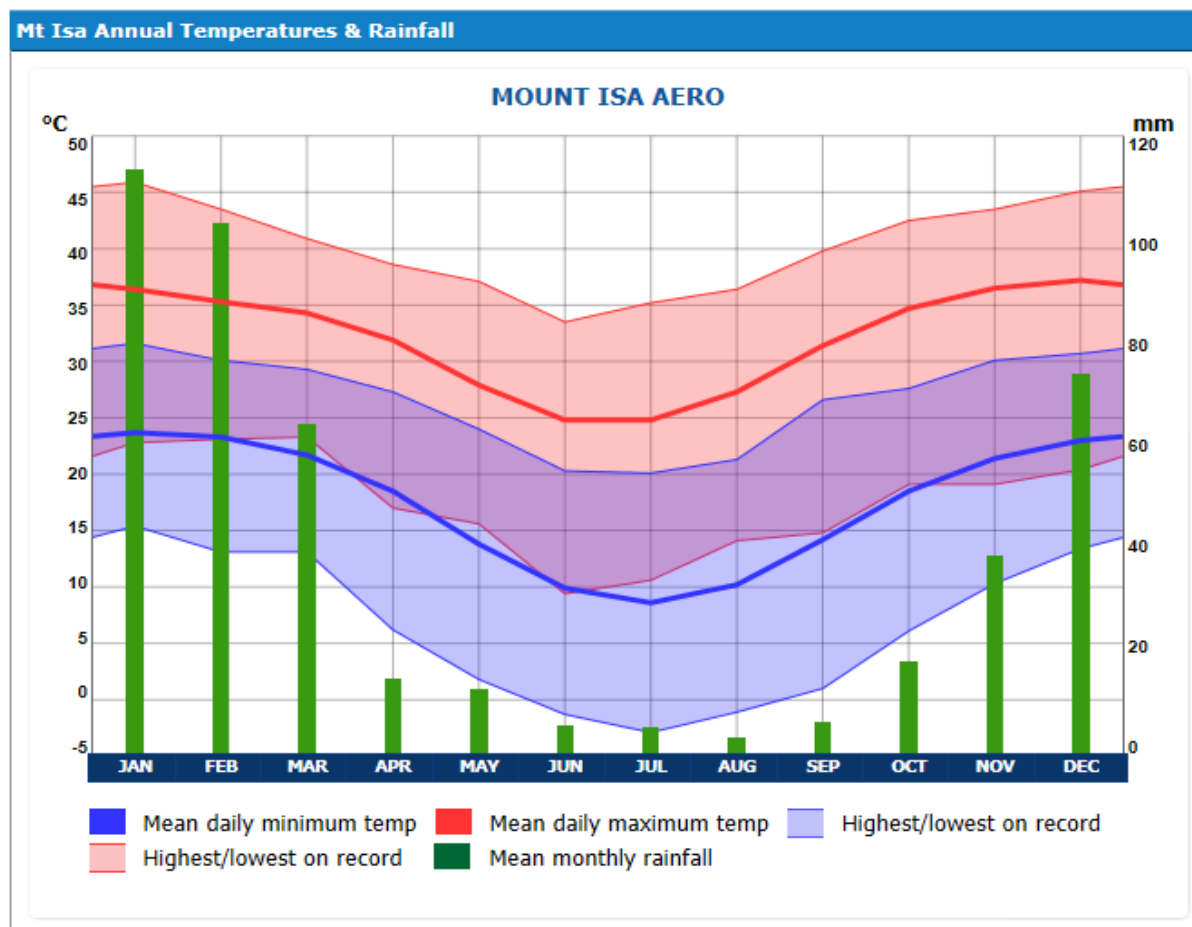
Figure 12: Climate Averages for Tennant Creek



Source: <http://www.weatherzone.com.au/>

January and February are the wettest months, with mean rainfall of 88.4mm and 90mm in Tennant Creek (Figure 12) and 114.4mm and 102.6mm in Mt Isa (Figure 13). The main influence of these rains is felt in the Channel Country in eastern Northern Territory.

Figure 13: Climate Averages for Mount Isa



Source: <http://www.weatherzone.com.au/>

5.1.2 Geology, Geomorphology and Soils

5.1.2.1 Land Systems

The Project falls within three broad geomorphic zones of the NT, namely: black soil plains, laterite plains and bedrock hills. The land systems intersected by the alignment are listed in Table 11.

Table 11: Land Systems Intersected by the Proposed NT Link Alignment

KP*	LAND SYSTEM
0-35	TENNANT CREEK Flat topped hills and broad valleys; skeletal and alluvial soils
35-65	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation.
65-67	YELVERTOFT Numerous widely separated areas of undulating timbered country in the S half of the region with gravelly and stony lateritic soils
67-81	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation
81-84	GOSSE A number of small scattered areas of sandy, seasonally flooded flats in the SW

KP*	LAND SYSTEM
	'desert' portion of the region
84-120	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation
120-122	YELVERTOFT Numerous widely separated areas of undulating timbered country in the S half of the region with gravelly and stony lateritic soils
122-165	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation
165-245	PRENTICE Gently undulating, with low limestone rises; calcified Lateritic soils. Occurs between Wonarah and Frewina on the Barkly Highway
245-343	YELVERTOFT Numerous widely separated areas of undulating timbered country in the S half of the region with gravelly and stony lateritic soils
343-350	BARKLY 2 Very gently undulating to nearly flat Mitchell Grass plains.
350-353	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
353-360	GEORGINA Gently undulating "black soil" plains cut by braided streamlines
360-371	YELVERTOFT Numerous widely separated areas of undulating timbered country in the S half of the region with gravelly and stony lateritic soils
371-378	BARKLY 2 Very gently undulating to nearly flat Mitchell Grass plains.
378-425	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
425-428	GEORGINA Gently undulating "black soil" plains cut by braided streamlines
428-440	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
440-441	GEORGINA Gently undulating "black soil" plains cut by braided streamlines
441-457	KALLALA Very gently undulating "black soil" plains. Heavy brown Pedocals
457-460	GEORGINA Gently undulating "black soil" plains cut by braided streamlines

*estimate only, based on alignment current in May 2015

5.1.3 Topography

The topography of the proposed alignment is relatively flat for most of its length, varying in elevation from 209m to 433m (at Mt Isa) with the highest point in the Northern Territory segment located close to the Stuart Highway crossing point (315m). The relative topography of the entire alignment is illustrated in Figure 14.

Figure 14: Alignment Topography



Source: Google, Digital Globe

5.1.4 Relevant Natural Processes (eg fire, flooding)

Bushfires are frequent and widespread throughout the grassy plains of Northern Australia. Depending on seasonal conditions bushfires can occur along the alignment anytime between March and December each year, due to a combination of lightning strikes, accidental ignition, controlled burning and land management burning by Aboriginal people. As a result, much of the region through which the NT Link Project alignment passes is burnt on an annual basis.

Flooding represents an important risk to any pipeline, as exposed pipeline can be subjected to unplanned structural stress and increased risk of collision accident; flooding can also lead to undermining buried pipe as padding material can be selectively removed by flood waters.

A preliminary flood risk assessment was conducted by APA as part of its initial route review and constraints analysis; this analysis focussed on broader risk across whole alignments, particularly the risk inherent in periodic flooding within the Lake Eyre catchment and the general risk posed by seasonal rainfall. The findings of this preliminary study supported the selection of the Warrego – Mt Isa alignment as the preferred option.

A detailed flood risk study of the Warrego – Mt Isa route will be conducted by APA in July / August, as part of the alignment definition process and in order to identify localised risks - and options for their avoidance.

5.1.5 Surface and Groundwater Hydrology

The proposed NT Link Project alignment has been selected to avoid permanent waterbodies. Several ephemeral drainage lines are crossed. Surface flows take place in exceptional wet seasons and in general, short-lived flows may be expected during the wet season on an average of one in five years. Construction of the NT Link Project will be timed to coincide as far as possible with the dry season.

Groundwater along the alignment is a critical source of stock and domestic water supply and the alignment passes within kilometres of numerous stock watering bores, especially across the Barkly Tablelands. The groundwater system consists primarily of limestone aquifers which provide good quality groundwater at typical yields of 2 L/s, although greater yields are possible (Tickell, 2003). The project will need water for a variety of purposes, particularly during construction and commissioning.

5.1.6 Soil Landscape and Surface Geology

Soils along the alignment have been reviewed at desktop level and have been visually inspected during a preliminary flyover. As expected, the soils of the alignment generally are made up of the following soil groups:

- Vertosols - cracking clay soils which may or may not be poorly drained. This is the most commonly encountered soil type along the alignment
- Kandosols - soils that are massive and earthy (formerly red, yellow and brown earths). Found throughout the Northern Territory and particularly widespread at the western end of the pipeline alignment
- Rudosols - very shallow soils or those with minimal soil development. Includes very shallow rocky and gravely soils across rugged terrain with limited distribution along the alignment

One of the most important factors for selecting pipeline routes, the depth of cover of soils, sands and clays overlying the bedrock geology, is difficult to determine through a desktop study or inspection from the air. Further field sampling, pot holing and augur boring will need to be carried out during the next study phase along the preferred alignment to determine both local area route refinements around rock outcrops and the likely degree of excavation difficulty through areas where soils may be shallow.

As it can typify the underlying trenching conditions to some extent, the alignment surface geology has also been reviewed, with the types encountered classified in Table 12.

Table 12: Surface Geology

Surface Geology Type	Length of alignment in area of geology (km)
Sedimentary carbonate, siliciclastic, regolith, argillaceous detrital sediment (Sands, gravels, calcrete, clays, limestone, mudstone, sandstone)	436
Metasedimentary carbonate & siliciclastic (Undivided sandstone, siltstone & quartzite)	9
Igneous felsic intrusive (Granite, diorite, tonalite)	11
Meta-igneous mafic volcanic (Metabasalt, amygdaloidal basalt, quartzite)	3

This initial review indicates that there may be generally good trenching conditions available along the proposed NT Link Project pipeline route.

5.1.7 Flora and Fauna

In support of the NT Link Project, APA has commissioned Low Ecological Services (LES), of Alice Springs and Tennant Creek, to conduct an initial desktop review followed by an aerial survey of the flora, fauna and ecology of the proposed alignment. The report from LES (LES 2015) can be viewed at Appendix A.

The desktop survey involved mapping and interpretation of the following layers and tools:

- Site of Botanical Significance
- Sites of Conservation Significance
- Northern Territory Fauna Atlas

- Northern Territory Flora Atlas
- EPBC Protected Matters Search
- Northern Territory Land Systems maps
- NVIS Vegetation maps
- 2013 Weed records.

A summary of the LES report is presented in the following sub-sections.

Vegetation Types Present

The information in Table 13 has come from NVIS 2007 mapping layers and the associated report but the descriptions have been simplified to pick out a defining species which would be noticeable to a non-biologist.

The vegetation community boundaries will be verified in the field in ground surveys. For additional information, see Appendix A particularly Maps 2, 3 and 4, which show the mapped vegetation community intersections.

Table 13: Vegetation Communities

KP*	Community	Total area of Community (km ²)
0-5	Mulga tall sparse shrubland (Map Unit 69)	2,759
5-11	Bloodwood low open woodland over gravelly sands (Map Unit 34)	4,602
11-15	Mulga tall sparse shrubland (Map Unit 69)	2,759
15-35	Snappy Gum low open woodland (Map Unit 36)	25,058
35-90	Bloodwood low open woodland over red earth (Map Unit 42)	28,095
90-95	Coolabah drainage – Gosse River (Map Unit 27)	12,668
95-215	Bloodwood low open woodland over red earth (Map Unit 42)	28,095
215-250	Bloodwood, Coolabah and Ghost Gum low open woodland (Map Unit 41)	3,274
250-345	Bloodwood low open woodland over red earth (Map Unit 42)	28,095
345-410	Mitchell Grass low tussock grassland (Mapping Unit 96)	60,868
410-425	Gidgee low open woodland (Map Unit 62)	10,964
425-460	Mitchell Grass low tussock grassland (Mapping Unit 96)	60,868

*KP'S are approximate

Vegetation communities with limited distribution include the communities west of Tennant Creek (Map Units 69 and 34) and map unit 41 which is east of the Barkly Road House: these vegetation communities are nonetheless composed of common dominant species.

The remaining vegetation communities cover larger areas within Australia.

The Northern Territory Flora Atlas shows 3,616 flora records of plants within 20km of the proposed alignment. The records are concentrated around the populated areas and the highways. Within these records is a list of 647 separate species of plants. The most numerous genus in the list is *Acacia*, with 35 species recorded within 20km of the proposed alignment.

Threatened Species or Ecosystems

Threatened Flora

- There were no records of plants listed as Vulnerable or Endangered under the EPBC Act within 20km of the proposed or alternative alignments
- The EPBC Act Protected Matters Database search did not indicate the potential presence of any threatened plants in the project area
- Two species of plants listed as Vulnerable under the Territory Parks and Wildlife Conservation (TPWC) Act (Table 14) have been recorded within 20km of the proposed alignment (refer to LES 2015).

Table 14: TPWC Act Threatened Flora Which May Occur

Species	Status	Records within 20Km of proposed alignment
<i>Austrobryonia argillicola</i> I.Telford	Vulnerable	2
<i>Sporobolus latzii</i> B.K.Simon	Vulnerable	1

Other 'Significant' Flora

'Significant' species listed under the TPWCA and in the Northern Territory Flora Atlas (2015) includes *Data Deficient* and *Near Threatened* categories (which are non-Threatened categories), as well as the threatened categories such as *Vulnerable*.

There are ninety four records of 'significant' species of plants recorded within 20km of the proposed alignment. The records are composed of twenty nine *Data Deficient* species and twelve *Near Threatened* species, in addition to the 2 *Vulnerable* species above.

The majority of the significant species are grasses and forbs of wetter areas and the records are concentrated in the Sites of Botanical Significance (SOBS), the vicinity of roads and areas that are seasonally or permanently inundated. See Appendix A for location information.

There are fewer records of 'significant' species in the red earth areas in the western portion of the proposed alignment. This may be due to the area being under-surveyed but could also reflect the widespread and common distribution of plants in those land systems/vegetation communities.

Targeted searches during the environmental impact assessment development process will focus on SOBS and riparian areas with a representation in the red sand land systems.

Threatened Fauna

Records of TPWC Act and EPBC Act fauna with *Endangered* or *Vulnerable* status are located in close proximity to the highways. The data may reflect the reduced survey effort away from the main roads or may show species preference for disturbance (see LES 2015 for locality information). Records are summarised in Table 15 and Table 16.

Table 15: EPBC Act Threatened Fauna Which May Occur

Scientific Name	Common Name	Status	Records within 20km of NT Link proposed alignment
<i>Acanthophis hawkei</i> ¹	Plains Death Adder	VU	1
<i>Liopholis kintorei</i> *	Great Desert Skink	VU	0
<i>Macrotis lagotis</i> ¹	Greater Bilby	VU	7
<i>Notoryctes typhlops</i> *	Southern Marsupial Mole	EN	0
<i>Petrogale lateralis</i> *MacDonnell Ranges Race	Black-footed Rock Wallaby	VU	0
<i>Pseudantechinus mimulus</i> *	Carpentarian Antechinus	VU	0
<i>Rostratula australis</i> *	Australian Painted Snipe	EN	0

*EPBC Search identified as potential only

¹ Northern Territory Fauna Atlas records

Table 16: TPWC Act Threatened Fauna Which May Occur

Scientific Name	Common Name	Status	Records within 20km of NT Link proposed alignment
<i>Acanthophis hawkei</i>	Plains Death Adder	VU	1 (as above)
<i>Falco hypoleucos</i>	Grey Falcon	VU	5
<i>Macrotis lagotis</i>	Greater Bilby	VU	7 (as above)

Source: Northern Territory Fauna Atlas records

Other 'Significant' Fauna

Within 20km of the proposed alignment there are 311 records of fauna of conservation 'significance'. 'Significant' species within the Northern Territory Fauna Atlas includes EPBC Act *Vulnerable*, *Endangered* and *Migratory* species, TPWC Act *Data Deficient*, *Near Threatened* species and several anomalies which do not fall into any of these categories.

One hundred and nineteen records of listed EPBC Act Migratory birds, composed of fourteen separate species, have been recorded within 20 km of the proposed alignment, as listed in Table 17.

All of these species are listed as *Least Concern* under the TPWC Act, apart from the wood sandpiper which has not been evaluated. See Appendix A for locality information.

Table 17: EPBC Act Migratory Birds Which May Occur

Scientific Name	Common name	Records within 20km of NT Link alignment
<i>Actitis hypoleucos</i>	Common Sandpiper	5
<i>Apus pacificus</i>	Fork-tailed Swift	4
<i>Ardea ibis</i>	Cattle Egret	1
<i>Ardea modesta</i>	Eastern Great Egret	34
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	2
<i>Charadrius veredus</i>	Oriental Plover	3
<i>Chlidonias leucopterus</i>	White-winged Black Tern	2
<i>Glareola maldivarum</i>	Oriental Pratincole	1
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	1
<i>Merops ornatus</i>	Rainbow Bee-eater	42
<i>Numenius minutus</i>	Little Curlew	2
<i>Plegadis falcinellus</i>	Glossy Ibis	16
<i>Rostratula benghalensis (sensu lato)</i>	Painted Snipe	0
<i>Tringa Glareola</i>	Wood Sandpiper	1
<i>Tringa nebularia</i>	Common Greenshank	5

Thirteen species of *Near Threatened* fauna and three species of *Data Deficient* fauna have been recorded within 20km of the proposed alignment.

Weeds and Feral Animals

Weeds are a major focus for environmental management in the Barkly region. Weed records from 2013 are downloadable from NR Maps at a scale of 1:550,000 and give an indication of the type and extent of occurrence in the pipeline alignment.

Significant weed infestations in the proposed alignment occur near Tennant Creek and also in the black soil country towards Queensland where there are heavy infestations of Northern Territory Declared and Commonwealth Weeds of National Significance (WoNS) weeds, as shown on Map 6 of the Appendix A.

The Northern Territory has three 'Declared' categories of weeds:

- Class A These weeds are to be eradicated when encountered
- Class B Growth and spread of these weeds is to be controlled
- Class C These weeds are not to be introduced to the Territory

The likely presence of Northern Territory Declared weeds or Federal WoNS are shown in Table 18.

Table 18: Northern Territory Declared or Federal WoNS Which May Occur

Scientific Name	Common Name	Northern Territory Declared Status	WoNS
<i>Azadirachta indica</i> ¹	Neem	B, C	
<i>Calotropis procera</i> ²	Rubber Bush	B, C	
<i>Jatropha gossypifolia</i> ^{1,3}	Bellyache bush	A in project area, C	
<i>Parkinsonia aculeata</i> ^{1,3}	Parkinsonia	B, C	Y
<i>Parthenium hysterophorus</i> ³	Parthenium Weed	A, C	Y
<i>Prosopis pallida</i> ^{1,3}	Mesquite	A, C	Y
<i>Tamarix aphylla</i> ³	Athel Pine	A in project area, C	Y
<i>Vachellia nilotica</i> / (<i>Acacia nilotica</i>) ^{1,3}	Prickly Acacia	A, C	Y
<i>Xanthium strumarium</i> ¹ / (<i>Xanthium occidentale</i>)	Noogoora burr	B, C	

1 Northern Territory Flora Atlas recorded within 20km of proposed alignment

2 NR Maps 2013 weed records show in vicinity. DRLM Weeds Management data

3 EPBC Protected Matters Search identifies as potentially occurring

The Northern Territory Fauna Atlas indicates that 13 introduced fauna may be found within 20 km of the proposed alignment (Table 19).

The Cane Toad is listed as a key threatening process for several species listed under the EPBC Act. It has not yet become established in the Northern Territory portion of the NT Link alignments but the area falls within the predicted future extent of the Cane Toad. The Mt Isa region is already heavily infested with Cane Toads.

Table 19 Feral animals

Scientific Name	Common Name
<i>Hemidactylus fenatus</i>	Asian House geckos
<i>Equus asinus</i>	Donkeys
<i>Vulpes vulpes</i>	Red Foxes

Scientific Name	Common Name
<i>Sus scrofa</i>	Pigs
<i>Mus musculus</i>	House mouse
<i>Felix catus</i>	Cats
<i>Equus caballus</i>	Horses
<i>Canis lupis familiaris</i>	Domestic Dogs
<i>Camelus dromedaries</i>	Camels
<i>Bos taurus</i>	Cattle
<i>Columba livia domestica</i>	Domestic Pigeon
<i>Passer domesticus</i>	House Sparrow
<i>Bufo marinus / Rhinella marina</i>	Cane Toad



5.2 Significant Sites or Features

5.2.1 National Parks

The alignment does not traverse any National Parks in the Northern Territory.

5.2.2 Conservation Reserves

The alignment does not traverse any Conservation Reserves in the Northern Territory.

5.2.3 Marine Parks or Reserves

The alignment is entirely inland and does not traverse any Conservation Reserves in the Northern Territory.

5.2.4 Sites of Conservation Significance

The alignment does not traverse any sites of conservation significance in the Northern Territory (source: <http://www.lrm.nt.gov.au/plants-and-animals/conservation-for-land-managers/sites-of-conservation-significance/map>).

The proposed alignment does run near (across the Barkly Highway from) NT Portion 4469 (Warumungu) which was considered recently to be a candidate for conservation tenure of some type – although it is understood this consideration is not currently proceeding.

Several ecosystems of potential significance that occur along the proposed NT Link alignment have been identified in Appendix A as follows:

- Swamp near Frewena (near KP 160)
- Wakaya Desert pristine community
- Short Range Waterholes Site of Botanical Significance – north of the proposed alignment
- Wonarah Beds Site of Botanical Significance (near KP 270)
- James River Waterholes Site of Botanical Significance (near KP 400)
- Georgina River Site of Botanical Significance (near KP 456)
- Black soil Mitchell Grass Plains (Vegetation type 96) - high cattle grazing value and habitat for threatened species such as Plains Death Adder – between KP 370 – 380.

All of the SoBS intersected by, or within 20km of the proposed alignment are of Bioregional Significance. See Map 5 of Appendix A for locations.

5.2.5 World Heritage Properties

The alignment does not traverse or run in the vicinity of any World Heritage Properties in the Northern Territory.

5.2.6 National Heritage Places

There are no listings on the Commonwealth National Heritage or the Northern Territory Heritage Database for the vicinity of the alignment in the Northern Territory.

5.2.7 Public/private Reserves

The alignment does not traverse or run in the vicinity of any public or private reserves in the Northern Territory excluding road reserves.



5.2.8 Conservation Zones Under a Planning Scheme

The alignment does not traverse or run in the vicinity of any conservation zones under a Planning Scheme in the Northern Territory.

5.2.9 Significant Natural Land Features

The alignment does not traverse or run in the vicinity of any published significant natural land features such as wetlands, caves, ranges, craters or sites of geological or geomorphological significance, although this will be verified at the local level during more detailed studies to be conducted when access is granted.

5.3 Cultural Heritage Environment

There are no listed heritage sites in the Northern Territory within 5km either side of the proposed alignment (email from Heritage Branch, Department of Lands, Planning and the Environment dated 28/5/15).

The absence of listings may reflect the lack of study in the area of the proposed alignment and an initial overview of the potential for, and likely locations of, areas of cultural heritage importance, was provided by Tim Hill of Tim Hill Heritage Management and Planning, located in Alice Springs. The initial advice provided a predictive model of areas likely to contain cultural heritage and was used as part of the initial alignment definition process.

At this stage of the NT Link alignment development, APA has had preliminary engagements with each of the Central Land Council, the Northern Land Council and the AAPA. Once access approvals have been granted, APA will conduct detailed alignment studies together with the Central Land Council and Northern Land Council, to ascertain the existence or otherwise of any cultural heritage sites..

5.4 Social and Economic Environment

5.4.1 Waterways used for recreational or commercial fishing activities, or by Indigenous communities for hunting and/or fishing

The proposed NT Link Project alignment does not cross any waterways used for recreational or commercial fishing activities.

5.4.2 The amenity of local residents and social infrastructure such as schools, hospitals, affordable accommodation or recreation areas

The proposed alignment does not pass in the vicinity of any locations of significant amenity or of any schools.

For the majority of the construction phase, construction workers will be living entirely in construction camps, with no prospect of affecting housing (rental) prices or the amenity of recreation areas.

The workforce is not expected to make any measurable demand on the supply of health services as it will have its own medical services provider; exceptions will be for emergency medevac situations, for which the Tennant Creek Hospital (or appropriate other significant health facility) will be used. The hospital is a 20-bed facility operated by Northern Territory Health and provides a wide range of



services including the following (source:

http://www.health.nt.gov.au/Hospitals/Tennant_Creek_Hospital/Services/index.aspx):

- Accident & Emergency
- Orthopaedics
- Acute Inpatient Services including:
 - General Medical Services
 - Limited General Rehabilitation Services
 - General Allied Health Services by appointment
 - Radiology
 - Pathology
 - Oral Health

5.4.3 Lifestyles, available services, workforce, cultural practices or opportunities within local communities

The lifestyle for the majority of the NT Link Project alignment is rural, with the workforce focussed on pastoral pursuits associated mostly with rearing livestock. There are nearby areas of Aboriginal Freehold Land where a mix of traditional and modern lifestyles are pursued and cultural practices are followed.

Tennant Creek offers a full range of services, including transportation infrastructure, power and water supply, health and security services. Apart from the vicinity of Tennant Creek, services offered are relatively limited, with residents in the more remote areas practising a high degree of self-reliance in their day-to-day lives.

Opportunities within local communities are limited, with the Barkly Regional Council noting that the available opportunities are generally associated with the provision of basic services and working with remote Indigenous communities.

5.4.4 Visual amenity, e.g. aesthetic values, views, sunlight access, night sky visibility

The Project is situated within a remote region with a relatively homogenous landscape. It is not located near any sites of potential important visual amenity, such as national parks. The lack of homesteads located nearby to the Project alignment limits views of the Project to those seen within moving vehicles along the Stuart or Barkly Highways.

5.4.5 Sites of high public interest - a major recreation area or natural scenic feature

The proposed NT Link Project alignment does not traverse or pass within view of any special natural scenic features or recreation areas.



6 POTENTIAL IMPACTS AND MITIGATION MEASURES

This section identifies the potential impacts of the Project and describes their nature and extent. It also presents mitigation measures to avoid, reduce or manage potential impacts.

Impacts are considered in terms of the existing environment, in particular:

- The natural environment
- Significant sites or features
- The cultural heritage environment
- The social and economic environment

The feasibility and effectiveness of the proposed mitigation measures are based on the following sources which are judged to be reliable and valid:

- Past and current APA pipeline construction and operation activities
- The APGA Code of Environmental Practice for Onshore Pipelines (APGA 2013)
- The experience of the principal consultant in developing Construction Environment Management Plans for various recent pipeline projects in Australia
- The findings of Low Ecological Services relating to potential ecological impacts and their mitigation (Appendix A).

It is important to note that the proposed impact mitigation measures will be reviewed and revised as part of the project environmental impact assessment process, and their final form will be included in the CEMP, which will itself form part of the NT Link Project Pipeline Management Plan.

APA has a history of responsible project implementation and recognises the importance of achieving and safeguarding its 'social licence to operate'. As part of its response to the community concerning this licence, APA is fully committed to the identification, development and effective implementation of impact mitigation measures.

APA has an accredited ISO9000 Quality Control System and an AS4801-compliant Health and Safety Management System and is in the process of developing an ISO 14000-based Environmental Management System. All contractors engaged on the Project will be reviewed in terms of their record for previous environmental performance with advantage given to proven performers with an enhanced environmental management record. The environmental performance of the Project is expected to be based on its demonstrated compliance with all granted approvals, licences and permits, as appropriate.

6.1 Land

6.1.1 Potential Impacts

The siting of the infrastructure described in the above sections, including the approximately 630 km of underground pipeline, will require clearing of vegetation and grading (and reinstatement) of topsoils and subsoils for the pipe trench. This clearing and land disturbance generally represents a relatively narrow strip of 30 m in the context of the extensive landscapes in which they will occur.

In pipeline construction, main potential impacts on soils are likely in areas with highly erosive soils. Impacts may include:

- Soil erosion (and loss of soil resources)
- Sediment release to land and water

- Damage to native vegetation and wildlife
- Damage to agricultural production and other land uses
- Subsidence of pipeline trench
- Reduced success of rehabilitation in dry / desert environments.

Some soil types are prone to more specific impacts. Acid sulphate soils – which could possibly be encountered in the vicinity of the ephemeral braided drainage channels to the eastern half of the proposed alignment, include the following potential impacts:

- Damage to native land and to aquatic vegetation and wildlife
- Damage to agricultural production and other land uses
- Significant adverse effects on soil and water quality
- Corrosion of concrete and steel infrastructure
- Reduced working life of construction materials
- Danger to project staff (acid burns, damage to clothing and other protective equipment).
- High shrink / swell soils will also be encountered along the alignment, particularly in black soil country. This soil group has the following potential additional impacts:
- Damage to infrastructure caused by movement
- Increased cost of infrastructure necessary to protect against movement
- Alignment access difficulties when the soil is wet – a particular danger in the event of a pipeline accident or incident.

Precise estimates of vegetation and land disturbance areas will be provided in the Project's environmental impact assessment. Measures for managing contamination risks to soil will be detailed in the Project's environmental impact assessment.

6.1.2 Mitigation Measures

Land impacts will be minimised through adoption of the following processes:

- Ensuring the environmental impact assessment process considers potential land impacts and minimises disturbance of areas of sensitivity or instability as far as possible
- Keeping the Construction Corridor to the minimum width necessary for safe and responsible construction
- Ensuring construction personnel do not clear any areas additional to those required for safe operation
- Rehabilitating disturbed areas to an agreed standard and in compliance with approvals after construction
- Conducting regular maintenance inspections of the operational pipeline – and responding to any areas of land impact noted during the inspections.

It should be noted that facilities will be located in general accordance with the guidelines within APGA Code of Environmental Practice (2013) such as:

- No facilities to be located within 100m of a watercourse
- No facilities to be located in areas with high prospectively for cultural heritage significance
- All facilities to be located within previously-cleared areas as far as possible
- All facilities to be correctly stabilised so as to minimise erosion
- All facilities to be located as agreed with landowners / occupiers
- At the completion of construction, all temporary facilities to be removed / rehabilitated as agreed with landowners / occupiers and regulators.



6.2 Water

6.2.1 Potential Impacts

In the absence of appropriate management measures, potential impacts to water would include the following:

- Reduction in water quality as a result of increased sediment load
- Contamination of surface or groundwater by product or chemicals
- Altered drainage patterns and water flow regimes
- Secondary impacts on flora and fauna as a result of altered water quality or quantity
- Wasting water.

Review of these issues has allowed APA to develop water impact mitigation objectives, including the following:

- To control and minimise the volume of sediment entering waterways from erosion, from the pipeline Construction Corridor, from associated Project works or facilities or from operational activities
- To prevent contamination of surface water, watercourses and groundwater
- To manage surface water flows and to minimise potential adverse impacts associated with altered flow regimes
- To minimise indirect impacts to flora and fauna, and direct impacts to riparian, aquatic and water-dependant flora and fauna
- To minimise water use to the extent practical for the promotion of safe operations and a healthy workforce

APA will discuss access to water with all landholders and obtain any permits required to extract, divert or contain water resources, as appropriate. APA will ensure that landholder access to water will not be impacted as a result of the Project.

6.2.2 Mitigation Measures

Water impacts will be managed through adoption of mitigation measures designed to minimise:

- Physical effects on watercourses
- The risk of pollution or changes to water quality
- Water availability

Mitigation measures to achieve these objectives will be fully detailed in the Construction Environmental Management Plan (CEMP), which will be developed in accordance with guidance from the APGA Code of Environmental Practice (2013) and advice from the regulator. Examples of the measures that will be detailed in the Project's environmental impact assessment include those in Table 20.

Table 20: Example Impact Mitigation Measures for Water

Activity	Management Measures
Pipeline Easement Management	Construction water sourcing options and any related approval requirements should be considered in planning documentation, including anticipated volumes and intended sources

Activity	Management Measures
and Access	The requirement for holding dams should be determined at the Project planning phase, including their indicative locations Requirements for and potential locations of holding dams should be discussed with the relevant landowner – to facilitate their post-construction re-use, if permitted and appropriate, as farm infrastructure and dams, if required, shall be located, constructed, managed and rehabilitated in accordance with the principles outlined for construction camps and work sites
Clearing	Cleared vegetation, including vegetation cleared within a watercourse, should be stockpiled away from watercourses and should not be stored in or felled so as to land in watercourses
Grading	Grading and stockpiling of soil should not, as far as practicable, impede surface drainage or water flows Grading of watercourse beds and banks should be minimised, leaving an undisturbed organic mat within the riparian zone, or delayed until construction of the crossing is imminent
Trenching	Where trench de-watering is required, it should be conducted in accordance with an approved de-watering plan Appropriate measures should be undertaken to protect water quality which may include: Testing water prior to disposal to determine if it meets the relevant regulatory standards Containing and / or treating water onsite or removing water off-site for treatment/disposal if it does not meet criteria for disposal on-site Dewatering to stabilised ground via low dispersion methods to prevent erosion Preventing discharges entering surface water bodies unless permitted by relevant authority Use of sediment traps where required

Activity	Management Measures
	Bunding of dewatering pumps to prevent fuel spill contamination.
Borrow Pits	Borrow pits to be located away from groundwater recharge zones
Construction Camps and Worksites	Where practicable, camps and worksites should be located so as to not drain directly to major water courses, creeks or other surface water bodies
General	Erosion and sediment controls will be implemented as per an approved ESC Management Plan, to protect water quality The removal and subsequent discharge of water from the pipeline Construction Corridor should not result in erosion or pollutants (such as sediment, saline, contaminated or pH-modified water) being released to land or water outside of acceptable parameters
Fuel and Chemical Management	Fuels, lubricants and chemicals, including drilling fluids, should be stored in compliance with applicable environmental and safety laws and, where practicable, handled within containment facilities such as bunded areas or over leak-proof trays, designed to prevent the release of spilled substances to the environment
Hydrostatic Testing	Where practicable, test water should be re-used for multiple test sections In the absence of specific approval conditions relating to its discharge, hydrotest water should only be discharged or recycled for secondary uses, such as pasture irrigation or livestock watering, where its quality is within relevant statutory water quality guidelines. No hydrostatic test water will be released into a watercourse.
Pipeline Easement Management and Access	Should erosion and sedimentation occur, appropriate corrective action will be promptly undertaken Stability of the pipeline easement and, in particular, the condition of watercourse bed, banks and riparian vegetation will be inspected in accordance with an agreed inspection program
Fuel and Chemical	The refuelling or maintenance of equipment, machinery and vehicles, should be conducted as far away as is reasonably practical from any surface water body and

Activity	Management Measures
management	in compliance with applicable environmental and safety laws Hazardous wastes will not be stored or handled in areas that drain directly to any waterway or surface water

6.3 Air

6.3.1 Potential Impacts

General Air Emissions

Air emissions from the Project are expected to be minor in quantity. Emissions that may have an adverse effect on air quality include the following:

- The intentional release of natural gas during pipeline purging to allow certain maintenance activities
- The products of combustion (particularly nitrous oxides) associated with flaring at the GPF
- The accidental release of odorant or of odorised gas
- Vehicle and machinery exhaust emissions
- Emissions from generators supporting on-site works, site camps or offices
- Dust emissions from vehicle and equipment movement
- Dust blown off unvegetated lengths of the pipeline alignment.

Mitigation is expected to revolve mostly around dust control, control of vehicle and equipment emissions and control of gas venting during commissioning and pipeline operations.

Greenhouse Gas Emissions

Greenhouse Gas (GHG) emissions from the Project are expected to be minor in quantity. The Arrow Bowen Pipeline EIS (Arrow 2012) located in Queensland was released in 2012 and describes a proposal to construct a pipeline of similar length to the overall NT Link Project. In the Arrow Bowen Pipeline EIS, the proponent has quantified its GHG emissions and the following notes from this EIS are presented to illustrate that pipeline construction is a very minor emitter of GHGs:

“The construction of the Arrow Bowen Pipeline is estimated to result in approximately 53,600 t CO₂-e of greenhouse gases representing 26,800 t CO₂-e on an annual basis. The annual emissions represent a small fraction of Queensland’s (0.02%) and Australia’s (0.005%) annual greenhouse gas emissions of 155.1 Mt CO₂-e and 564.4 Mt CO₂-e respectively as reported by The Department of Climate Change and Energy Efficiency (DCCEE) for 2010.”

APA will perform a similar GHG emission quantification for the NT Link Project as part of its environmental impact assessment.

6.3.2 Mitigation Measures

Air quality management measures will aim to minimise:

- Impacts on the community and the construction workforce
- Impacts on land, water and air quality
- Impacts on flora and fauna

- Water use
- Emissions across the Project, particularly those that are reportable
- The creation of emissions-related safety hazards.

Mitigation measures design to fulfil these objectives during construction and operation include the following:

- Ensuring a dust suppression strategy is developed during the planning phase
- Monitoring emissions during construction to ensure they remain within acceptable limits
- Ensuring all plant and equipment is maintained in an efficient operating condition
- Minimising planned gas emissions during construction and operation
- Ensuring planned emissions take place during favourable meteorological conditions
- Managing vehicle speed limits so as to minimise dust creation
- Keeping traffic movement on unsealed tracks to a necessary minimum
- Minimising dust creation from stockpiles
- Attending to dust minimisation as part of any blasting activity
- Progressively reinstating disturbed areas so as to keep the un-stabilised area to a practical minimum.

A complete air quality management program will be contained in the CEMP. Although GHG emissions are expected to be minor, a GHG Management Plan will be developed as part of the environmental impact assessment.

6.4 Noise and Vibration

6.4.1 Potential Impacts

The proposed alignment is separated by some distance from nearest sensitive receptors such as homesteads. The potential to impact upon any sensitive receptors will be considered as part of the Project's environmental impact assessment.

None-the-less, construction hours will generally be restricted to the daytime with few exceptions – such as urgent response situations (safety risks), HTB of infrastructure, pipeline hydrotesting.

During commissioning of the Project, air will be discharged through valves during the purging and introduction of gas. The noise impact from air release is expected to be minimal, as this activity will be temporary and would be limited to valve sites along the proposed alignment.

No significant noise would be generated from normal operation of the Project. Valves will be located away from homesteads. However, if venting is required (e.g. emergency release) a very loud, high-pitched noise would be generated. This would generally only occur in an emergency and would be a rare event.

Construction and operation of a gas pipeline are not activities associated with vibration, with the exception of blasting. Where the use of conventional excavation or ripping equipment is not feasible, it may be necessary to use controlled blasting. The handling, storage and use of explosives are governed by prescriptive legislation and Australian Standards and will require site-specific programs to be approved by NT Worksafe.

6.4.2 Mitigation Measures

Given the remoteness of the Pipeline, vibration/ blasting impacts are considered unlikely. None-the-less, APA will minimise the potential impact from blasting, including potential vibration nuisance, by adopting the following approach:

- Acting in accordance with the guidelines within the APGA Code of Environmental Practice (2013)
- Conducting the selection, storage and handling of explosives in accordance with the Australian Dangerous Goods Code and the Australian Explosives Code
- Using only properly licensed , specialist sub-contractors
- Compliance with the dangerous goods aspects of the Queensland Work Health and Safety

6.5 Ecosystems, Flora and Fauna

6.5.1 Potential Impacts

Ecosystems

Potential impacts to ecosystems in general terms include the following (APGA 2013):

- Reduced vegetation cover leading to:
- erosion and sedimentation
- loss of agricultural productivity
- disruption of native fauna movement along migratory pathways
- loss of visual amenity
- Disturbance to existing vegetation
- Excessive vegetation regrowth
- Establishment of weed and invasive species.

Potential impacts to ecosystems will be quantified as part of the Project's environmental impact assessment.

Flora

In relation to flora species in general, potential impacts from a pipeline Project consist of the following:

- Disturbance to existing vegetation
- Excessive vegetation regrowth
- Establishment of weed and invasive species
- Interference with or permanent alteration of waterways and / or drainage patterns
- Introduction of herbivorous pests
- Erosion and sedimentation
- Interference with connectivity.

Potential impacts to flora species will be quantified as part of the Project's environmental impact assessment. For a review of impacts on MNES please refer to section 6.11.

Fauna

In relation to fauna species in general, potential impacts from a pipeline Project consist of the following (derived from APGA 2013):

- Loss of breeding sites
- Loss of habitat
- Harm and injury to wildlife.

Potential impacts to fauna species will be quantified as part of the Project's environmental impact assessment. Site based surveys will be carried out.

For a review of impacts on MNES please refer to section 6.11.

6.5.2 Mitigation Measures

The measures adopted mitigate impacts to ecosystems are those applicable also to flora, fauna, water and land. Impact management and mitigation measures relating to flora are based on the following objectives:

- To avoid Grey Falcon nesting sites by 500 m (typically communication towers), where possible
- To minimise threat to native flora, particularly listed species, assemblages or ecosystems
- To prevent the introduction or spread of pest species
- To prevent the introduction or spread of invasive weed species
- To promote and maintain stable vegetation cover
- To avoid loss of agricultural production or soil productivity
- To minimise soil erosion and sedimentation.

Environmental management and impact management measures to fulfil these objectives will be developed as part of the Project CEMP and will respond to the impact mitigation hierarchy of avoidance, reduction, remedy.

Avoidance measures will include the following:

- Revise the proposed pipeline alignment to avoid impacts to significant sites
- Apply construction procedures which avoid impacts – such as biosecurity procedures, strict limits on clearing areas, etc.
- Train the Project workforce at induction in impact awareness in order to avoid unnecessary impacts
- Compliance with relevant guidelines within listed in APGA CoEP.

Flora impact reduction measures will include the following:

- Development of a Weed Management Plan
- Flagging weed areas for avoidance, flagging listed species for relocation where feasible and practical
- Strictly limiting areas to be cleared
- Controlling areas Project traffic may traverse
- Restoring the Construction Corridor through use of native species where practical and appropriate
- Stockpiling cleared native vegetation for later re-spreading back across the alignment where practical
- Applying best practice sediment and erosion control procedures
- Compliance with relevant guidelines within listed in APGA CoEP.

Flora impact remedy measures may include the following:

- Developing and implementing an offsets strategy
- Compliance with relevant guidelines within listed in APGA CoEP.



Fauna

Impact management and mitigation objectives for fauna are:

- To minimise impacts on native fauna, particularly listed species, or their habitat
- To prevent the spread or transfer of pest or weed species.
- Procedures to fulfil these objectives will be developed as part of CEMP development and will respond to the impact mitigation hierarchy of avoidance, reduction, remedy.

Avoidance measures will include the following:

- Revise the proposed pipeline alignment to avoid impacts to significant sites
- Apply construction procedures which avoid impacts – such as traffic management procedures, strict limits on clearing areas, etc.
- Train the Project workforce at induction in impact awareness in order to avoid unnecessary impacts
- Compliance with relevant guidelines within listed in APGA CoEP.

Fauna impact reduction measures will include the following:

- Where possible, flagging key habitat trees for avoidance
- Preclearance flora and fauna surveys in advance of clearing activities
- Fauna spotter / catchers on site whenever there is an open trench
- Strictly limiting areas to be cleared
- Felled brush/trees will not be burnt and will be retained in regular stockpiles in the vicinity of the ROW (subject to landholder agreement)
- Hollow-bearing trees (if/when encountered) will be preferentially avoided to the extent practicable (i.e. subject to consideration of safety, cultural heritage, landholder and constructability constraints)
- Controlling areas Project traffic may traverse
- Restoring the Construction Corridor through use of native species where practical and appropriate
- Compliance with relevant guidelines within listed in APGA CoEP.

Fauna impact remedy measures may include the following:

- Developing and implementing an offsets strategy if required
- Compliance with relevant guidelines within listed in APGA CoEP.

6.6 Waste

6.6.1 Potential Impacts

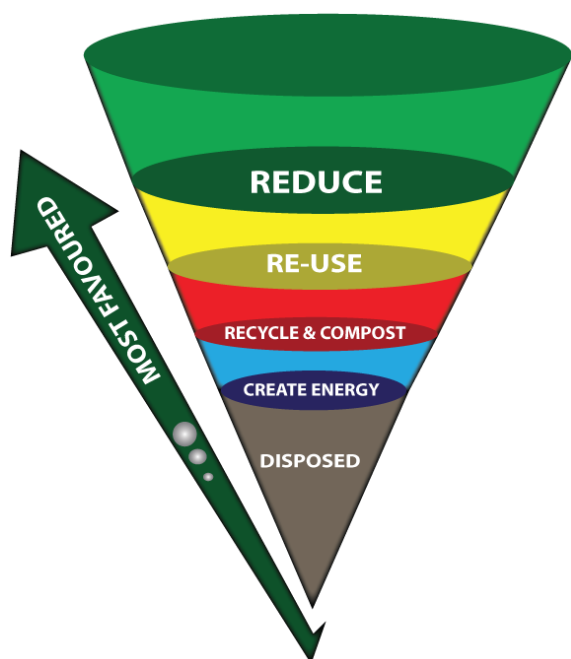
- Waste is defined in the Waste Management and Pollution Control Act to include solids, liquids or gases that are left over, surplus or otherwise an unwanted by-product of an activity considered to be any material not wanted by the Project following construction, commissioning or during operations. Accordingly, waste generated by the Project has the potential to result in: Emissions of odours and air-borne contaminants
- Emissions to surface water and groundwater affecting water quality
- Emissions to land affecting soil quality and land use
- Reduction in visual amenity
- Spread of pests and weeds

- Reduction in life of waste management facilities

6.6.2 Mitigation Measures

The Project will manage waste in accordance with the guidance provided in the APGA Code of Environmental Practice and the waste management hierarchy, as represented in Figure 15.

Figure 15: Waste Management Hierarchy



This hierarchy has led to the identification of the following waste management objectives for the Project:

- To avoid the contamination of soil and water
- To minimise potential risks to workers and the public
- To minimise adverse effects on native vegetation, livestock and wildlife
- To minimise visual impacts
- To maximise the efficiency of resource use
- To minimise health risks associated with waste management
- To minimise environmental impacts related to waste management
- To promote the principles of reduce, reuse and recycle.

Fulfilment of these objectives will be achieved through development and implementation of a Project Waste Management Plan.

6.7 Visual Amenity and Night Lighting

6.7.1 Potential Impacts

Compared to other major infrastructure, buried pipelines are not visually intrusive infrastructure. The associated above-ground infrastructure is generally minor and, in the Project area, remote from public access, viewsheds and residential properties. The exception may be any infrastructure (e.g. gas compressor and/or gas processing facility, if required) at the tie-in point with the Amadeus Gas

Pipeline. This infrastructure will not be visible from the Stuart Highway, although it will be visually similar to nearby existing facilities.

In the NT, the visual aesthetics impacts are likely to be restricted to the following:

- Temporary and relatively minor impacts associated with construction – such as localised concentration of machinery, equipment and personnel at active construction sites and temporary construction camps
- The permanent presence of above-ground facilities
- The impact of any new tracks, which include access tracks for above-ground facilities and a selection of other un-reinstated Construction Corridor access tracks which are left for land occupier's use at the request of that land occupier
- The alignment access track – a 3m-wide, permanent track required along the alignment for maintenance and incident response purposes
- Pipeline safety signage as required by law
- The general absence of trees above the installed pipeline - as required for safety purposes to remove the risk of root penetration around the pipeline - not expected to be visually significant given the generally 'open nature' of the existing vegetation.

In a manner similar to the potential impacts from noise, the impact of lighting from pipeline construction and operations is limited almost entirely to the transient impacts associated with construction.

Construction hours will generally be restricted to the daytime, at night, active construction fronts and construction camps will be illuminated as a safety measure. Lighting will be fit-for-purpose and - where operations are being conducted in the vicinity of sensitive receptors - will be screened to minimise impact as far as possible.

6.7.2 Mitigation Measures

As part of its more detailed assessment and approval processes, APA will seek to negotiate coordinated clearance processes, to be led by the relevant Land Council but carried out in accordance with AAPA methodologies. The outputs of these processes are intended to include a certification/notice of approval that preliminary survey activities may be carried out, and an AAPA certificate for the conduct of development, construction and operation activities.

6.8 Cultural Heritage (Indigenous and Non-Indigenous)

6.8.1 Potential Impacts

The main potential impacts to cultural heritage are as follows:

- Failure to consult with appropriate Aboriginal representatives over Aboriginal cultural heritage
- Failure to locate items of heritage
- Failure to correctly record items of heritage
- Damage to items of heritage
- Failure to respect the significance of heritage items.

6.8.2 Mitigation Measures

As part of its more detailed assessment and approval processes, APA will consult the Aboriginal Parties, archaeologists and others with regional heritage expertise and will develop appropriate

Cultural Heritage Management Plans to protect and manage any cultural heritage values identified within the project footprint.

6.9 Hazard and Risk / Health and Safety

6.9.1 Potential Impacts

The health and safety of the community and the Project workforce will be given high priority during all phases of the Project, from construction through to its eventual decommissioning. APA maintains a Health and Safety Management System which provides a framework for continually reducing the risk of adverse health and safety impacts arising from its activities. The Project objectives relevant to health and safety include the following:

- To protect the environmental values relating to people and property, whilst maintaining a high level of safety
- To maintain a safe working environment for the construction workforce and near neighbours
- To maintain a safe working environment during operation for maintenance teams and other land users
- To prevent or minimise any losses or damage to people and property.

6.9.2 Mitigation Measures

Measures will be put in place to restrict public access to construction activities, including installation of signs in compliance with the Manual of Uniform Traffic Control Devices and other applicable standards and implementation of traffic management plans where the Construction Corridor intersects public roads. During the operational phase, valve stations and other above-ground installations along the proposed alignment will be fenced and appropriate signs erected. Regular inspections will be made along the Construction Corridor to detect any third party activities that may interfere with the pipeline or create a public risk. Any potential health and safety impacts will be managed through appropriate health and safety policies as part of the Project Construction Health and Safety Management Plan.

To protect the construction workforce, all activities will be carried out in compliance with applicable safety standards

- risk assessments will be conducted for individual activities
- safe work procedures will be developed and implemented as required
- Health and Safety Officers will be present on the construction site to facilitate compliance with safety systems.

Safety performance will be monitored and injury statistics will be reported to both APA management and to the health and safety regulator (for example, Workplace health and Safety Queensland, Petroleum and Gas Inspectorate) as required.

6.10 Social and Economic Effects

6.10.1 Potential Impacts

Beneficial social impacts are expected to include the following:

- Employment opportunities during construction
- Regional economic boost during construction

- Wider economic benefit during operations - stemming from the increased confidence in the availability of gas to Queensland, NSW and Victorian users and potential users and benefits flowing to the NT as a result of providing access to the east coast gas market
- Increased knowledge of all types (social, environmental and cultural) through dedicated site studies associated with Project assessment and approval.

Potential adverse social impacts may include the following:

- Temporary shortage of urban accommodation
- Temporary crowding at social venues during the initial construction phase
- Minor and temporary traffic increase during peak times as the construction workforce leaves for and returns from the construction site
- Potential damage to road quality from increased traffic
- Short-term loss of amenity in the immediate construction vicinity.

Beneficial regional economic impacts include the following:

- Direct expenditure on goods and services within the region
- Employment opportunities to supply goods and services to the Project and to the construction workforce
- Ongoing development opportunities of all types based on the availability of a clean, reliable energy source.

At the state and national level, beneficial economic effects can be listed as:

- The benefits accruing from the increased confidence among the business community that gas supplies will not run short in the near term
- The opportunity for permanent jobs – associated with manufacturing Projects brought on through the availability of a dependable, cost-effective and reliable energy source
- Benefits to the NT of providing access to the east coast gas market.

Due to the remote nature of much of the Project area, the Project is not expected to have a significant impact on indigenous communities. APA will undertake extensive consultations and negotiations in regard to Aboriginal Cultural Heritage and Native Title interests and will work with Traditional owners on cultural heritage surveys and impact mitigation plans so as to minimize any potential adverse impacts to cultural heritage.

All economic impacts and benefits will be quantified as part of the studies conducted in support of the Project environmental impact assessment.

6.10.2 Mitigation Measures

APA will develop a social impact assessment as part of its Project assessment processes. This which will include:

- Assessment of the impacts (both beneficial and detrimental) arising from the Project including, where possible, cumulatively with other developments in the region
- Mitigating social impacts that are directly related to the Project
- Incorporation of the principles of adaptive management
- Consideration of the full lifecycle of the Project
- Being based on the best data available
- Identification of strategies to capitalise on social opportunities and to avoid, manage, mitigate or offset the predicted impacts arising from the Project

- Engagement with communities of interest for the life of the Project, recognising local knowledge, experience, customs and values.

Potential social impacts will be mitigated by adoption of the following:

- Installing and operating construction camps away from Tennant Creek
- Including social impact issues in workforce inductions
- Conducting regular engagement with community leaders to identify any social issues before they become major
- Conducting periodic checks of workforce compliance with requirements relating to vehicle management, drug and alcohol consumption, etc.

6.11 Matters of National Environmental Significance

The nature of the proposed gas pipeline and its location mean that the following MNES will not be affected based on the MNES Significant Impact Guidelines 1.1 (Department of the Environment 2013):

- Commonwealth marine areas (the Project is onshore)
- Great Barrier Reef Marine Park (the Project is not located adjacent to, or within any catchment draining to the Great Barrier Reef Marine Park)
- Nuclear actions (no nuclear activities will form part of or be affected by the Project)
- Water resources (the Project is not an extractive activity)

The remaining MNES were subject to an ecological assessment (refer Appendix A) to identify their presence or absence, and whether a significant impact was likely to occur on them as a result of the Project. If a significant impact is considered likely then the Project would need to be referred to the Commonwealth Department of the Environment for assessment under the EPBC Act.

The ecological impact assessment included a desktop study and a five day post-wet (autumn) season fauna and flora survey with the following objectives:

- Assess flora, including endangered, vulnerable and near threatened species listed under the EPBC Act
- Assess fauna, including endangered, vulnerable and near threatened species listed under the EPBC Act and their breeding places
- Assess pest fauna and flora (weed) species
- Assess vegetation communities and remnant Regional Ecosystems
- Ground-truth mapped areas of high ecological significance including, but not necessarily limited to, riparian areas, nationally threatened ecological communities, large tracts of remnant vegetation, corridors and special biodiversity areas.

Based on the results of this, it can be concluded that there are no nationally important designated sites located within the Project area, including:

- World heritage properties
- National heritage properties
- Wetlands of international importance (Ramsar sites)

The study confirmed that no threatened ecological communities are present along the alignment. No impacts on any nationally designated sites or threatened ecological communities are therefore predicted.

With respect to threatened species, the following endangered and vulnerable species are considered at least moderately likely to occur in the general area of the project:

- Plains death adder (*Acanthophsis hawkei*) - vulnerable
- Greater bilby (*Macrotis lagotis*) - vulnerable
- Australian painted snipe (*Rostratula australis*) – endangered
- 15 migratory bird species

Based on the results of the ecological impact assessment undertaken to date, significant impacts are unlikely on threatened species or migratory species listed under the EPBC Act. This judgement is based on the following specific assumptions:

- Associated infrastructure is located away from wetland areas (refer section 5.2.4)
- There are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the Project

These ecological management measures will be enhanced through the provision of the additional environmental management measures described in 6. Notwithstanding this, APA as proponent for the Project will monitor the Project's potential to impact on MNES. APA would need to refer the Project to the Commonwealth Department of the Environment under the EPBC Act if a significant impact is considered likely on an MNES. Any assessment and approval under the EPBC Act would therefore be carried out separately to the NT environmental impact assessment process, if required.



7 STATEMENT ON WHETHER SIGNIFICANT IMPACTS ARE LIKELY

The information presented above describes the Project's context and its potential environmental impacts. The key findings of this appraisal are:

- The project scope is limited to the construction of a buried steel pipeline with associated above ground facilities. Many of the impacts on the natural environment will be short term and limited in extent and magnitude, and related to construction activities. The final operational footprint will be relatively small.
- The average rainfall in this area relatively low with the majority of the area is classified as semi-arid and therefore not as likely to be impacted by monsoonal weather patterns as is the case further north in the NT
- The ecological studies to date have not found any matters that may cause a significant impact on any Matter of National Environmental Significance (MNES)
- The project will not involve any novel or untested processes or technologies
- APA has extensive experience in the design and construction execution of pipelines and the environmental management strategies required to successfully construct and operate a pipeline such as this

Based on this evaluation, APA concludes that the Project has the potential to impact on only a limited number of environmental elements i.e. land, water, air and ecology/ biodiversity. The remaining aspects of the environment are unlikely to be significantly impacted particularly with the inclusion of the proposed mitigation measures, as appropriate. The scope of potential impacts on land, water and ecology/ biodiversity is limited in magnitude, duration, frequency and extent such that no significant residual impacts are likely to occur as a result of the Project. As such, to ensure the timely assessment of impacts and effective regulatory approvals, a proportional level of assessment under the *Environmental Assessment Act* would be appropriate. APA seeks that the portion of the Project within the NT is assessed through a Public Environmental Report to the extent there are potentially significant impacts.

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APPENDIX A

Low Ecological Services (2015) – NT Link Project Biodiversity Impact Assessment





Assessment of Impacts to Biodiversity

Warrego to NT/QLD border only



NT Link Gas Pipeline

Prepared by Angela Carpenter, Damien Griffiths and Dr Bill Low

Revision 1 June 2015



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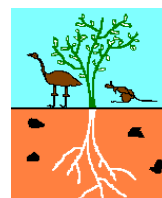


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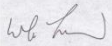
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GLOSSARY

Alignment	Location pipeline is proposed to travel through (also referred to as the pipeline route)
CEMP	Construction Environmental Management Plan
CNC	CNC Project Management
DLRM	(Northern Territory) Department of Land Resource Management
DNRETAS	(Northern Territory) Department of Natural Resources, Environment, the Arts and Sport – now DLRM – Department of Land Resource Management
DSEWPaC	(Australian Government) Department of Sustainability, Environment, Water, Population and Communities – now DoE – Department of the Environment
EIS	Environmental Impact Statement – Assessed by the NT EPA under the <i>Environmental Assessment Act</i>
EPBCA	(Commonwealth) <i>Environment Protection and Biodiversity Conservation Act</i>
Gilgai	A gilgai is a small depression in the soil surface in expanding clay soils which may hold ephemeral ponds (Wikipedia)
KP	Kilometre Point (0 at Warrego, 460 at the NT/QLD border)
LES	Low Ecological Services Pty Ltd
Mitigation	The action of reducing the severity, seriousness, or painfulness of something
MNES	Matter of National Environmental Significance as defined under the EPBCA
NOI	Notice of Intent
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
Residual Risks	A risk that remains after all efforts have been made to mitigate or eliminate risks
Significant Impact	As defined under the EPBCA guidelines. http://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance
SoBS	(Northern Territory) Site of Botanical Significance. No legislation behind it but a trigger for areas with floral significance
TPWCA	(Northern Territory) <i>Territory Parks and Wildlife Conservation Act</i>
WoNS	Weed of National Significance. Weeds of high priority for management in Australia. WoNS are now managed by States and Territories

1. EXECUTIVE SUMMARY

Low Ecological Services (LES) was subcontracted by CNC Project Management to carry out an assessment of risks to biodiversity related to the Northern Territory portion of the NT Link gas pipeline project. The Northern Territory portion of the alignment/route is approximately 460km extending from Warrego near Tennant Creek to the Northern Territory/Queensland border. Revision one of the alignment has been assessed in this report. All results in this report pertain to the Northern Territory only.

Findings have been based on a desktop assessment of previous surveys, database searches, review of reference material and a helicopter flyover of the alignment on 29 May 2015. The proponent has committed to on ground representative and targeted site ecological assessments once all access approvals have been granted. A preclearance flora and fauna survey would also be carried out a few weeks ahead of clearing. The surveys would allow:

- A more intimate understanding of the landscape and potential risks to biodiversity
- Fine scale recording of features and dominant vegetation and fine tuning of the pipeline alignment
- Targeted searches in prospective threatened species habitat- searching for Bilby *Macrotis lagotis* signs in red earths, Painted Snipe (*Rostratula benghalensis/australis*) near persisting water holes, congregations of migratory species, threatened plants in riparian areas, Grey Falcon (*Falco hypoleucos*) breeding sites, night surveys for reptiles such as the Plains Death Adder (*Acanthopis hawkei*)
- Recording of declared weeds along the alignment
- Recording of feral animals

The pipeline route follows main roads for much of the way, therefore the risk of disturbing new areas is reduced.

The route intersects three distinct land types: The hilly areas west of the Stuart Highway, the large, relatively flat but variable red earths section with open woodland in the centre and the black soil Mitchell Grass plains to the east. Intersecting these are seasonal rivers, creeks and swamps of higher biodiversity value than surrounds and three Sites of Botanical Significance of bioregional level. The Sites of Botanical Significance coincide with rivers and one site with differing underlying limestone geology.

Infestations of declared weeds, particularly prickly bushes (*Parkinsonia aculeata*, *Prosopis pallida* and *Vachellia* (formerly *Acacia*) *nilotica*), occur along the alignment, near roadsides, watercourses and areas where cattle gather in the Mitchell Grass Plains. There are relatively few weeds recorded in the Wakaya Desert.

EPBC Act threatened species

There are no Commonwealth *Environment Protection and Biodiversity Conservation Act* (EPBCA) listed plants expected or known to occur near the project. EPBCA threatened fauna with a moderate to high

potential of occurring are the Plains Death Adder (*Acanthopis hawkei*), Greater Bilby (*Macrotis lagotis*) and Painted Snipe (*Rostratula benghalensis*) based on previous records and/or suitable habitat. The project is unlikely to have a significant impact on any of these Matters of National Environmental Significance as there may not be a current population of the species in the project area or the habitat is not critical.

Other EPBCA threatened species identified by the Protected Matters Search have a low potential for occurring based on lack of records near the alignment or lack of suitable habitat.

EPBCA migratory species

Fourteen species of EPBCA listed migratory birds have been recorded within 20km of the alignment however the project is unlikely to have a significant impact on any of these Matters of National Environmental Significance as the habitat is unlikely to be critical to the species (of national or international importance) and if hydrology and hydraulics of the existing wetlands is maintained for these migratory species, the habitat will be unaffected beyond temporary construction activities.

TPWCA threatened species (not already covered under EPBCA)

The Grey Falcon (*Falco hypoleucos*) is known to occur -they have been recorded in the last two years in close proximity to the alignment and appropriate habitat is present. The project has potential to impact this species if breeding is occurring less than 500m from the alignment at the time of construction. The proponent has committed to local realignment to ensure that the pipeline and ancillary construction activities are at least 500m from an identified potential breeding location. The on ground representative and targeted site ecological assessments and preclearance flora and fauna surveys will further instruct the need for local mitigation strategies to avoid impacts.

Two threatened plants (*Austrobryonia argillicola* and *Sporobolus latzii*) which grow in riparian areas have high potential to occur. The project has the potential to impact these species, however the on ground representative and targeted site ecological assessments and preclearance flora surveys should detect presence and direct local realignment if necessary. Maintaining hydrology will ensure that seasonal supply of water is not cut off.

Matters of National Environmental Significance (MNES)

The project is unlikely to have a significant impact on any other Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act* (EPBCA).

Within 20km of the pipeline alignment there are:

- No Ramsar Wetlands of International Importance
- No Commonwealth Marine Environments
- No World Heritage Properties
- No National Heritage Places
- or Listed Threatened Ecological Communities

Mitigation measures

There is unlikely to be any significant biodiversity threats that cannot be managed if the main mitigation/prevention strategies are implemented:

- On ground representative and targeted site ecological assessments, preclearance flora and fauna surveys and local realignment where necessary
- Weed management -avoid spread of declared weeds along the alignment
- Staff awareness campaigns and fauna spotter/catchers on site whenever there is an open trench
- Avoid changing the hydrology by earthworks along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared, including all ancillary clearing for items such as access tracks, laydown areas, camps and borrow pits
- Controlling areas project traffic may traverse
- Prepare a Feral Species Management Plan

Other specific mitigation strategies will be outlined in the project NOI. They will be detailed in the project Construction Environmental Management Plan (CEMP).

In conclusion, the alignment has been well chosen within Australia and at a local level to avoid environmental impacts. The number of threatened species which may be impacted in the Northern Territory is small and there is unlikely to be any significant or unacceptable biodiversity threats that cannot be managed.

2. INTRODUCTION

2.1. BACKGROUND

Low Ecological Services (LES) has been subcontracted by CNC Project Management to carry out an assessment of risks to biodiversity of the Northern Territory portion of the NT Link gas pipeline project. The Northern Territory portion of the alignment/route is approximately 460km long extending from the APA's Warrego Compressor Station near Tennant Creek to the Northern Territory/Queensland border. Revision 1 of the alignment has been assessed in this report.

Findings have been based on a desktop assessment and a helicopter flyover of the alignment on 29 May 2015. Ground surveys including on ground representative and targeted site ecological assessments will be conducted once land access has been granted. Preclearance flora and fauna surveys will also be conducted prior to construction commencing.

2.2. PROJECT LOCATION

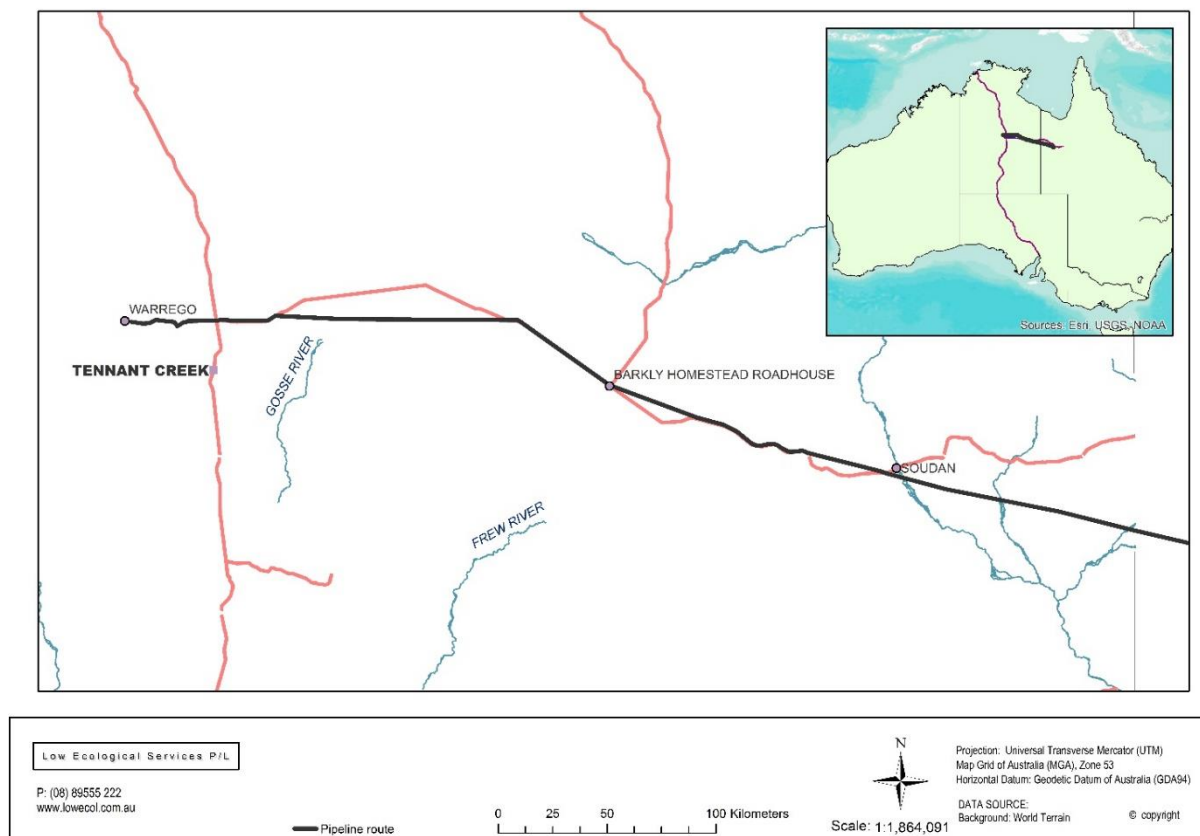


Figure 1: Project location

2.3. BRIEF PROJECT DESCRIPTION

The NT Link Project is a 12-20" diameter gas transmission pipeline connecting APA Group's pipeline assets near Warrego (near Tennant Creek, Northern Territory (NT)) and Mica Creek (near Mount Isa, Queensland). The proposed pipeline is approximately 632 km in length and its purpose is to connect the Amadeus (NT) and Carpentaria (Qld) Pipelines, enabling gas supplies within the NT to be transported to east coast customers.

The proposed alignment passes through several pastoral leasehold properties; from its western terminus in the north of the Tanami Region, NT, it extends east for approximately 280km through the Davenport Murchison Range bioregion, traversing the Barkly Tablelands (Mitchell Grass bioregion) and the northern parts of the Channel Region for another 130km before crossing into Qld at a point approximately 45km SSW of Camooweal. Once in Qld, the alignment passes through a further 60km of alluvial (Channel) country and then transits 100km of the dissected plateaus and hills of the Mt Isa Inlier before terminating south of Mount Isa.

The proposed corridor commences from a location on the Amadeus Pipeline near the APA's Warrego Compressor Station and heads east, generally along Warrego Road to Kilometre Point (KP) 21 from where it crosses Phillip Creek pastoral lease to the intersection of the Stuart Highway and the Barkly Highway ('Three Ways') at approximately Kilometre Point (KP) 40.

From Three Ways, the corridor parallels the Barkly Highway for approximately 27km within Aboriginal Freehold Land. At approximately KP67, the corridor leaves the Barkly Highway alignment heading in an easterly direction through Tennant Creek pastoral lease and running along inside the northern boundary of the Wakaya Desert between KP95 to KP169.

The corridor crosses the Barkly Highway at KP170 and continues adjacent to the northern edge of the road reserve until ~KP310 where it moves up to 5km north of the Barkly Highway alignment. In this stretch, the corridor runs through two additional pastoral leases; the corridor crosses the Barkly Highway again at ~KP350, running successively through several additional pastoral leases before crossing into Qld at ~KP460. The proposed alignment then heads in an ESE direction to the south of Camooweal traversing a further pastoral lease before its terminus with the Carpentaria pipeline approximately 6km south of Mt Isa.

The pipeline will be trenched for virtually its entire length, using conventional trenching methods; exceptions will occur at major infrastructure crossings (road and rail lines) – and possibly at one or more watercourse crossings – where trenchless construction techniques may be applied.

All construction will be generally in accordance with the guidelines provided within the Australian Gas and Pipeline Association Code of Environmental Practice (APGA 2013) and the 'AS 2885 – Pipelines – Gas and liquid petroleum' series of standards. Works will also be carried out according to the approved Construction Environmental Management Plan (CEMP). The CEMP will, in part, provide for any appropriate management measures needed to avoid and minimise potential impacts on ecological resources. This includes measures such as vegetation pre-clearance checks and supervision of any works in ecologically sensitive areas, as appropriate.

The pipeline's construction will typically be carried out within a 30m-wide Construction Corridor - using a production line approach. An indicative cross-section of an active pipeline Construction Corridor is shown in Figure 2.

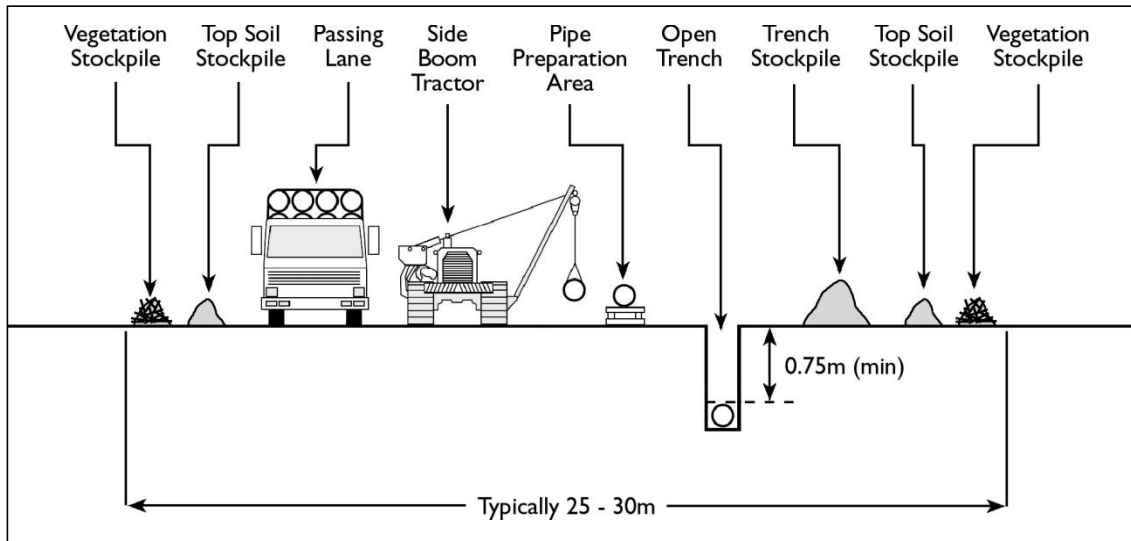


Figure 2: Typical construction cross-section (not-to-scale) Source: APIA 2013

Ancillary clearing for items such as access tracks, borrow pits and construction camps will be required. The details and placement of these will be further described in the project Notice of Intent (NOI).

3. LEGISLATIVE FRAMEWORK

Legislation which may be relevant to biodiversity include:

3.1. FEDERAL

- *Environment Protection and Biodiversity Conservation Act (EPBCA)*
- *Aboriginal Land Rights Act (ALRA)*

3.2. TERRITORY

- *Bushfires Act*
- *Crown Lands Act*
- *Energy Pipelines Act*
- *Environmental Assessment Act*
- *Pastoral Land Act*
- *Territory Parks and Wildlife Conservation Act (TPWCA)*
- *Waste Management and Pollution Control Act*
- *Weeds Management Act*
- Weeds Management Regulations

4. PREVIOUS SURVEYS

4.1. TERRITORY ECO-LINK CORRIDOR WAKAYA DESERT SURVEY

This survey was carried out by Low Ecological Services in May 2011 as part of the Territory Eco-link Project which is now defunct. The survey sites were accessed by helicopter at the end of an exceptional wet season, survey sites are shown in Figure 3.

No species currently listed as Threatened under the EPBCA or TPWCA were recorded despite high trapping success of small mammals. Ecological communities were not unique. Two TPWCA 'Near Threatened' animals were recorded:

- Australian Bustard (*Ardeotis australis*) was sighted. This large bird was listed as Vulnerable under the TPWCA at the time of the surveys but was downgraded to Near Threatened in 2012
- Long-haired Rats (*Rattus villosissimus*) were captured. They are listed as Near Threatened under TPWCA but periodically occur in plague numbers when suitable rainfall conditions occur.

No signs of Greater Bilbies (*Macrotis lagotis*) were observed.

The area was mostly 'free of weeds'. Below is an extract from the preliminary findings report:

'Based on our review of background data and end of wet season on-site investigations the 'Wakaya block' is not considered to be a site of high conservation value i.e. supporting a diverse range of habitats with threatened and/or ecologically significant flora and fauna. Species and habitats are typical of the Tanami Desert and/or Davenport and Murchison Bioregions ... However, the 'Wakaya block' is unique in that it is essentially undisturbed by human development and likely infrequent prehistoric use of the area due to normal lack of surface water and low value as pastoral land. Wildfires and foxes and cats are the main disturbance factors. The red earth Wakaya Desert along the southern fringe of the Barkly Tablelands is not represented in any conservation reserves and it's pristine condition may not present a priority case for reservation; however upgrade to its vacant crown land status may assist in maintaining the 'Wakaya block's' relatively pristine condition.' (LES 2011)

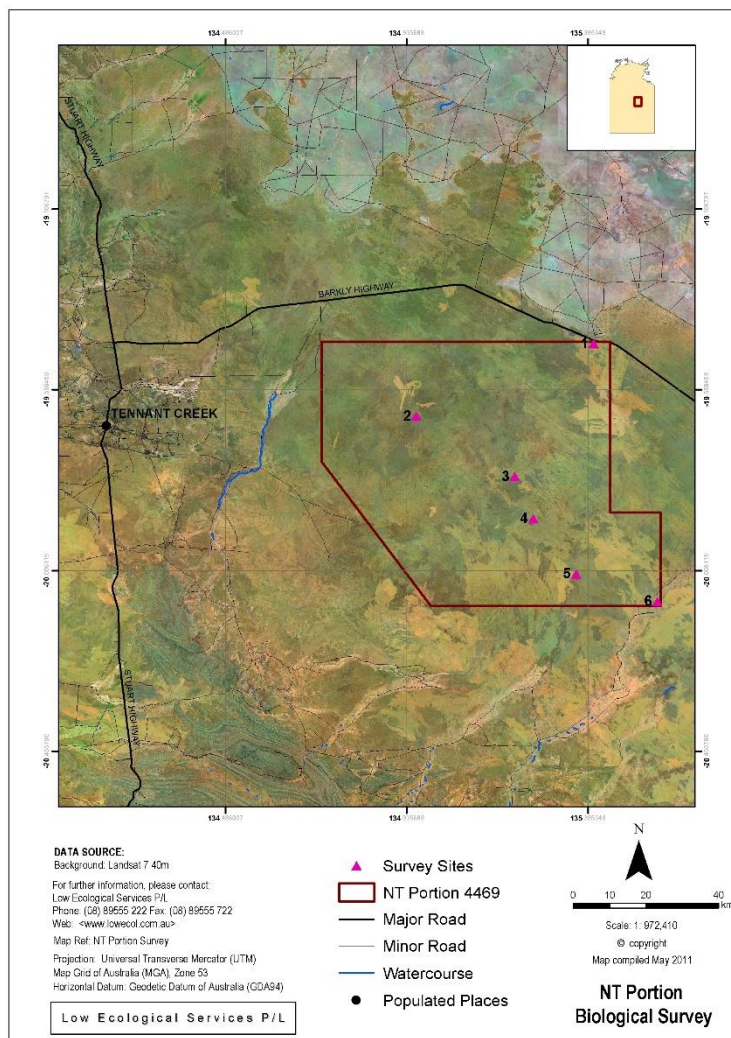


Figure 3: 2011 Eco-link Survey Wakaya Desert



Photograph 1: Eco-link Survey Site 1



Photograph 2: Eco-link Survey Site 4



Photograph 3: Eco-link Survey Site 2



Photograph 4: Eco-link Survey Site 5



Photograph 5: Eco-link Survey Site 3



Photograph 6: Eco-link Survey Site 6

4.2. MINEMAKERS WONARAH PHOSPHATE PROJECT

Permission has not been sought or given at this stage to release the Minemaker's Wonarah Flora and Fauna Reports completed by LES in 2008 and 2009, therefore only publicly available information has been included in this report.

The Wonarah Phosphate Project is located on Mineral Lease 27244 south of the Barkly Highway and within the Wonarah Beds Site of Botanical Significance (SoBS) (See Figure 4). Associated exploration leases extend from the Mineral Lease and include a bore field north of the Barkly highway. A project description is available on the company website: <http://www.minemakers.com.au/>. This project has not become operational to date.

Low Ecological Services carried out flora and fauna surveys for Minemakers Limited Wonarah Phosphate Project in June 2008 (Dry Season) and March 2009 (Wet Season). Fauna data was submitted to Parks and Wildlife as per the conditions of the Wildlife Permit and are able to be viewed on NR Maps (NTG 2014).

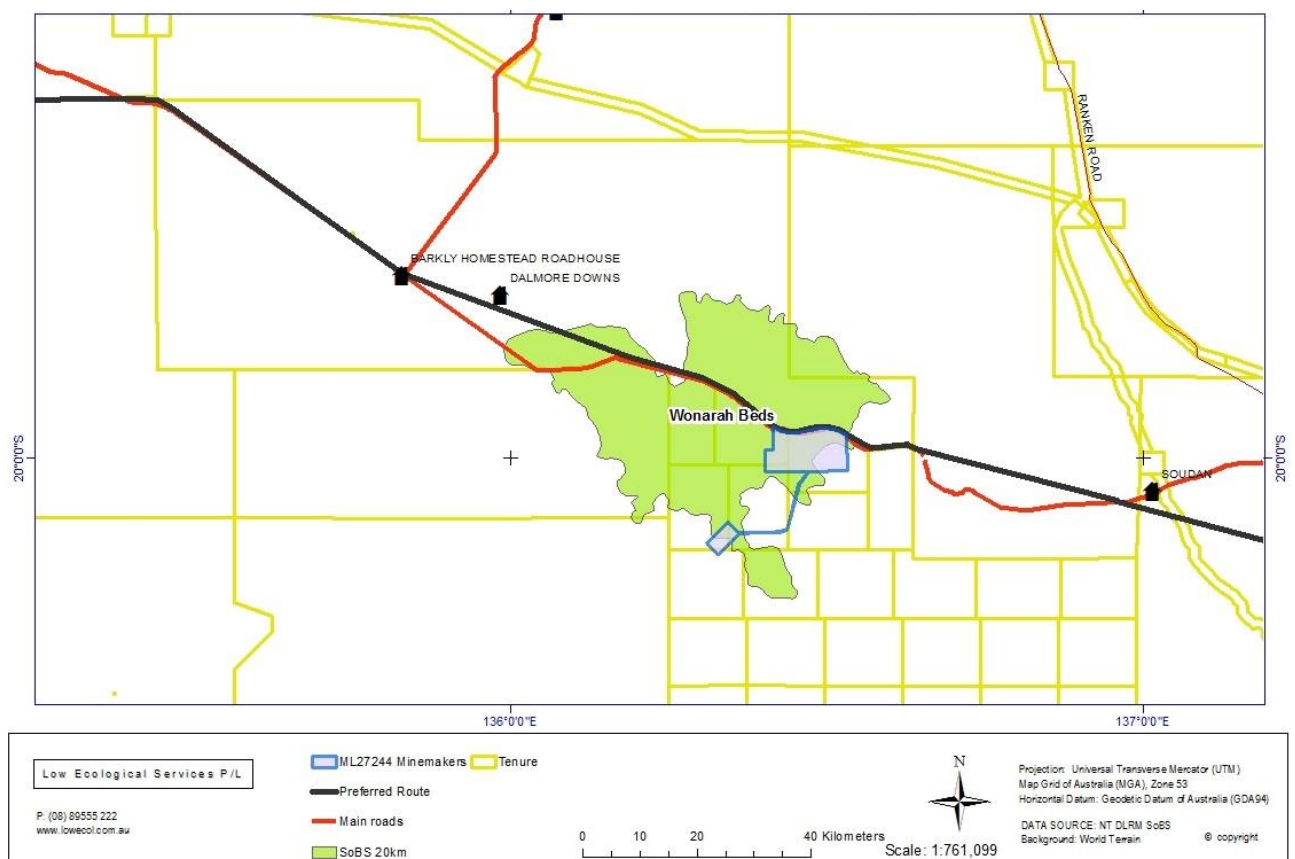


Figure 4: Minemakers Wonarah Phosphate Project location

A TPWCA Near Threatened bird was recorded during the survey:

- Australian Bustard (*Ardeotis australis*) – was listed as Vulnerable under the TPWCA at the time of the surveys but in 2012 was downgraded to Near Threatened (LES 2008,2009)

The Northern Territory Environmental Assessment of the Environmental Impact Statement (EIS) for the project was completed in April 2010 with the release of Assessment Report 64 which contained a list of recommendations. Recommendations 14 and 15 were about further surveys for threatened and Data Deficient plants (DNRETAS 2010).

4.3. TERN AUSPLOTS DATA

Plot data for vegetation and soil was collected by the Terrestrial Ecosystem Research Network (TERN) Ausplots team from two plots near Six Mile Creek on Soudan Station. The plots were near a patch of Gidgee (*Acacia georginae*). See <http://www.tern.org.au/What-is-TERN-pg22570.html> for more information on TERN. The plots were sampled in the late wet season on 13 March 2014. Plots were 100m by 100m with 10 transects in each. (See Figure 5 for location). Fifty species of plants were identified by the Herbarium from within the plots and this data is able to be downloaded from the Soils to Satellites website (TERN Ausplots 2014). There were no threatened plants or declared weeds recorded.

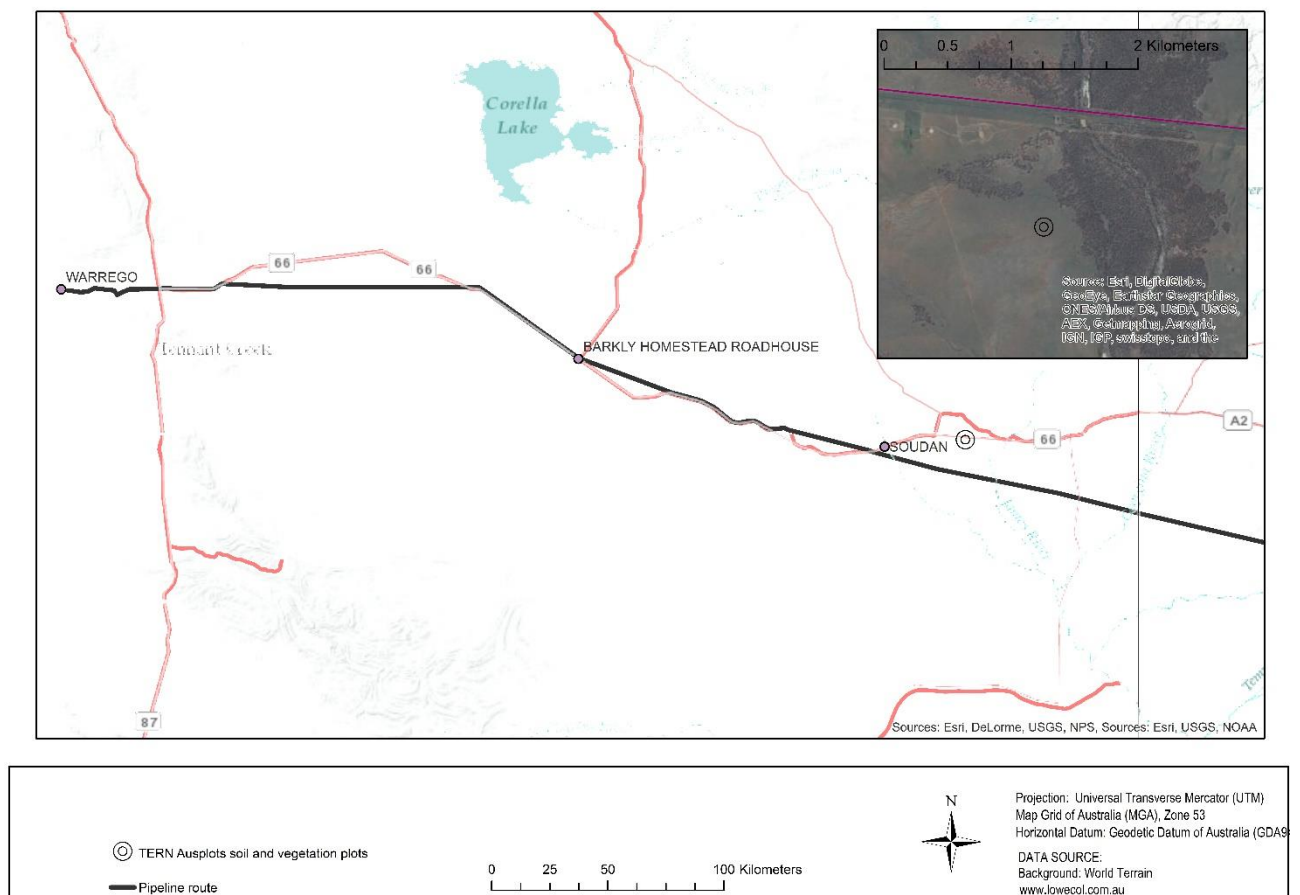


Figure 5: TERN Ausplots soil and vegetation plot location

5. SURVEY METHODOLOGY

The desktop survey has been based on mapping and interpretation of the following mapping layers and tools:

- TERN Ausplots point intercept data (TERN Ausplots 2014).
- Australia's Bioregions (DSEWPaC 2012)
- Land system mapping (Christian *et al.* 1954)
- Vegetation mapping (Wilson *et al.* 1990)
- NT Flora Atlas records (Northern Territory Department of Land Resource Management (DLRM 2015)
- DLRM Weed records (DLRM 2015)
- NT Fauna Atlas records (DLRM 2015)
- Atlas of Living Australia records (ALA 2015)
- EPBCA Protected Matters Search (DoE 2015)
- Sites of Botanical Significance (White *et al.* 2000)

Sources referenced in the report were also drawn upon including previous survey reports by Low Ecological Services as discussed in section 4. Government experts were also consulted, as referenced.

Low Ecological Services flew along the alignment in a helicopter from Mt Isa to Warrego on 29 May 2015. The only landing was to fuel up at Soudan airstrip.

6. RESULTS

6.1. BIOREGIONS AND LAND SYSTEMS

Bioregion divisions assist in reserve system planning within Australia with a minimum target of 10% of the total area of each bioregion to be 'protected' within reserves (DSEWPac 2012).

- The majority of the alignment falls within the Davenport and Murchison Ranges Bioregion. The bioregion covers a total area of 58,051 square kilometres and has less than 5% protected within reserves in Australia.
- Minor sections intersect the Tanami Bioregion which covers an area of 259,972 square kilometres and has over 30% protected within reserves.
- The eastern portion of the alignments intersect the Mitchell Grass Downs Bioregion which covers an area of 33,4687 square kilometres and has less than 5% protected within reserves.

Land system mapping gives a good broad scale indication of the types of habitat that will be present. Habitat suitability for plants and animals is based on land system elements such as underlying geology, soil type and topography as well as other factors including plant species and climate.

Land System descriptions presented in Table 1 have been adapted from the 'Land Research Series No. 3. Survey of the Barkly Region, Northern Territory and Queensland', (1954). The survey was carried out following World War II and remains the most comprehensive survey over much of the rangelands of Australia. Map 1 and Map 2 show land systems in relation to the pipeline route.

LES found that the land system mapping was a more useful indicator of what was on the ground (during the flyover) than the broad vegetation mapping discussed in the next section.

The Yelvertoft rises were easily visible in the flyover. Erodible soils of the Tennant Creek land system were identifiable, the Prentice Land System was an area of variable vegetation and soil. The 'black soil' plains contained some red laterite and gilgai in places. Some of the land systems in the 'black soil' plains could not be differentiated from the air e.g. the Kallala from the Wonardo. This is not unexpected as Land Systems comprise Land Units which occur in different proportions to define the broader scale Land Systems.

Fine scale recording of land system elements (land units) along the alignment will be possible from the on ground representative and targeted site ecological assessments which will be conducted once access approvals have been granted and the preclearance flora and fauna surveys prior to construction.

Table 1: Land systems intersected by the proposed alignment

KP*	LAND SYSTEM
0-31	TENNANT CREEK Flat topped hills and broad valleys; skeletal and alluvial soils
31-44	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation.
44-46	TENNANT CREEK Flat topped hills and broad valleys; skeletal and alluvial soils
46-69	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation.
69-71	YELVERTOFT Widely separated areas with gravelly and stony lateritic soils. Small hill
71-90	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation (possible drainage area from KP70-75)
90-94	GOSSE Scattered areas of sandy, seasonally flooded flats
94-121	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation
121-123	YELVERTOFT Widely separated areas with gravelly and stony lateritic soils. Small hill
123-164	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation
164-165	Frewena drainage#
165-245	PRENTICE Gently undulating, with low limestone rises; calcified Lateritic soils. Occurs between Wonarah and Frewina on the Barkly Highway
245-344	WONORAH Gently undulating with deep lateritic soil and low, scrubby vegetation
344-350	BARKLY 2 Very gently undulating to nearly flat Mitchell Grass plains.
350-353	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
353-359	GEORGINA Gently undulating "black soil" plains cut by braided streamlines
359-371	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
371-377	BARKLY 2 Very gently undulating to nearly flat Mitchell Grass plains.
377-425	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
425-428	GEORGINA Gently undulating "black soil" plains cut by braided streamlines
428-440	WONARDO Irregular areas of gently undulating to nearly flat Mitchell Grass plains confined to the Georgina valley in the S.E. portion of the region
440-443	GEORGINA Gently undulating "black soil" plains cut by braided streamlines
443-454	KALLALA Very gently undulating "black soil" plains. Heavy brown Pedocals
454-460	GEORGINA Gently undulating "black soil" plains cut by braided streamlines

*Boundaries are approximate and are related to Rev 1 of the alignment. Source: Adapted from Christian et al (1947).

Added in by LES

6.2. VEGETATION COMMUNITIES

The information below has come from National Vegetation Information System (NVIS) 2007 mapping layers based on the associated report by Wilson *et al* (1990). The descriptions have been adapted to layman terms to show a dominant species which would be noticeable to a non-biologist.

Vegetation mapping indicates that communities west of Tennant Creek (Map Units 69 and 34) are relatively restricted however they are composed of common dominant species. The remaining vegetation communities cover large areas within Australia.

Vegetation communities intersected are native and have not been cleared or 'improved'. This includes the Mitchell Grass (*Astrebla sp.*) Plains which are a naturally occurring feature.

Boundaries were viewed in a helicopter flyover on 29 May 2015. The Gidgee (*Acacia georginae*) low open woodland which appeared in the NVIS mapping, Map Unit 62 between KP410-425, was absent, likely due to mis-mapping during desktop assessment for the original vegetation mapping.

Map Unit 42 (Bloodwood (*Corymbia*) low open woodland over red earth) covered a large part of the alignment and contained much variation with large areas of dominant Acacias rather than Bloodwood. Map Unit 41 and 42 could not be differentiated from the flyover. Map 3 and Map 4 show the broad vegetation layers with the addition of the Melaleuca drainage near Frewena which is an important area due to periodic inundation.

Table 2: Vegetation communities intersected by the proposed alignment

KP*	VEGETATION COMMUNITIES	TOTAL AREA OF COMMUNITY#
0-5	Mulga tall sparse shrubland (Map Unit 69)	2,759 km ²
5-12	Bloodwood low open woodland over gravelly sands (Map Unit 34)	4,602 km ²
12-15	Mulga tall sparse shrubland (Map Unit 69)	2,759 km ²
15-35	Snappy Gum low open woodland (Map Unit 36)	25,058 km ²
35-90	Bloodwood low open woodland over red earth (Map Unit 42)	28,095 km ²
90-94	Coolibah drainage – Gosse River (Map Unit 27)	12,668 km ²
94-164	Bloodwood low open woodland over red earth (Map Unit 42)	28,095 km ²
164-165	Drainage - melaleucas	
165-215	Bloodwood low open woodland over red earth (Map Unit 42)	28,095 km ²
215-250	Bloodwood, Coolibah and Ghost Gum low open woodland (Map Unit 41)	3,274 km ²
250-344	Bloodwood low open woodland over red earth (Map Unit 42)	28,095 km ²
344-410	Mitchell Grass low tussock grassland (Mapping Unit 96)	
410-425	<i>Gidgee low open woodland (Map Unit 62)*</i>	Did not exist here
410-460	Mitchell Grass low tussock grassland (Mapping Unit 96)	60,868 km ²

As per Wilson *et al* (1990). Boundaries are approximate and are related to Rev 1 of the alignment

The NT Flora Atlas shows 3,616 flora records of plants within 20km of the alignment. The records are concentrated around the populated areas and the highways. Within these records is a list of 647 separate species of plants. The most numerous genus is the *Acacia* with 35 species recorded within 20km of the alignment (DLRM 2015).

6.3. WEEDS

Weeds are a major focus for current environmental management in the Barkly region. Weed records from DLRM (2015) shown in Map 6 give an indication of the occurrence and pathways by which weeds spread in proximity to the pipeline route.

Substantial weed infestations occur near Tennant Creek and in the black soil country towards Queensland.

NT Declared categories of weeds:

- **Class A** To be eradicated
- **Class B** Growth and spread to be controlled
- **Class C** Not to be introduced to the Territory

Weeds of National Significance (WoNS) are a list of thirty two weeds with a high priority for control in Australia. Coordination across jurisdictions and a strategic approach is required for control however States and Territories are responsible for legislation, regulation, and administration of the WoNS goals (DoE 2014).

Other species appearing in weed records such as Buffel Grass (*Cenchrus ciliaris*), are environmental weeds but are not declared as Class A, B, or C under the NT *Weeds Management Act*. They are introduced species either with other uses such as grazing value or are of low environmental risk and there are no legal obligations regarding these species. Below is a table of declared weeds likely to occur.

Table 3: NT Declared weeds which may occur

SCIENTIFIC NAME	COMMON NAME	NT DECLARED STATUS	WoNS
<i>Azadirachta indica</i> ³	Neem	B,C	
<i>Calotropis procera</i> ^{1,2}	Rubber Bush/Calotrope	B, C	
<i>Jatropha gossypifolia</i> ^{1,2}	Bellyache bush	A in project area, C	
<i>Parkinsonia aculeata</i> ^{1,2}	Parkinsonia	B,C	Y
<i>Parthenium hysterophorus</i> ²	Parthenium Weed	A,C	Y
<i>Prosopis pallida</i> ^{1,2}	Mesquite	A,C	Y
<i>Tamarix aphylla</i> ^{1,2}	Athel Pine	A in project area, C	Y
<i>Tribulus terrestris</i> ¹	Caltrop	B,C	
<i>Vachellia nilotica</i> / (<i>Acacia nilotica</i>) ^{1,2}	Prickly Acacia	A,C	Y
<i>Xanthium strumarium</i> ^{1,2} / (<i>Xanthium occidentale</i>)	Noogoora burr	B,C	

1 NT DLRM weed recorded within 20km of pipeline route

2 EPBCA Protected Matters Search identifies as potentially occurring

3 NT FLORA ATLAS recorded within 20km of pipeline route

Basic weed mitigation strategies are listed in section 7.1.

6.4. FAUNA

The NT Fauna Atlas reveals 6,028 records of fauna within 20km of the alignment. Significant fauna which may occur in the project area are discussed in sections 6.5 and 6.6.

Introduced fauna which may be found in the project area include:

Birds:

Domestic Pigeon (*Columba livia domestica*) – confined to built-up areas

House Sparrow (*Passer domesticus*) – confined to built-up areas

Frogs:

Cane Toad (*Bufo marinus* / *Rhinella marina*)

In 2005 the Cane Toad was listed as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) for ‘*The biological effects, including lethal toxic ingestion, caused by Cane Toads (Bufo marinus)*’ (DESWPaC 2011). Of the threatened fauna listed in this report, the Cane Toad is thought to be a key threat to the Plains Death Adder (*Acanthopis hawkei*) as discussed in section 7.3.2.

The Cane Toad has not yet become established in the Northern Territory portion of the NT Link alignment but the area falls within their predicted future extent and the major water courses provide adequate habitat. The Mt Isa region is already heavily infested with Cane Toads.

Mammals:

Cattle (*Bos taurus*)

Camels (*Camelus dromedarius*)

Domestic Dogs (*Canis lupus familiaris*)

Horses (*Equus caballus*)

Cats (*Felis catus*)

House mouse (*Mus musculus*)

Pigs (*Sus scrofa*)

Red Foxes (*Vulpes vulpes*)

Donkeys (*Equus asinus*)

European Rabbit (*Oryctolagus cuniculus*)

Reptiles:

Asian House geckos (*Hemidactylus frenatus*)

Dingoes (*Canis lupus dingo*) are considered native wildlife in the Northern Territory and are protected under the TPWCA. This in contrast to QLD where dingoes are a declared pest outside of National Parks.

6.5. MATTERS OF NATIONAL CONSERVATION SIGNIFICANCE

This section contains a list of threatened and migratory species that may occur along the alignment based on records or EPBCA Protected Matters Search results. The list is not based on habitat suitability or current population status. Section 7 contains a more detailed look at whether each species is likely to occur based on current population status and habitat suitability and whether the project is likely to have a significant impact on each species.

Other 'significant' species such as Data Deficient and Near Threatened have been touched upon in this section as they may highlight locations where there is higher biodiversity.

Records of threatened fauna along the alignment are in close proximity to the main roads which may reflect reduced survey effort in other areas or species preference for disturbance. See Maps 7-11 for records of significant species in relation to the alignment.

Also summarised is any habitat areas of international, national, Territory, bioregional or local conservation significance.

The impact assessment for each of these categories is carried out in Section 7.

6.5.1. EPBCA Threatened species

- There are no records of plants listed as threatened under the EPBCA within 20km of the alignment.
- The EPBCA Protected Matters Search did not identify the likely presence of any threatened plants in the project area
- Seven threatened fauna species may occur based on previous recordings or EPBCA protected matters search results.
- Only two of these species have been recorded within 20km of the alignment and the records are very old, as shown in Map 9.

Table 4: EPBCA Threatened fauna which may occur

SCIENTIFIC NAME	COMMON NAME	STATUS	RECORDS WITHIN 20KM *
<i>Acanthophis hawkei</i> ¹	Plains Death Adder	VU	1
<i>Liopholis kintorei</i> *	Great Desert Skink	VU	0
<i>Macrotis lagotis</i> ¹	Greater Bilby	VU	7 ²
<i>Notoryctes typhlops</i> *	Southern Marsupial Mole	EN	0
<i>Petrogale lateralis</i> *MacDonnell Ranges Race	Black-footed Rock Wallaby	VU	0
<i>Pseudantechinus mimulus</i> *	Carpentarian Antechinus	VU	0
<i>Rostratula australis</i> *	Australian Painted Snipe (a bird)	EN	0

*EPBCA Search identified as potential only

1 NT Fauna Atlas records

2 Five of the bilby records appear to be duplicates of the same record taken in 1969 so there may only be three records near the alignment rather than seven.

6.5.2. EPBCA Migratory Species

One hundred and nineteen records of EPBCA Migratory birds composed of fourteen separate species have been recorded within 20km of the alignment (DLRM 2015). All are listed as Least Concern under the TPWCA apart from the Wood Sandpiper (*Tringa Glareola*) which has not been evaluated. Map 11.

Of the fourteen species, nine are migratory birds which use the East Asian – Australasian Flyway and do not breed in Australia. The East Asian – Australasian Flyway species are listed in the table below. Most of them are 'shorebirds', apart from the Fork-tailed Swift (*Apus pacificus*) and the White-winged Black Tern (*Chlidonias leucopterus*).

Table 5: EPBCA East Asian – Australasian Flyway migratory birds which may occur

SCIENTIFIC NAME	COMMON NAME	RECORDS WITHIN 20KM*
<i>Actitis hypoleucos</i>	Common Sandpiper	5
<i>Apus pacificus</i>	Fork-tailed Swift	4
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	2
<i>Charadrius veredus</i>	Oriental Plover	3
<i>Chlidonias leucopterus</i>	White-winged Black Tern	2
<i>Glareola maldivarum</i>	Oriental Pratincole	1
<i>Numenius minutus</i>	Little Curlew	2
<i>Tringa Glareola</i>	Wood Sandpiper	1
<i>Tringa nebularia</i>	Common Greenshank	5

The six remaining migratory bird species which may occur, breed within Australia.

Table 6: EPBCA other migratory birds which may occur

SCIENTIFIC NAME	COMMON NAME	RECORDS WITHIN 20KM*
<i>Ardea ibis</i>	Cattle Egret	1
<i>Ardea modesta</i>	Eastern Great Egret	34
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	1
<i>Merops ornatus</i>	Rainbow Bee-eater	42
<i>Plegadis falcinellus</i>	Glossy Ibis	16
<i>Rostratula benghalensis (sensu lato)</i>	Painted Snipe	0

6.5.3. Other Matters of National Environmental Significance

Within 20km of the pipeline alignment there are:

- No Ramsar Wetlands of International Importance
- No Commonwealth Marine Environments
- No World Heritage Properties
- No National Heritage Places
- or Listed Threatened Ecological Communities.

6.6. TERRITORY CONSERVATION SIGNIFICANCE

6.6.1. TPWCA Threatened Species

Two species of plants listed as Vulnerable under the TPWCA have been recorded within 20km of the alignment as shown below and in Map 7 (DLRM 2015).

Table 7: TPWCA Threatened flora which may occur

SPECIES	STATUS	RECORDS WITHIN 20KM
<i>Austrobryonia argillicola</i> I.Telford	Vulnerable	2
<i>Sporobolus latzii</i> B.K.Simon	Vulnerable	1

Two of the TPWCA threatened fauna species which may occur are also listed as EPBCA threatened. One species which may occur, the Grey Falcon (*Falco hypoleucos*) was listed as threatened under the TPWCA as of late 2012 but is not listed under the EPBCA.

Table 8: TPWCA Threatened fauna which may occur

SCIENTIFIC NAME	COMMON NAME	STATUS	RECORDS WITHIN 20KM*
<i>Acanthophis hawkei</i>	Plains Death Adder	VU	1
<i>Falco hypoleucos</i>	Grey Falcon	VU	5
<i>Macrotis lagotis</i>	Greater Bilby	VU	7 ²

Source: NT Fauna Atlas records

2 Five of the bilby records may be duplicates.

6.6.2.TPWCA Data Deficient or Near Threatened Species

Concentrations of Data Deficient and Near Threatened species can indicate areas of higher biodiversity. Upon further investigation, Data Deficient species end up going to either Near Threatened or Least Concern (Ian Smith DLRM email communication 2015). Stakeholders may value non-threatened species as much as threatened species.

Within 20km of the alignment are twenty nine Data Deficient plant species and twelve Near Threatened plant species recorded. The majority are grasses and forbs of wetter areas. See Map 8.

Within 20km of the alignment thirteen species of TPWCA Near Threatened fauna and three species of Data Deficient fauna have been recorded.

6.7. BIOREGIONAL OR LOCAL CONSERVATION SIGNIFICANCE

The project area does not fall within any Northern Territory 'Site of Conservation Significance', any 'nationally important wetlands' or National Parks or Reserves.

The following is a list of Sites that may be of elevated conservation significance within their particular bioregion or at a local level:

6.7.1. Wakaya Desert

The Wakaya Desert is a pristine area as discussed in Section 4.1 (See Figure 3)

6.7.2. Wonorah Beds Site of Botanical Significance

The Wonorah Beds Site of Botanical Significance is intersected by the alignment as shown in Figure 4 and Map 5. The distinctive undulating surface is unique to this area of the 'Wakaya Desert' (White *et al* 2000). It is of bioregional significance.



Photograph 7: Wonorah Beds SoBS near KP270 of alignment. Facing north. Photograph by D. Griffiths 29 May 2015

6.7.3. James River Waterholes Site of Botanical Significance

The James River Waterholes Site of Botanical Significance is intersected by the pipeline alignment as shown in Map 5. It is of bioregional significance (White *et al* 2000).

In May 2015 the James River was observed to contain waterholes which provide refuge during the dry season. Birds such as Pelicans (*Pelecanus conspicillatus*), Egrets (*Ardea sp.*), ducks and Whistling Kites (*Haliastur sphenurus*) were observed from the air. The river is lined with Coolibahs (*Eucalyptus sp.*) which probably contain tree hollows which animals such as birds and bats utilise.



Photograph 8: James River SoBS intersection with alignment near KP400, 29 May 2015. Photograph A. Carpenter



Photograph 9: James River waterhole upstream from alignment. North of KP400. Photograph B. Low 29 May 2015

6.7.4. Georgina River Site of Botanical Significance

The Georgina River Site of Botanical Significance is intersected by the alignment as shown in Map 5. It is of bioregional significance (White *et al* 2000).



Photograph 10: Georgina River SoBS intersection with alignment near KP456, 29 May 2015. Photograph A. Carpenter

6.7.5. Other Riparian and Wetland Communities

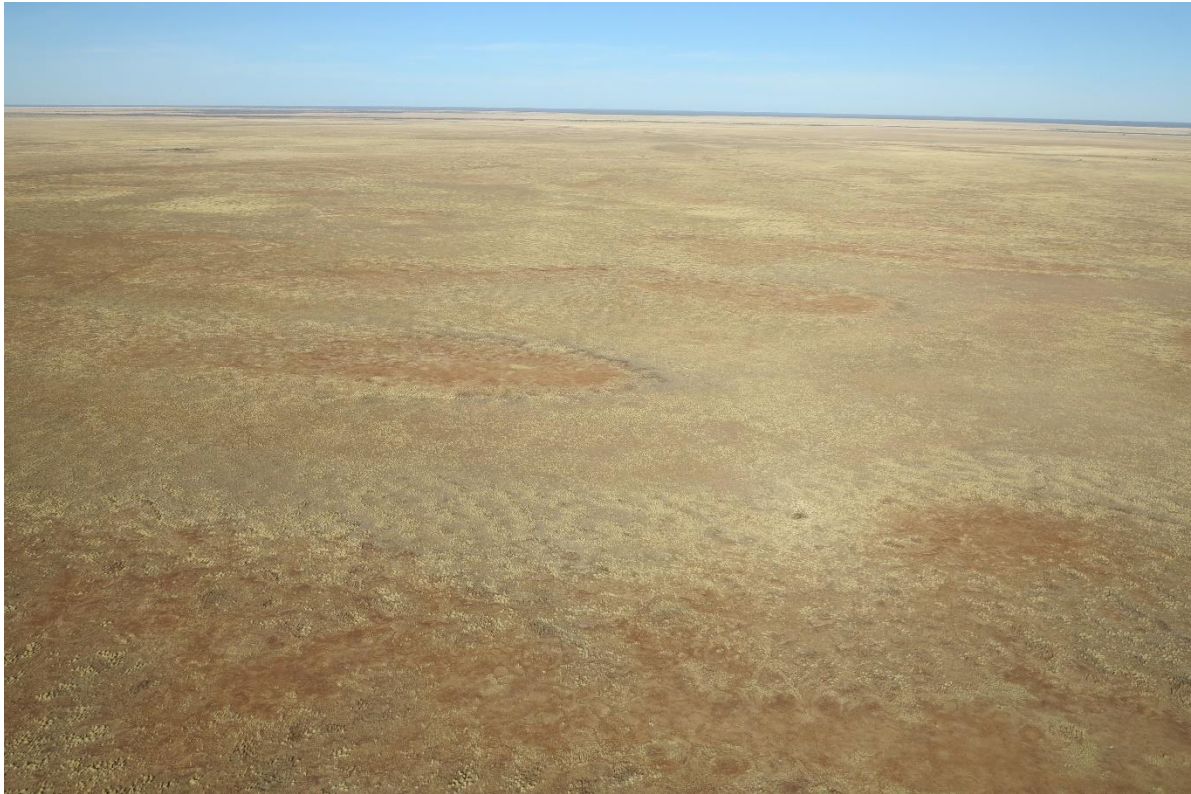
All riparian and wetland communities (including Coolibah (*Eucalyptus sp.*) swamps) are considered ecologically significant according to the DNRETAS Land Clearing Guidelines (2010) at a local or bioregional level. This includes river and creek crossings do not appear in maps and have not been discussed, such as the Ranken River near Soudan, swampy areas such as near the Frewena Rest stop and the Gosse River floodout.



Photograph 11: Swamp near KP160 (Frewena) intersection with alignment. Photograph A.Carpenter 29 May 2015

6.7.6. Black Soil Mitchell Grass Plains

'Black soil' Mitchell Grass (*Astrebla sp*) plains (Vegetation type 96 on Map 4) are of high cattle grazing value and provide habitat for animals in the cracks of the clay.



Photograph 12: Mitchell Grass Plains. Photograph taken between KP370-380 on 29 May 2015 by A.Carpenter

The Short Range Waterholes Site of Botanical Significance is 16km north of the alignment and is unlikely to be impacted due to its distance from the alignment and lack of connectivity.

7. IMPACT ASSESSMENT

The impact assessments have been made in the absence of ground surveys and on the basis that the key mitigation strategies, outlined below, will be met. The proponent has committed to the key mitigation strategies below.

7.1. IMPACT MITIGATIONS

Planning phase	On ground representative and targeted site ecological assessments, and preclearance flora and fauna surveys by ecologists and subsequent local realignment if necessary so as to: • Avoid listed species locations or highly prospective habitat • Avoid infestations of declared weeds where practicable
	Areas to be avoided logged and flagged
	Prevention of the spread of weeds • Detailed weed management plan in place prior to construction commencing. Developed in consultation with landholders, NT and QLD Weeds Branch and any other relevant stakeholders and implemented • Strategic installation/ location of wash-down bays, operational throughout construction • All machinery washed-down with certificate before coming to the site • Staff awareness campaigns • Inspections for emerging weeds by trained and familiar staff Response strategy for any detections. Eradication equipment on hand to dedicated personnel.
	Feral species management plan prepared and implemented
Construction	Avoid changing the hydrology (by earthworks) in the project area beyond temporary alteration during the dry season. Maintain natural contours and flow in occasionally or seasonally inundated areas such as swamps, rivers and creeks and avoid creating new water ways.

	The project area includes the pipeline alignment and all ancillary items including but not limited to access tracks, borrow pits, camps, laydown areas
	Strictly limiting areas to be cleared, including all ancillary clearing associated with the project
	Controlling areas project traffic may traverse
	Accredited fauna spotter/catchers on-site during clearing operations and whenever there are open trenches during construction
Post Construction/operation	Timely rehabilitation of cleared areas
	Inspection for issues post construction and remediation carried out where required

7.2. IMPACT ASSESSMENT RATINGS

The following impact assessment ratings have been based on the criteria (below) which Queensland ecological counterparts have used. The ratings are conservative.

- **Known to occur** – the species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it.
- **High potential to occur** – the species has been recorded in the region (desktop searches) and suitable habitat is present at the study area.
- **Moderate potential to occur** – the species has been recorded in the region (desktop searches) however suitable habitat is generally lacking from the study area or species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.
- **Low potential to occur** – the species has not been recorded in the region (no records from desktop searches) and/or current known distribution does not encompass study area and/or suitable habitat is generally lacking from the study area.

7.3. NATIONAL CONSERVATION SIGNIFICANCE

7.3.1. EPBCA Threatened Species Known to Occur

There are no EPBCA threatened species with recent records (less than 5-10 years) within 20km of the alignment. See Table 4 and Map 9.

7.3.2. EPBCA Threatened Species with High Potential to Occur

There are two EPBCA threatened species which have been recorded within 20km of the alignment (although some decades ago) **and** there is suitable habitat near the alignment for these species.

PLAINS DEATH ADDER

The Plains Death Adder (*Acanthopis hawkei*) is an ambush predator. There is some confusion as to whether it is the same species as the Northern Death Adder (*Acanthopis praelongus*) (Cogger 2014) or the Common Death Adder (*Acanthopis antarcticus*). *Acanthopis hawkei* lives in cracks of the black soil plains, using the tip of its tail as a lure for prey (Cogger 2014).

The EPBCA classification has been based on expected decline/death caused by consuming introduced Cane Toads (*Rhinella marina*) as Cane Toads expand into the *Acanthopis hawkei* area of distribution, particularly in the Top End of Australia (DoE 2011). Cane Toads are discussed in section 6.4.



Photo by G. Brown. (from Ward and Phillips 2012)

Population status: (Is there a population near the alignment, and if so, is it an important population?). There is a single record of this species within 20km of the alignment taken in 1978. It may be that *Acanthopis hawkei* records are low due to their low detectability (P. McDonald pers. Comm. 2015). Surveys for *Acanthopis hawkei* could be incorporated into the on ground representative and targeted site ecological assessments as nocturnal driving surveys.

It is unlikely that a population along the alignment would constitute an 'important population' under the EPBCA guidelines (P. McDonald pers. Comm. 2015).

Habitat suitability: Suitable habitat present. Not critical. The black soil plains *Acanthopis hawkei* inhabits is present and covers a large area in the Northern Territory. Records of *Acanthopis hawkei* have been widely placed.

It is unlikely that the project will have a significant impact on this species.

Key mitigation strategies which have been committed to by the proponent which may further reduce the likelihood of significant impact include:

- Feral species management plan
- Strictly limiting areas to be cleared
- Controlling project traffic
- Fauna spotter/catchers on-site whenever there is an open trench
- Timely rehabilitation of cleared areas

Table 9: *Acanthopis hawkei* (Plains Death Adder) significant impact guidelines (EPBCA) assessment for vulnerable species

Criteria	Significant impact on Plains Death Adder (<i>Acanthopis hawkei</i>)
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	Unlikely, provided appropriate mitigation measures implemented
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

GREATER BILBY

Population status: Unknown. May not be a current population along the alignment. The Greater Bilby (*Macrotis lagotis*) strong hold is in the western deserts such as the Tanami Desert where they are still fairly widespread (Pavey 2006). There have been no recent records of *Macrotis lagotis* near the alignment although there are records south of Tennant Creek from 2004. Previous surveys conducted by LES in the Wakaya Desert and Wonarah area in 2008, 2009 and 2011 did not reveal any signs of *Macrotis lagotis*. The on ground representative and targeted site ecological assessments would allow detection of tracks and burrows in the red sand areas.

Habitat: Suitable but not critical. *Macrotis lagotis* are very mobile and have been known to favour some disturbance for burrowing. The alignment passes through the Red Earths (Wonarah Land System/ Blood wood low open woodland) which, based on previous records, is suitable habitat. (It is unlikely that *Macrotis lagotis* would be found in the black soil plains to the east).

It is unlikely that the project will have a significant impact on this species.

Key mitigation strategies which have been committed to by the proponent which may further reduce the likelihood of significant impact include:

- Pre clearance surveys by ecologists for signs of Bilbies and subsequent realignment to avoid any active burrows
- Areas to be avoided logged and flagged
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Fauna spotter/catchers on site during clearing operations and whenever there are open trenches during construction

Table 10: *Macrotis lagotis* (Greater Bilby) significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on Bilby (<i>Macrotis lagotis</i>)
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

7.3.3. EPBCA Threatened Species with Moderate Potential to Occur

PAINTED SNIPE

The Painted Snipe (*Rostratula benghalensis/australis*) is listed as both an endangered species and a migratory species under the EPBCA.

The Painted Snipe has been reported more commonly in eastern parts of Australia, particularly the Murray –Darling Basin where it was once recorded more commonly. It is thought to breed in response to favourable conditions rather than at certain times of the year. Its movement patterns are not well understood but it may disperse to areas based on seasonal conditions. It is a distinctive but secretive bird which is mainly active at dawn, dusk and at night rather than during the day (DoE 2015).

Population: Unknown.

There are no reliable records of the Painted Snipe (*Rostratula benghalensis/australis*) in the vicinity of the proposed alignment. The Atlas of Living Australia shows one record near the alignment with no information attached. The nearest record with details is from 1906 approximately 85km north of the alignment at Lake Sylvester. In the Northern Territory *Rostratula benghalensis/australis* has most recently been recorded at Jervois Dam and the Alice Springs sewage ponds where bird experts have been present.

Habitat: Suitable areas. There is likely to be suitable habitat for *Rostratula benghalensis/australis* at any riparian spots – rivers, creeks, swamps and dams but it is unlikely that the habitat is critical due to *Rostratula benghalensis/australis* wide and sparse distribution in Australia.

It is unlikely that the project will have a significant impact on this species.

Key mitigation strategies which have been committed to by the proponent which may further reduce the likelihood of a significant impact include:

- On ground targeted searches for Painted Snipe, pre clearance surveys by ecologists and subsequent realignment if necessary to avoid breeding areas
- Areas to be avoided logged and flagged
- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse

Table 11: *Rostratula benghalensis* (*Sensu lato*) (Painted Snipe) significant impact guidelines assessment for endangered species

Criteria	Significant impact on Painted Snipe (<i>Rostratula benghalensis -Sensu lato</i>)
Lead to the long term decrease in the size of a population of the species	No
Reduce the area of occupancy of the species	No
Fragment an existing important population into two or more populations	No

Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of a population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species that are harmful to an endangered species becoming established in the endangered species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere with the recovery of the species	No

7.3.4. EPBCA Threatened Species with Low Potential to Occur

GREAT DESERT SKINK

Population status: No known population. Species has not been recorded east of the Stuart Highway. The nearest records in the NT Fauna Atlas are several hundred kilometres west of the alignment. The most recent records were gathered in 2012 during Regional Biodiversity Monitoring in the Tanami Desert by LES with Traditional Owners. There may not be a population in the alignment area.

Habitat: May not be suitable. The Great Desert Skink (*Liopholis kintorei*) has been recorded in a patch of the Wonarah Land System in the Tanami Desert west of the Stuart Hwy. A large patch of the Wonarah Land System is intersected by the alignment, however the habitat is known to differ: The Tanami site is dominated by spinifex low open grassland, whereas the alignment is dominated by Bloodwood low open woodland. The habitat may be unsuitable for this species.

It is unlikely that the project will have a significant impact on this species.

Key mitigation strategies which have been committed to by the proponent which may further reduce the likelihood of significant impact include:

- Pre-clearance surveys by ecologists and subsequent realignment to avoid any active burrows
- Areas to be avoided logged and flagged
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Fauna spotter/catchers on-site whenever there is an open trench

Table 12: *Liopholis kintorei* (Great Desert Skink) significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on Great Desert Skink (<i>Liopholis kintorei</i>)
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

SOUTHERN MARSUPIAL MOLE

Population status: No known population. Southern Marsupial Moles (*Notoryctes typhlops*) have not been recorded east of the Stuart Highway north of Alice Springs. *Notoryctes typhlops* signs have been recorded 100km west of the Warrego end of the alignment and specimens collected at Barrow Creek in 1901.

Habitat: Habitat may be unsuitable. Records of *Notoryctes typhlops* are in different land systems to those along the alignment. The records have been made in the Singleton Land system which is desert sand plains. The soil along the alignment may not be sandy enough to be suitable habitat for *Notoryctes typhlops* however they are not well known.

It is unlikely that the project will have a significant impact on this species.

Relevant mitigation strategies committed to include:

- Pre-clearance surveys by ecologists and subsequent realignment to avoid any active burrows
- Areas to be avoided logged and flagged
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Fauna spotter/catchers on-site whenever there is an open trench

Table 13: *Notoryctes typhlops* (Southern Marsupial Mole) significant impact guidelines assessment for endangered species

Criteria	Significant impact on the Southern Marsupial Mole (<i>Notoryctes typhlops</i>)
Lead to the long term decrease in the size of a population of the species	No
Reduce the area of occupancy of the species	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of a population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species that are harmful to an endangered species becoming established in the endangered species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere with the recovery of the species	No

BLACK-FOOTED ROCK WALLABY

Population status: No known population. There are no records in the NT Fauna Atlas of the Black-footed Rock Wallaby (*Petrogale lateralis*) as far north as the alignment. The closest and most recent reliable records exist 120km south at the Devil's Marbles (Karlukarlu) as recent as 2012. This species is easily detectable if present and can cope with some disturbance nearby as demonstrated by the populations thriving on the edges of Alice Springs and other highly visited areas.

Habitat: Possibly no suitable habitat. *Petrogale lateralis* live amongst rocky boulders and generally near native fruiting plants such as Native Figs and Wild Plums with a permanent water source nearby. The alignment passes near but avoids rocky hills near the Warrego end of the alignment. The small hills in this area have very few or no Native Figs or other fruiting plants and are subject to regular fires. The hills near the alignment may be unsuitable habitat. There was one small hill observed during the flyover that appeared to have a native fig and this could easily be checked for *Petrogale lateralis*. There are Northern Nail Tail Wallabies (*Onychogalea lunata*) in this area. The remainder of the alignment has no rocky boulders and is unsuitable habitat.

It is unlikely that the project will have a significant impact on this species.

Relevant mitigation strategies committed to include:

- Pre-clearance surveys by ecologists and subsequent realignment if necessary
- Areas to be avoided logged and flagged
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse

Table 14: *Petrogale lateralis* MacDonnell Ranges Race (Black-footed Rock Wallaby) significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on Black-footed Rock Wallaby (<i>Petrogale lateralis</i>)
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	No

Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

CARPENTARIAN ANTECHINUS

Population status: No known population. The closest record of the Carpentarian Antechinus (*Antechinus mimulus*) to the project was in the vicinity of the Ranken Road, recorded in 1969. The location is accurate to within 50km according to the NT Fauna Atlas records. All of the other records have been much further north in the Gulf region including on some of the islands.

Habitat: Unsuitable. It typically occurs in rocky areas with high cover of rocks, boulders and crevices. The record from the Barkly tablelands is thought to be anomalous.

It is unlikely that the project will have a significant impact on this species.

Relevant mitigation strategies committed to include:

- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Fauna spotter/catchers on-site whenever there is an open trench

Controlling areas project traffic may traverse

Table 15: *Pseudantechinus mimulus* (Carpentarian Antechinus) significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on Carpentarian Antechinus (<i>Pseudantechinus mimulus</i>)
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

7.3.5. EPBCA Migratory Species Known to Occur or with a Moderate Potential to Occur

The following species have been recorded within 20km of the alignment apart from the Painted Snipe (*Rostratula benghalensis/australis*). The list of species falls into two categories: birds that migrate yearly to Australia to feed and which do not breed in Australia and those that move around and breed within Australia and/or countries nearby depending on seasonal conditions.

EAST ASIAN – AUSTRALASIAN FLYWAY MIGRATORY BIRDS

As discussed in section 6.5.2, nine of the migratory bird species that have been recorded within 20km of the alignment do not breed in Australia and are generally only present in Australia between mid-October to March/April every year. They spend six months feeding in Australia before moving back to the northern hemisphere to breed. The movements of these birds and important breeding and staging areas are reasonably well known. Important sites are generally related to internationally or nationally important wetlands.

The Fork-tailed Swift (*Apus pacificus*) and White-winged Black Tern (*Chlidonias leucopterus*) have been included in this section as although they are not shorebirds, they do migrate every year. The Fork-tailed Swift (*Apus pacificus*) does not land in Australia, instead feeding and sleeping on the wing. This further reduces the chance that it will be affected by the project.

According to the Draft Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia August 2014), internationally important habitat for migratory shorebirds regularly supports:

- 1% of the individuals in a population of one species or sub species of waterbird or
- A total abundance of at least 20,000 birds.

Sites exist that have already been identified as internationally important are Ramsar listed.

Nationally important habitat is present if it regularly supports:

- At least 0.1% of the flyaway population of a single species or
- At least 2000 migratory shorebirds or
- At least 15 shorebird species.

There are no existing listed internationally or nationally important wetlands for shorebirds in the vicinity of the project. The national criteria is unlikely to be met as there is a maximum of five records for any of the nine species that have been recorded along the alignment. To trigger the criteria above, between twenty-five Common Sandpipers up to 2000 Oriental Pratincoles would need to be 'regularly supported' by a 'site' as per the definitions in Bamford *et al* (2008).

Nationally important wetlands for certain species in the Barkly region include Lake Woods and Lake Sylvester.

Key mitigation strategies which have been committed to which will further reduce the likelihood of a significant impact include:

- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Timely rehabilitation

Table 16: *Actitis hypoleucos* (Common Sandpiper) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Common Sandpiper (<i>Actitis hypoleucos</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 17: *Apus pacificus* (Fork-tailed Swift) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Fork-tailed Swift (<i>Apus pacificus</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 18: *Calidris acuminata* (Sharp-tailed Sandpiper) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 19 *Charadrius veredus* (Oriental Plover) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Oriental Plover (<i>Charadrius veredus</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 20: *Chlidonias leucopterus* (White-winged Black Tern) significant impact guidelines assessment for migratory species

Criteria	Significant impact on White-winged Black Tern (<i>Chlidonias leucopterus</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 21: *Glareola maldivarum* (Oriental Pratincole) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Oriental Pratincole (<i>Glareola maldivarum</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 22: *Numenius minutus* (Little Curlew) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Little Curlew (<i>Numenius minutus</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 23: *Tringa glareola* (Wood Sandpiper) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Wood Sandpiper (<i>Tringa glareola</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

Table 24: *Tringa nebularia* (Common Greenshank) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Common Greenshank (<i>Tringa nebularia</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

MIGRATORY BIRDS WHICH BREED IN AUSTRALIA

CATTLE EGRET

As per Table 6, there is one record of *Ardea ibis* within 20km of the alignment.

Key mitigation strategies which have been committed to which will further reduce the likelihood of significant impact include:

- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Timely rehabilitation

Table 25: *Ardea ibis* (Cattle Egret) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Cattle Egret (<i>Ardea ibis</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

EASTERN GREAT EGRET

As per Table 6, there are thirty four records of *Ardea modesta* within 20km of the alignment. The records are scattered near water bodies along the whole alignment. Whilst there are relatively more records of Eastern Great Egrets (*Ardea modesta*) than other migratory wading birds along the alignment, the most important areas for breeding for this species is the Top End and the Channel Country in Queensland (DoE 2015). The estimated total population for this species is between 25,000 and 100,000 (DoE 2015), therefore 0.1% would be 25-100 individuals.

Key mitigation strategies which have been committed to which will further reduce the likelihood of significant impact include:

- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Timely rehabilitation

Table 26: *Ardea modesta* (Eastern Great Egret) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Eastern Great Egret (<i>Ardea modesta</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

WHITE-BELLIED SEA EAGLE

As per Table 6 there is a single record of the White-bellied Sea Eagle (*Haliaeetus leucogaster*) flying over Mary Ann Dam in June 2013 (ALA 2015). *Haliaeetus leucogaster* hunt and breed near large bodies of water and are more common in coastal areas. There is a very low chance that *Haliaeetus leucogaster* will occur along the alignment however if it was found breeding (nesting), it may constitute an important population and the breeding area would need to be avoided.

There may be suitable habitat near water under some seasonal conditions.

Impact mitigation measures:

- On ground representative and targeted site ecological assessments, **and** preclearance flora and fauna surveys by ecologists and subsequent local realignment if necessary so as to avoid listed species locations or highly prospective habitat
- Areas to be avoided logged and flagged
- Avoid changing the hydrology (by earthworks) in the project area beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared, including all ancillary clearing associated with the project
- Controlling areas project traffic may traverse
- Timely rehabilitation of cleared areas

Table 27: *Haliaeetus leucogaster* (White-bellied Sea Eagle) significant impact guidelines assessment for migratory species

Criteria	Significant impact on White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

RAINBOW BEE-EATER

As per Table 6, there are forty two records of *Merops ornatus* within 20km of the alignment. The Rainbow Bee-Eater (*Merops ornatus*) is common and widespread in Australia. Its movements are not well understood but it seems to move north in the winter months. Records of *Merops ornatus* are distributed over the alignment. Rainbow Bee-Eaters dig burrows in the earth to breed in and as such, any earthworks such as stockpiles and trench walls will be utilised if left long-enough.

Impact mitigation measures:

- Accredited fauna spotter/catchers on-site during clearing operations and whenever there are open trenches during construction
- Timely rehabilitation of cleared areas

Table 28: *Merops ornatus* (Rainbow Bee-eater) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Rainbow Bee-eater (<i>Merops ornatus</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

GLOSSY IBIS

There are sixteen records of *Plegadis falcinellus* within 20km of the alignment. The main breeding area for the Glossy Ibis (*Plegadis falcinellus*) is known to be the Channel Country in Queensland (DoE 2015).

Relevant mitigation strategies include:

- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse
- Timely rehabilitation

Table 29: *Plegadis falcinellus* (Glossy Ibis) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Glossy Ibis (<i>Plegadis falcinellus</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

PAINTED SNIPE

The Painted Snipe (*Rostratula australis*) has been evaluated in section 7.3.3.

Table 30: *Rostratula benghalensis (sensu lato)* (Painted Snipe) significant impact guidelines assessment for migratory species

Criteria	Significant impact on Painted Snipe (<i>Rostratula benghalensis (sensu lato)</i>)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No

7.3.6. Other Matters of National Environmental Significance

As stated in section 6.5.3, there are no other Matters of National Environmental Significance (MNES) as per the *EPBCA* that are affected by the project.

7.4. TERRITORY CONSERVATION SIGNIFICANCE

7.4.1. TPWCA Threatened Species Known to Occur

GREY FALCON

The Grey Falcon (*Falco hypoleucos*) is not listed as threatened under the EPBCA but is listed as threatened under the Northern Territory *Territory Parks and Wildlife Conservation Act* (TPWCA).

Falco hypoleucos were upgraded from Near Threatened to Vulnerable under the TPWCA in late 2012. The classification is based on the number of adults being less than 1000 (Ward 2012).

Population status: *Falco hypoleucos* has a very wide but sparse distribution in Australia. They are often misidentified (Schoenjahn 2015). The Atlas of Living Australia (2015) shows sightings in 2013 of *Falco hypoleucos* near the Frewena Rest stop (KP 160). These records are the closest to the Revision 1 of the alignment. One record from a communications tower is within 180m of the alignment. It is expected that construction activity within 180m of a nest site would impact on breeding of *Falco hypoleucos*. A distance of 500m would be far enough to avoid disturbance (Pavey pers.comm 2015, Schoenjahn pers.comm 2015). Breeding occurs between July and November with July/August the most sensitive time. Fledglings may stay with the parents in the area until May the following year and breeding may occur in the same location if conditions are suitable (Schoenjahn pers.comm 2015). The chance of *Falco hypoleucos* breeding in the particular Telstra Tower at the time of construction is quite low, however the proponent has committed to realigning the pipeline in this area so that it is at least 500m from the communications tower.

Habitat: There is suitable habitat along the alignment. *Falco hypoleucos* has been recorded roosting and breeding in Telstra Towers along the Stuart Highway and Barkly Highway in the Northern Territory and Queensland (see Map 10). They will also breed in taller trees along drainage lines. They appear to move around from year to year.

The project is unlikely to have a significant impact on this species provided appropriate mitigation measures are implemented.

Key mitigation strategies which have been committed include:

- Pipeline realignment at KP160 to at least 500m from communications tower
- On ground representative and targeted searches and pre clearance surveys by ecologists and subsequent realignment to avoid any identified breeding areas (nests)
- Areas to be avoided logged and flagged
- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse

Table 31: *Falco hypoleucos* (Grey Falcon) significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on Grey Falcon (<i>Falco hypoleucos</i>)
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	No
Disrupt the breeding cycle of an important population	Unlikely, provided appropriate mitigation measures implemented
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

7.4.2. TPWCA Threatened Species with High Potential to Occur

As discussed in section 6.5.1 and 7.3.2, Plains Death Adder (*Acanthopis hawkei*) and Greater Bilby (*Macrotis lagotis*) are both EPBCA and TPWCA listed and are considered to have a high potential for occurring but impacts are unlikely to be significant.

AUSTROBRYONIA ARGILICOLA

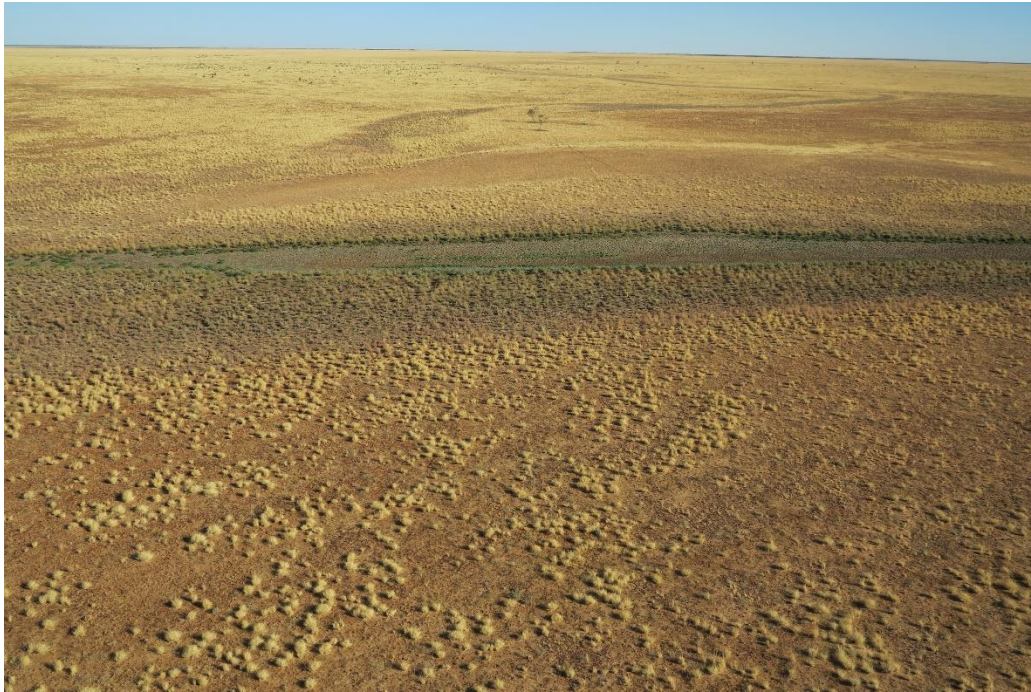
A prostrate herb with heart shaped leaves and smooth pale green fruit with dark stripes. Flowers in March, May, July and October. Occurs along creeks and in poorly drained areas. It is classed as Vulnerable in the NT due to:

- the number of mature individuals < 1000,
- area of occupancy estimated to be <20km²
- threats from human activities (Nano *et al* 2012).

This species was delisted from the EPBCA in December 2013 due to its larger than expected extent and lack of known threats.



Photo by M. Armstrong



Photograph 13: Drainage line near KP 370, 4km upstream from *A.argillicola* record. Photograph A.Carpenter

Population status: Unknown. The on ground representative and targeted site ecological assessments would ascertain presence or absence of this species at crossing points and would allow alignment revision to avoid impacts.

Habitat: The alignment intersects suitable habitat.

Mitigation measures will ensure that there are no significant impacts on this plant and other riparian plants.

- On ground representative and targeted searches and pre clearance surveys by ecologists and subsequent realignment to avoid any populations
- Areas to be avoided logged and flagged
- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Prevention of the spread of weeds
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse

Table 32: *Austrobryonia argillicola* significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on <i>Austrobryonia argillicola</i>
Lead to the long term decrease in the size of an important population of the species	Unlikely, provided appropriate mitigation measures implemented
Reduce the area of occupancy of an important population	Unlikely, provided appropriate mitigation measures implemented
Fragment an existing important population into two or more populations	Unlikely, provided appropriate mitigation measures implemented
Adversely affect critical habitat to the survival of the species	Unlikely, provided appropriate mitigation measures implemented
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	No
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

SPOROBOLUS LATZII

Sporobolus latzii is a perennial grass.



Photo by D. Albrecht

Population status: May not occur along the alignment. Its occurrence is known from a single location on the edge of a Coolibah-fringed (*Eucalyptus sp.*) seasonal swamp in the phosphate rich area within the 'Wonarah Beds' Site of Botanical Significance. It is several kilometres from a Minemakers mineral lease as discussed in Section 3e and shown in Map 8. It has been recorded flowering in May. It was searched for in approximately 40 other swamps nearby but was not found (Albrecht *et al* 2012). The on ground representative and targeted site ecological assessments would ascertain presence or absence of this species at crossing points and would allow identification of local alignment revision options to avoid impacts.

Habitat: Potentially present.

It is unlikely that the project will have a significant impact on this species as the alignment follows the Barkly Highway closely through the 'Wonarah Beds' Site of Botanical Significance.

- On ground representative and targeted searches and pre clearance surveys by ecologists and subsequent realignment to avoid any populations
- Areas to be avoided logged and flagged
- Avoid changing the hydrology along the alignment beyond temporary alteration during the dry season.
- Prevention of the spread of weeds
- Strictly limiting areas to be cleared
- Controlling areas project traffic may traverse

Table 33: *Sporobolus latzii* significant impact guidelines assessment for vulnerable species

Criteria	Significant impact on <i>Sporobolus latzii</i>
Lead to the long term decrease in the size of an important population of the species	No
Reduce the area of occupancy of an important population	No
Fragment an existing important population into two or more populations	No
Adversely affect critical habitat to the survival of the species	Unlikely, provided appropriate mitigation measures implemented
Disrupt the breeding cycle of an important population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species becoming established in the vulnerable species habitat	Unlikely, provided appropriate mitigation measures implemented
Introduce the disease that may cause the species to decline	No
Interfere substantially with the recovery of the species	No

7.4.3.TPWCA Data Deficient or Near Threatened species

The impacts of the project to Data Deficient or Near Threatened flora and fauna is expected to be minimal provided key mitigation strategies are followed:

- Prevention of the spread of weeds
- Avoid changing the hydrology (by earthworks) in the project area beyond temporary alteration during the dry season. Maintain natural contours and flow in occasionally or seasonally inundated areas such as swamps, rivers and creeks and avoid creating new water ways
- Strictly limiting areas to be cleared, including all ancillary clearing associated with the project Controlling areas project traffic may traverse
- Timely rehabilitation of cleared areas

7.5. BIOREGIONAL OR LOCAL CONSERVATION SIGNIFICANCE

The NT link alignment has been well placed to avoid or minimise impacts on areas of bioregional significance. The alignment follows the Barkly Highway closely through the Wonarah Beds Site of Botanical Significance, therefore, the impacts to the Wonarah Beds SoBS from this project is expected to be reduced provided key mitigation strategies are followed.

The key mitigation strategies presented in section 7.1, particularly those committed to maintaining hydrology and weed control, will ensure that significant impact is unlikely.

8. OFFSET ASSESSMENT

Offsets for biodiversity impacts are gradually becoming incorporated into development decisions in Australia to manage residual risk and keep in line with public expectation. In the Northern Territory the *Environmental Assessment Act* has no provision for offsets. As stated in the Northern Territory Environment Protection Authority (NT EPA) Offset guidelines: 'the NT EPA has no role in requiring, developing or managing environmental offsets or similar requirements in conditions of approval' (NT EPA 2013).

The EPBCA provides for offsets where there is a residual risk to a Matter of National Environmental Significance (MNES). Based on this assessment, it is not expected that the Northern Territory portion of the NT Link project will have a residual risk to a MNES.

9. CONCLUSIONS

A low impact route has been selected for the NT link pipeline. The area in which it passes from Warrego to Mt Isa is not known to be an area with particularly high numbers of threatened species or rare vegetation communities. In addition, the route follows existing roads for much of the way, therefore the risk of disturbing new areas is greatly reduced.

The proponent has committed to on ground representative and targeted site ecological assessments once all access approvals have been granted. A preclearance flora and fauna survey would also be carried out a few weeks ahead of clearing. The surveys would allow:

- A more intimate understanding of the landscape and potential risks to biodiversity
- Fine scale recording of features and dominant vegetation
- Targeted searches in prospective threatened species habitat- searching for Bilby *Macrotis lagotis* signs in red earths, Painted Snipe (*Rostratula benghalensis/australis*) near persisting water holes, congregations of migratory species, threatened plants in riparian areas, Grey Falcon (*Falco hypoleucos*) breeding sites, night surveys for reptiles such as the Plains Death Adder (*Acanthopis hawkei*).
- Recording of declared weeds along the alignment
- Recording of feral animals

The Significant impact threat assessments in this report are based on the assumption that mitigation strategies listed in Section 7.1, such as the on ground representative and targeted site ecological assessments, maintaining hydrology, weed management, and so forth will be implemented fully. The number of threatened species that may be impacted in the Northern Territory is relatively small and there is unlikely to be any significant or unacceptable biodiversity threats that cannot be managed.

The project is assessed as being unlikely to have a significant impact on any Matters of National Environmental Significance (MNES) under the EPBCA.

Within 20km of the pipeline alignment there are:

- No Ramsar wetlands of international importance
- No Commonwealth marine environments
- No World Heritage Properties
- No National Heritage Places
- or Listed Threatened Ecological Communities

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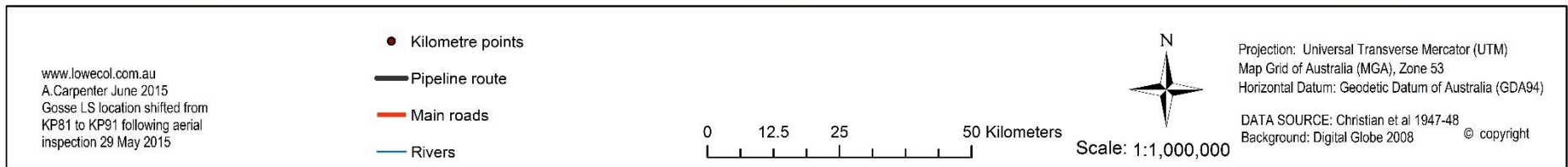
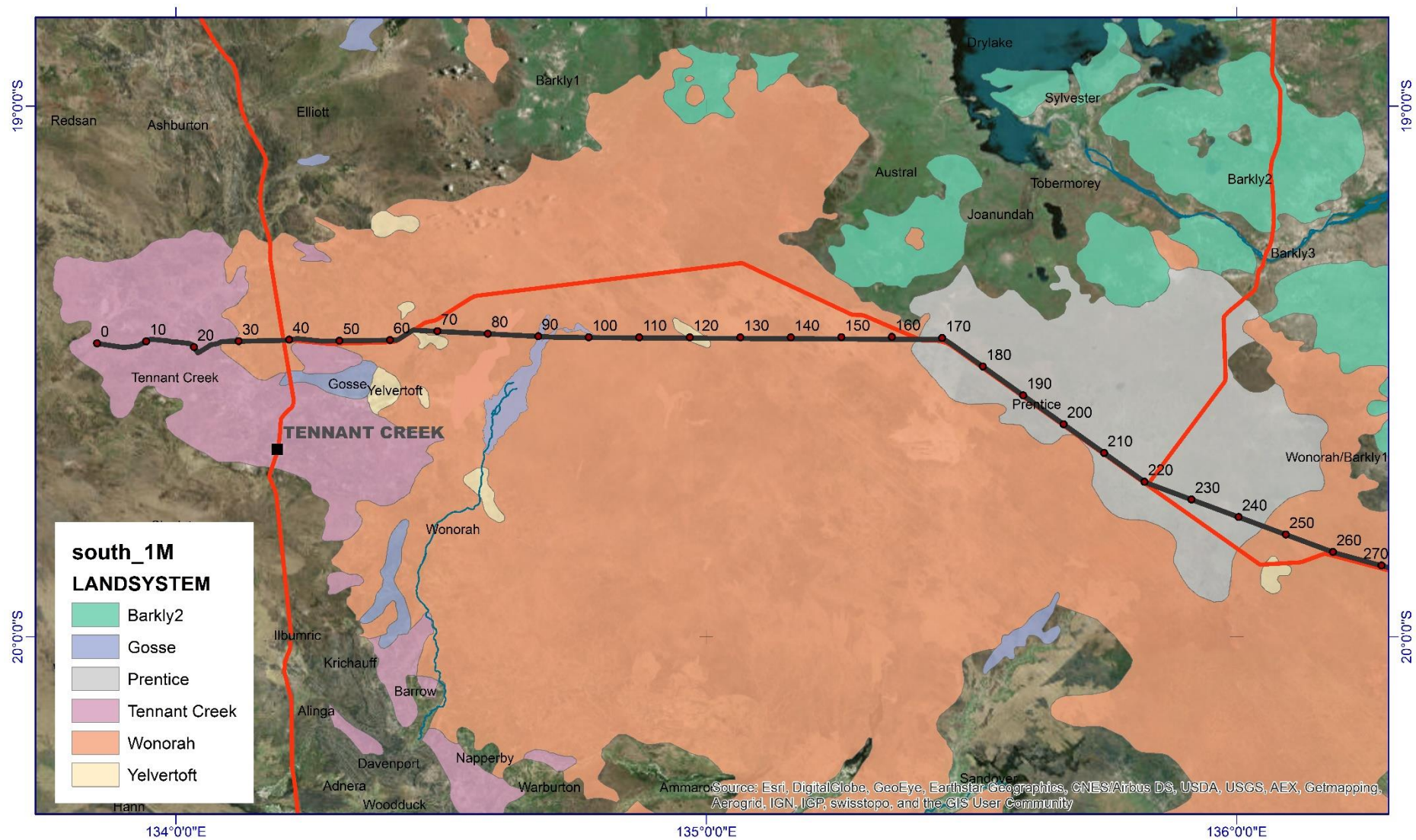
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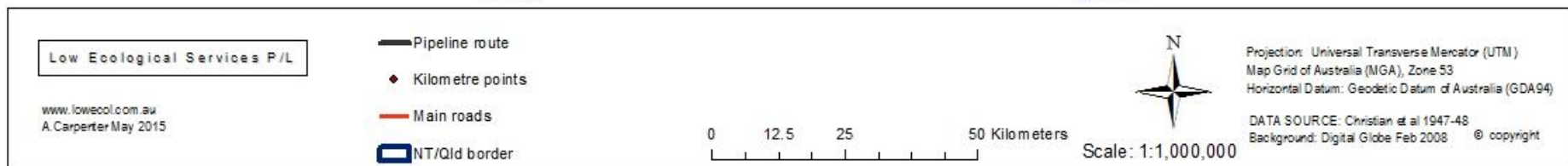
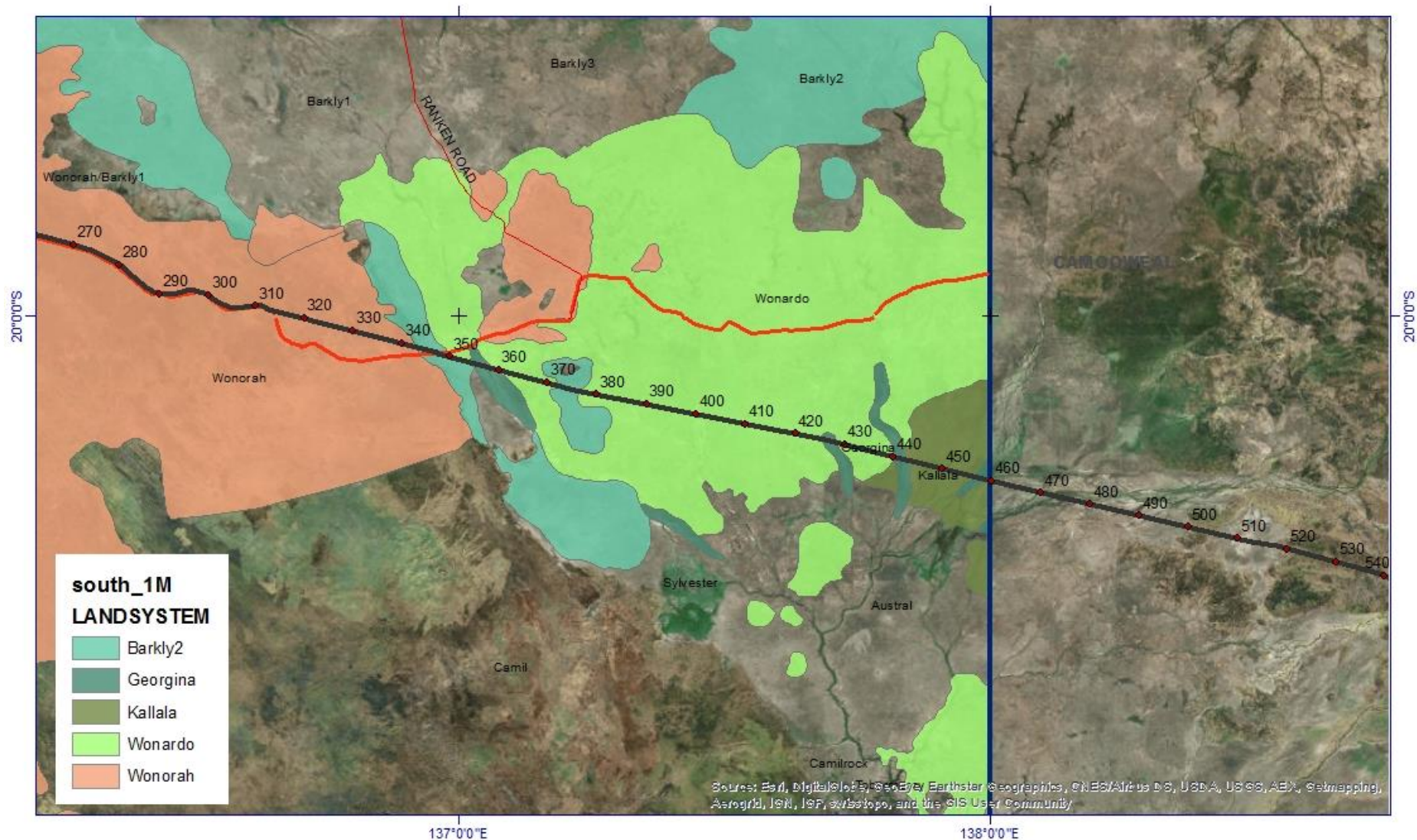
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11. APPENDICES

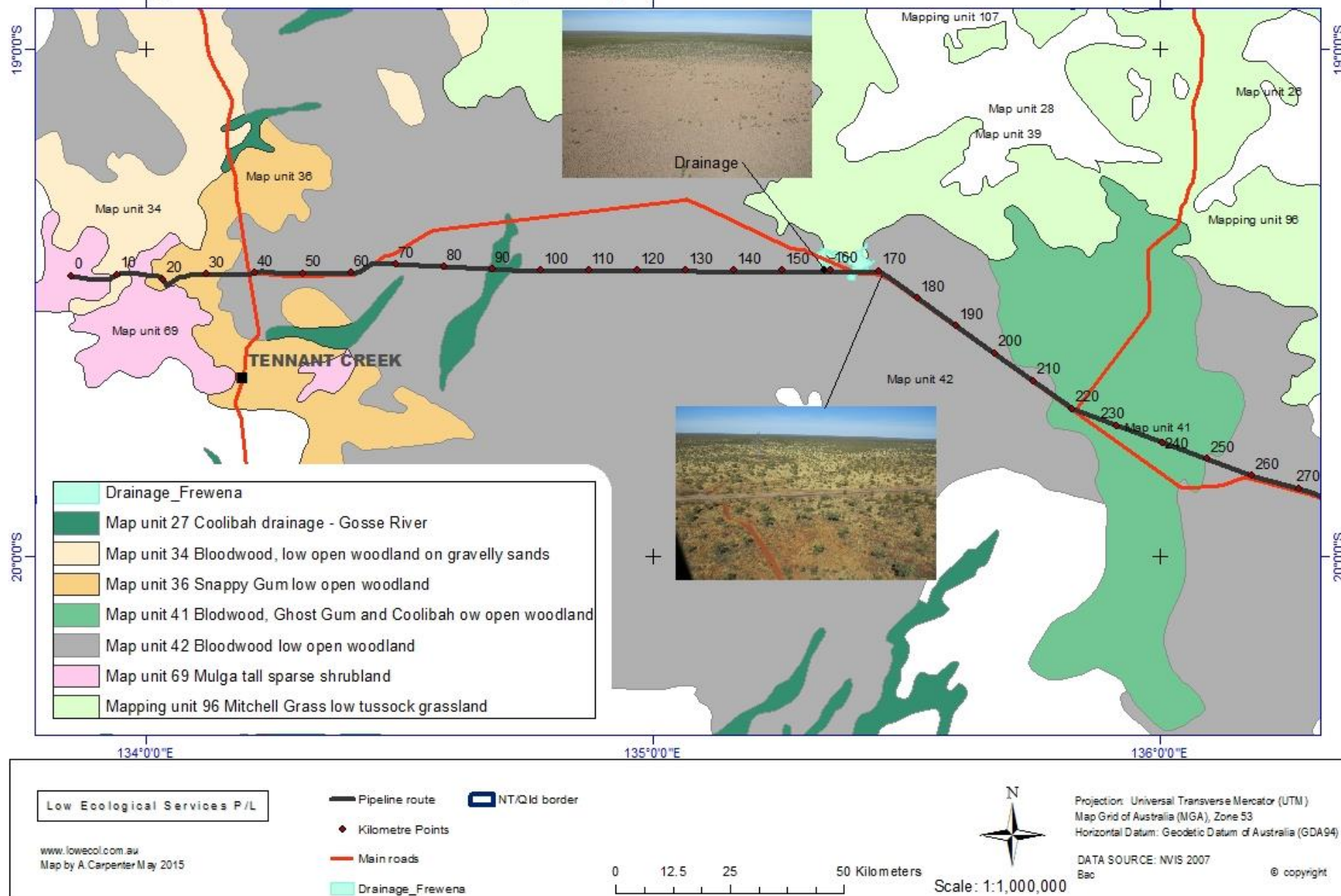


Map 1: Land systems intersecting the pipeline route Kilometre Points 0-270. Gosse land system position was shifted 10km east to line up with actual drainage.



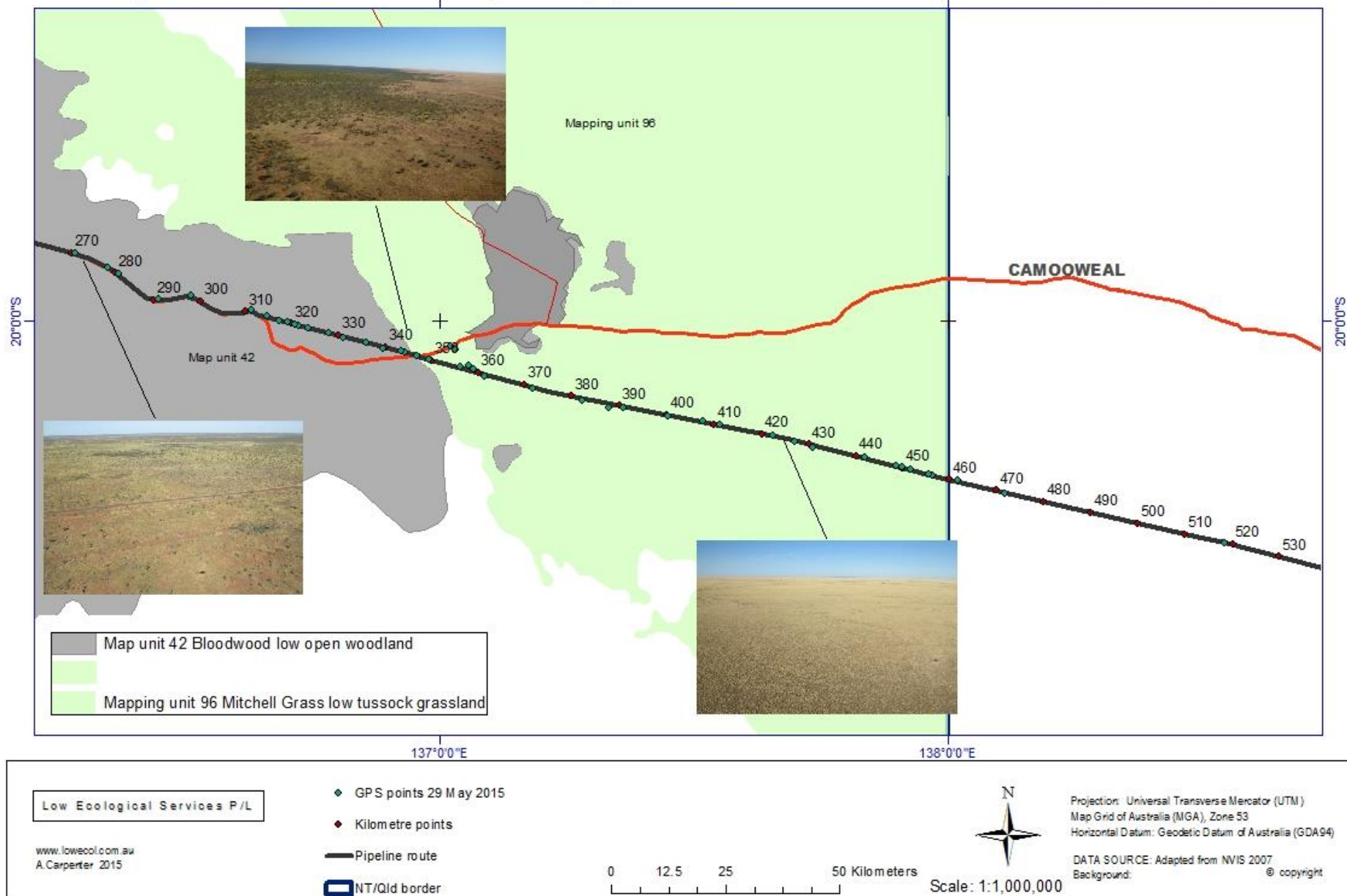
Map 2: Land systems intersecting the pipeline route Kilometre Points 270-460

Vegetation intersecting the pipeline route KP 0-270. 1:1,000,000



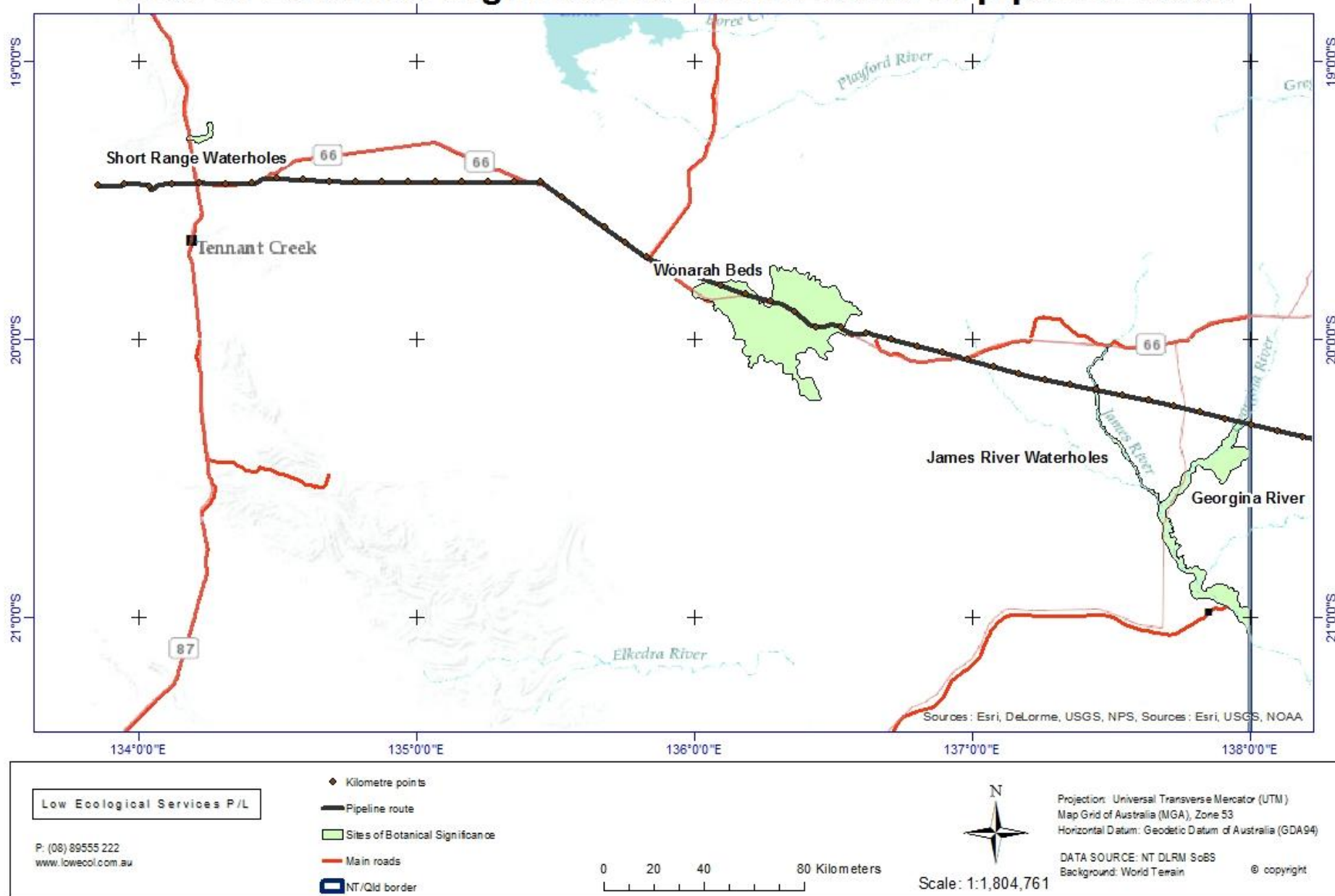
Map 3: Vegetation communities intersecting the pipeline route Kilometre Points 0-270

Vegetation intersecting the pipeline route KP 270-460. 1:1,000,000



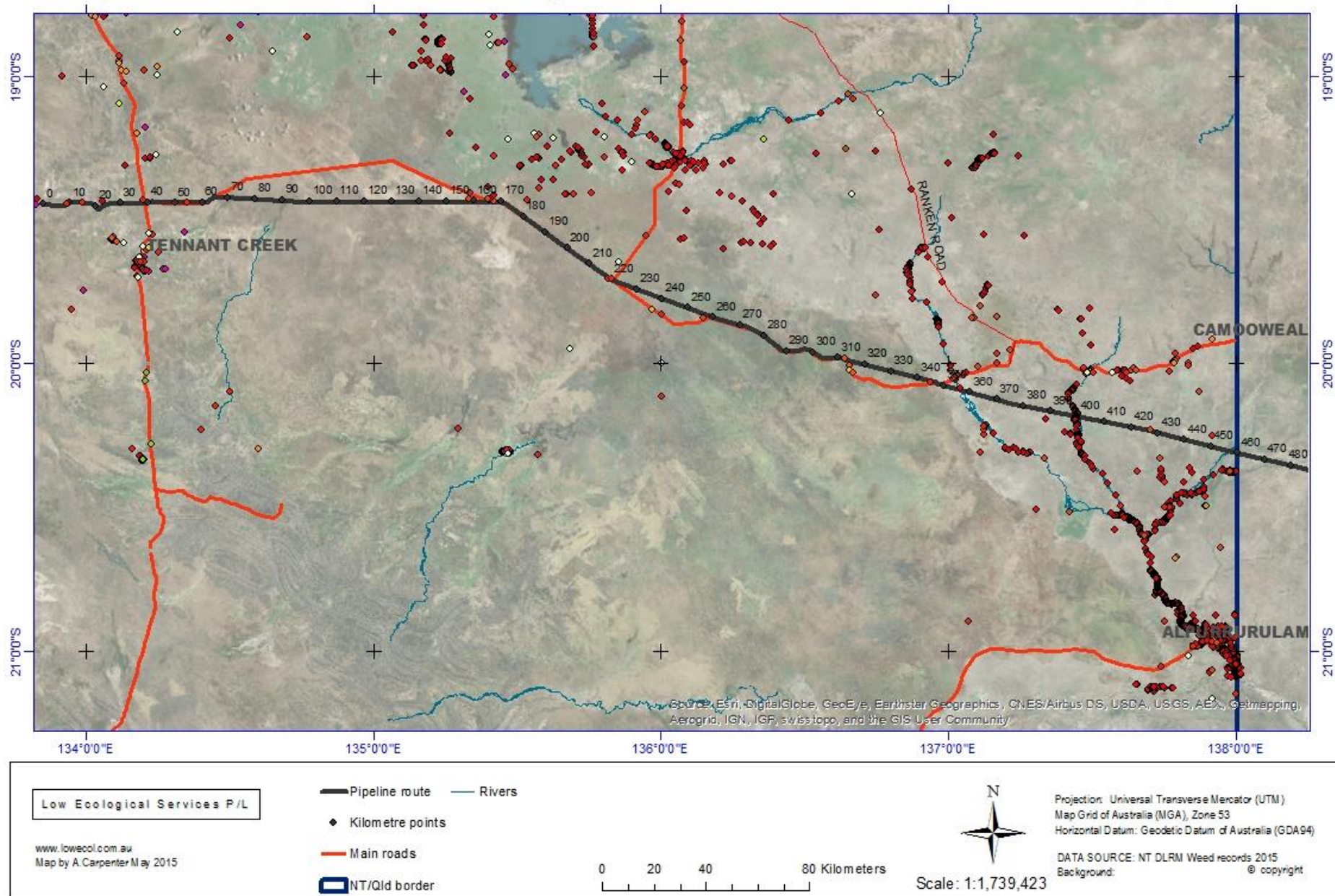
Map 4: Vegetation communities intersecting the pipeline route Kilometre Points 270 -460

Sites of Botanical Significance within 20kms of pipeline route



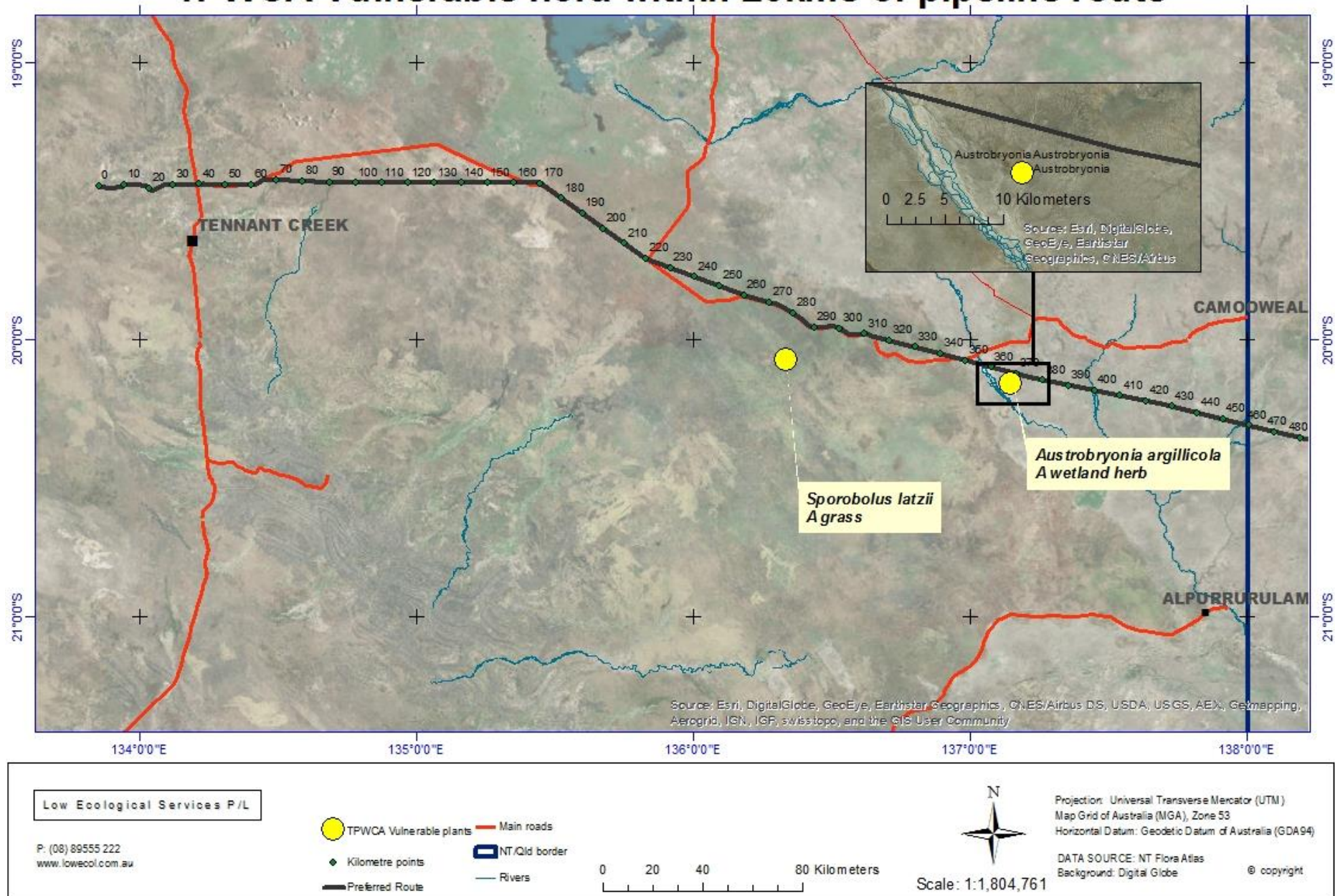
Map 5: Sites of Botanical Significance within 20km of the pipeline route

NT Department of Land Resource Management Weed Records within 100km of the pipeline route



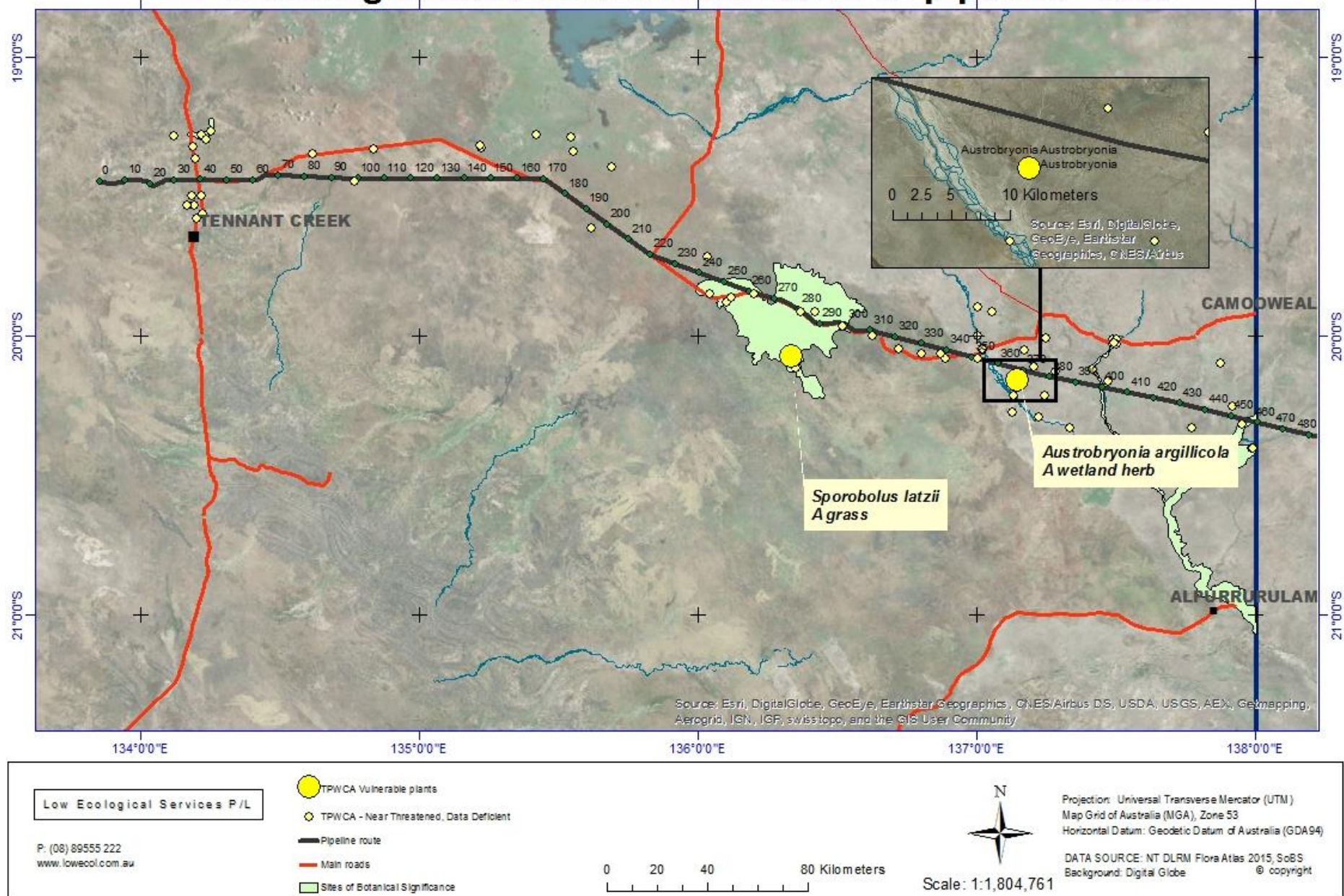
Map 6: DLRM Weed records within 100km of the pipeline route

TPWCA Vulnerable flora within 20kms of pipeline route



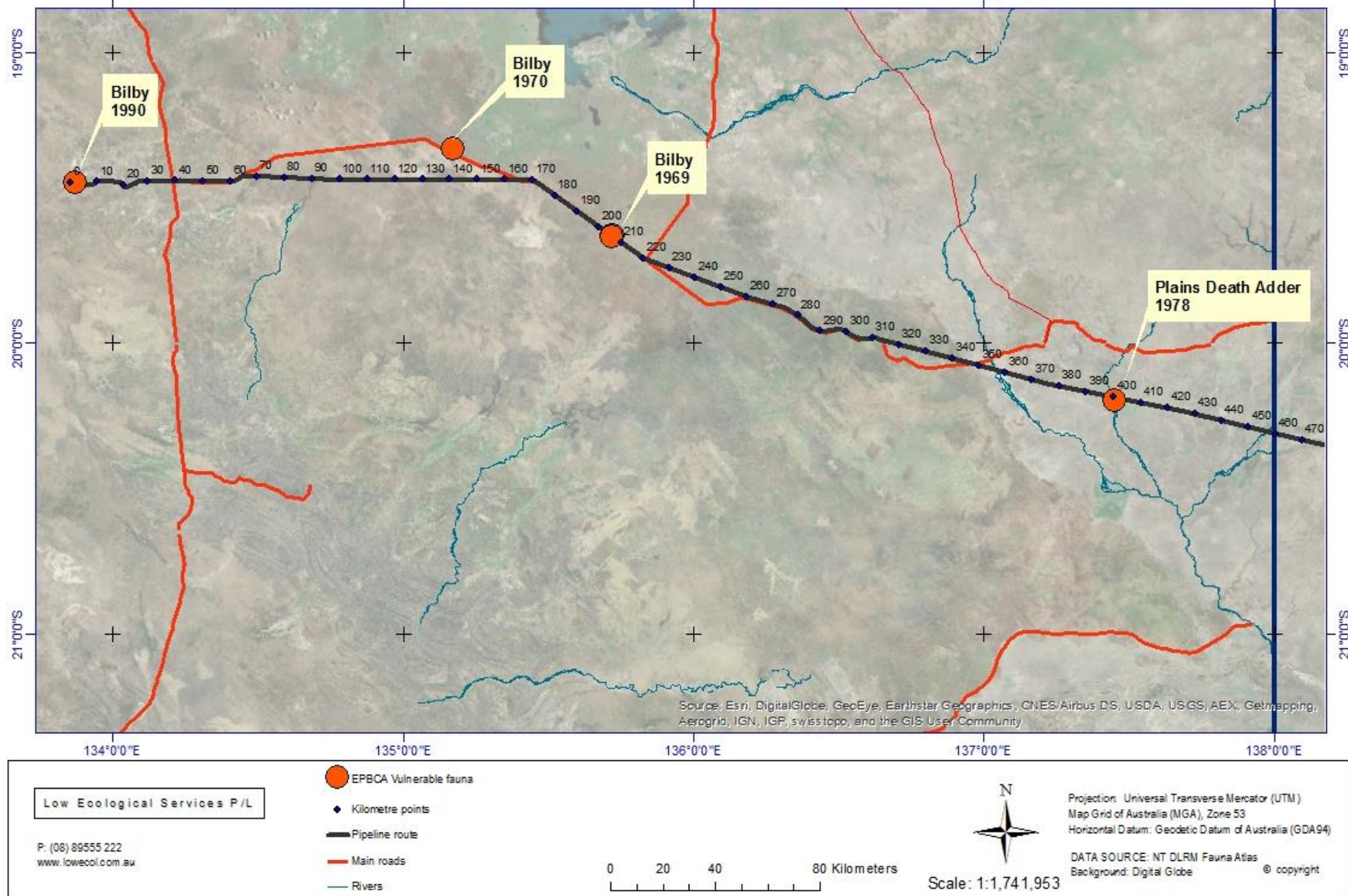
Map 7: DLRM Weed records within 100km of the pipeline route

TPWCA Significant flora within 20kms of pipeline route



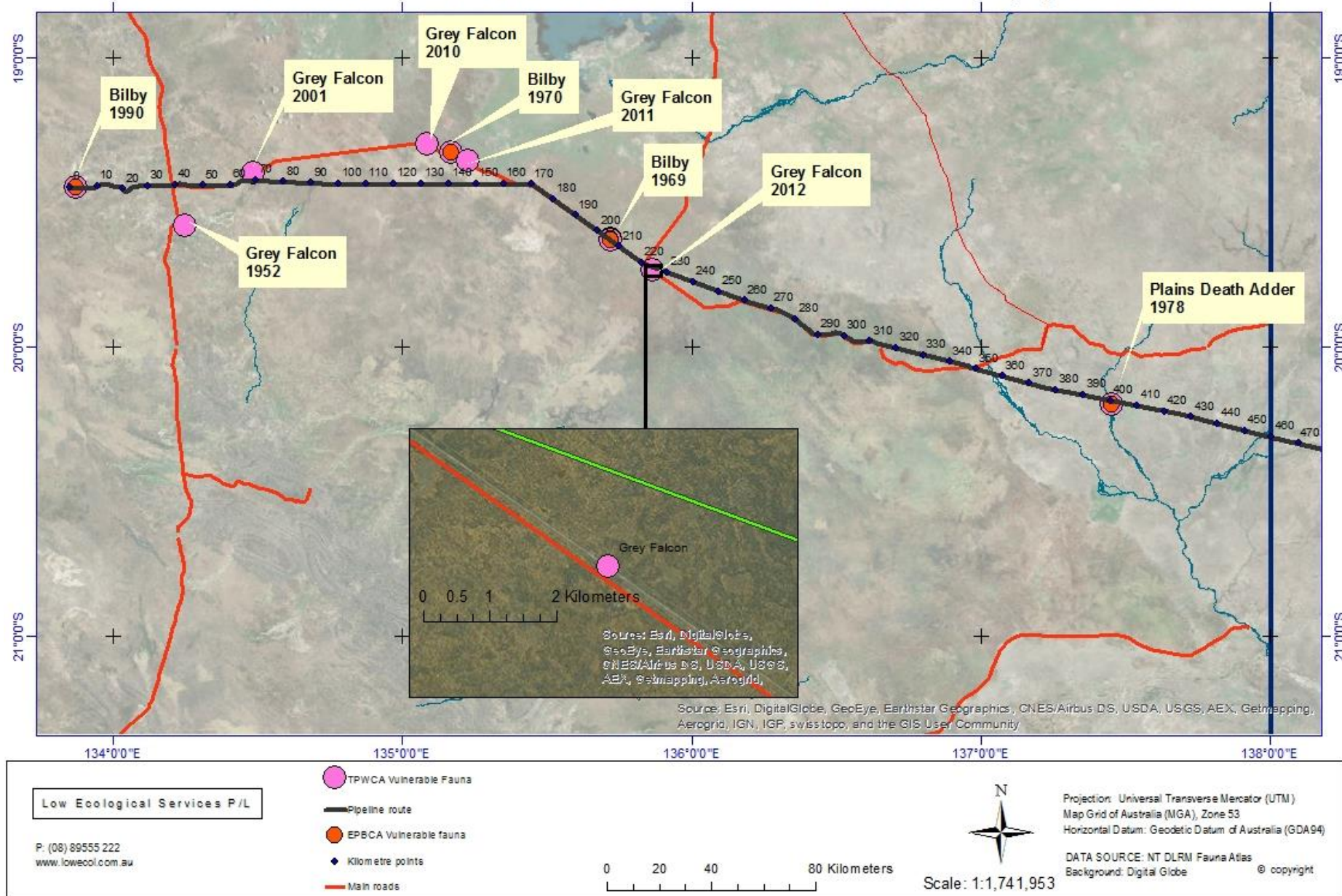
Map 8: TPWCA significant flora recorded within 20km of the pipeline route

EPBC Vulnerable fauna records within 20kms of pipeline route



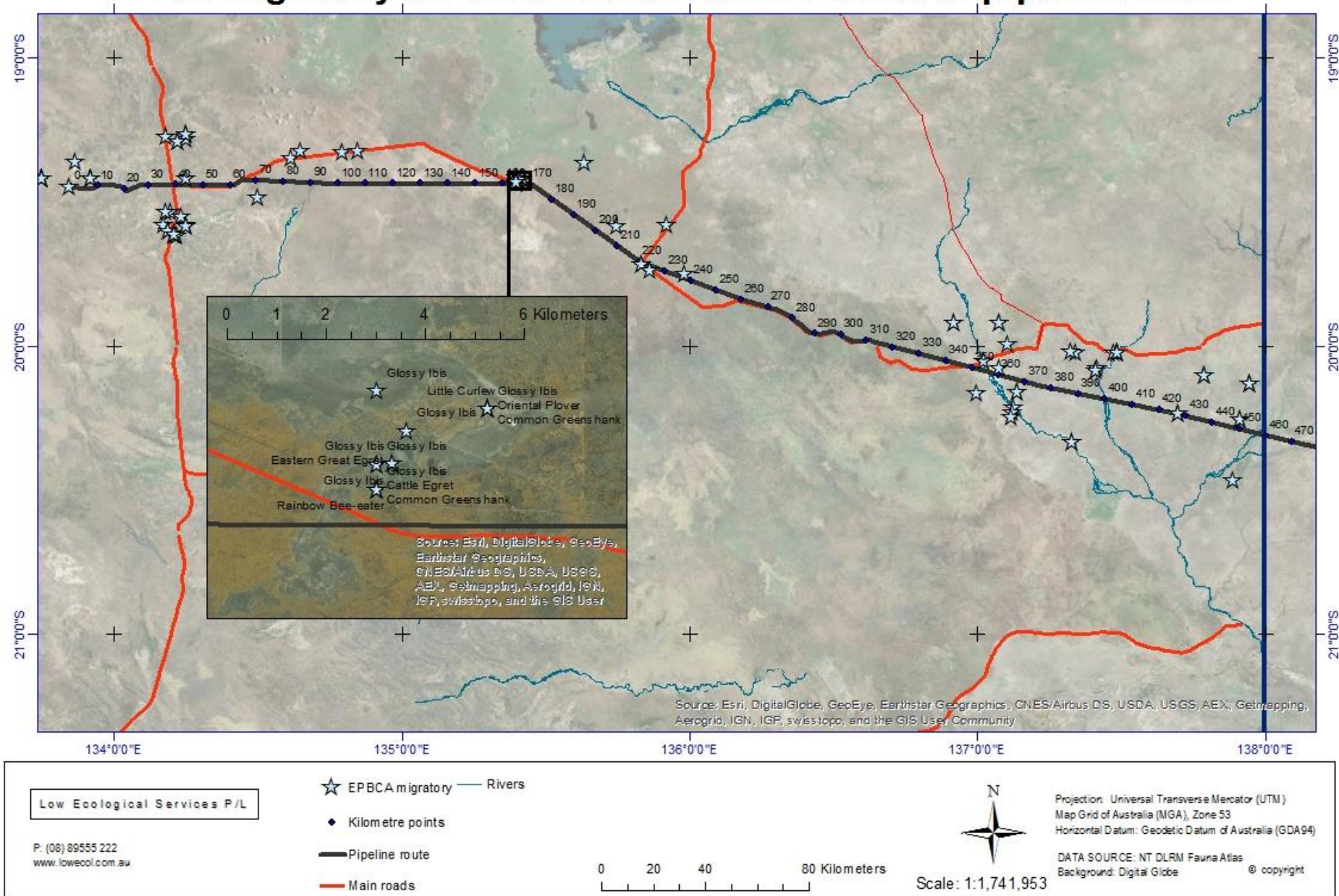
Map 9: EPBCA Vulnerable fauna recorded within 20km of the pipeline route

TPWCA Vulnerable fauna records within 20kms of pipeline route



Map 10: TPWCA Vulnerable fauna recorded within 20km of the pipeline route

EPBC Migratory birds recorded within 20kms of pipeline route



Map 11 EPBCA Migratory birds recorded within 20km of the pipeline route