

ASSESSMENT REPORT 79

**NORTHERN GAS PIPELINE
JEMENA NORTHERN GAS PIPELINE PTY LTD**

January 2017

Northern Territory Environment Protection Authority

GPO Box 3675

Darwin

Northern Territory 0801

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Abbreviations

DPIR	Department of Primary Industry and Resources
draft EIS	Draft Environmental Impact Statement
EA Act	<i>Environmental Assessment Act</i>
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESD	Ecologically Sustainable Development
KP	Kilometre Point
MVS	Major Vegetation Subgroups
NEGI	North East Gas Interconnector
NT	Northern Territory of Australia
NT EPA	Northern Territory Environment Protection Authority
ROW	Right of Way
TPWC Act	<i>Territory Parks and Wildlife Conservation Act</i>

Glossary

Advisory bodies	Agencies having administrative responsibilities in respect of the proposed action
the Australian Government Minister	The Australian Government Minister responsible for the <i>Environment Protection and Biodiversity Conservation Act 1999</i>
Environmental Impact Statement	The Environmental Impact Statement is the draft Environmental Impact Statement, the Supplement to the draft Environmental Impact Statement and additional information
the Minister	The Minister of the Northern Territory responsible for the <i>Environmental Assessment Act</i>
the Project	Northern Gas Pipeline
the Proponent	The person, organisation or Agency responsible for the development and execution of the proposed action; that is Jemena Northern Gas Pipeline Pty Ltd
this Report	This Assessment Report 79 for the Northern Gas Pipeline
the Responsible Minister	The Minister of the Northern Territory primarily responsible for authorising the proposed action; that is the Minister of the Northern Territory responsible for the <i>Energy Pipelines Act</i>
Commenter	Person or person(s) from the public or an organisation that is not an advisory body whom provided written comment on the draft Environmental Impact Statement
the Supplement	The Supplement to the draft Environmental Impact Statement

Summary

Environmental Impact Assessment (EIA) is a process for identifying the potential environmental impacts and risks of a proposed action, evaluating the significance of those impacts and risks and determining appropriate avoidance, minimisation/mitigation and offset measures to reduce those impacts and risks to acceptable levels. This Assessment Report (this Report) examines the EIA for the Northern Gas Pipeline (the Project), proposed by Jemena Northern Gas Pipeline Pty Ltd (the Proponent).

The Proponent proposes to construct and operate a high pressure underground gas pipeline between the Amadeus Gas Pipeline commencing at Warrego approximately 45 km north-west of Tennant Creek, Northern Territory, and the Carpentaria Gas Pipeline near Mount Isa, Queensland. The pipeline would be 622 km in length; approximately 457 km would be in the Northern Territory.

The Proponent identified a 20 km wide planning corridor within which a 1 km alignment corridor would be defined. Within this alignment corridor all pipeline construction activities would occur including the 30 m wide pipeline construction right of way. The pipeline trench would be constructed using conventional open trenching methods. Supporting infrastructure would be located within the 1 km alignment corridor and would include temporary workforce camps, access roads and above ground facilities, such as meter stations, compressor stations, mainline valves and a nitrogen reduction skid, at intervals along the pipeline route. Construction is scheduled to commence in early 2017 with the pipeline system planned to be operational in 2018 to achieve commencement of gas transportation services (commercial operation) in mid-2018.

The Northern Territory Environment Protection Authority (NT EPA) has produced this Report as advice to the Northern Territory Ministers for Environment and Natural Resources (the Minister) and Primary Industry and Resources (the responsible Minister) to be taken into account in decisions made by the Northern Territory Government. The responsible Minister, taking into consideration this Report, will decide whether to grant a licence for the construction and operation of the Project under the *Energy Pipelines Act* and if so, the conditions that may be applied. This Report provides advice and recommendations; it does not provide an environmental approval.

The NT EPA decided the Project required assessment at the level of an Environmental Impact Statement (EIS) under the *Environmental Assessment Act* (EA Act). The NT EPA initially identified the following potential impacts and risks that contributed to the decision to assess the Project at the level of an EIS:

- potential impacts on biodiversity from land clearing and construction activities (e.g. trenching, etc.). Risks and mitigation measures had yet to be adequately addressed, especially in relation to the identification and protection of threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* and the *Territory Parks and Wildlife Conservation Act* and in the control of declared weeds
- increased risk of soil erosion and dust generation. Some soils that occur along the proposed pipeline route are highly sensitive to disturbance and have poor recovery potential once disturbed
- potential impacts to water resources from sourcing water to support the construction of the pipeline and hydrostatic testing of the pipeline, including safe disposal of test waters
- the Project is likely to increase demand and/or impact on existing services and infrastructure, including roads, air transport networks and water supplies. The increased demand on the transport network has the potential to damage local infrastructure and impact on the safety of users, including seasonal tourists

- potential impacts to stakeholders, including land holders and Traditional Owners, due to land access and disruption from construction and maintenance activities
- potential social, cultural and economic impacts, including the risks of the Project not realising its projected economic and social benefits.

Information requirements based upon potential impacts and identified risks were described in the Terms of Reference for the Project. The Proponent submitted the draft EIS to address these requirements, including a whole-of-project risk assessment. A total of 162 potential environmental, social and economic impacts for the planning, construction and operation of the Project were identified for the Project. The Proponent undertook a risk assessment and concluded that following assessment, 129 residual risks remaining were rated as being low, 32 were rated as being moderate and one was rated as significant (the introduction and spread of weeds). No high or extreme risks were predicted by the Proponent following the application of risk/impact treatment and mitigation measures.

The NT EPA has reviewed the Project and provided its views on the impact assessment and acceptability of the Project. The NT EPA considers that the Proponent has appropriately considered risks and potential impacts to biodiversity, soils and socio-economic aspects. The evaluation of the significance of those impacts and risks by the Proponent has mostly been appropriate. However, the Proponent did not provide the necessary information to allow the NT EPA to adequately assess the potential impacts and risks to water resources and road safety as an issue associated with increased traffic movement from construction vehicles on the Barkly Highway, and other roads. The NT EPA has provided its review on these matters in this Report.

The NT EPA makes eight recommendations as an outcome of the EIA of the Project. These recommendations are primarily for the Proponent to address when entering into the next stage of the Northern Territory and Commonwealth assessment and approval processes and for the execution of the proposed action. The NT EPA considers it essential that the commitments, safeguards and recommendations detailed in the final EIS, this Report and in the final management plans approved by the Agency responsible for administering the *Energy Pipelines Act*, are implemented and subject to regular reporting and compliance auditing.

Recommendations

Recommendation 1

The Proponent shall ensure that the Northern Gas Pipeline is implemented in accordance with all environmental commitments and safeguards:

- identified in the Environmental Impact Statement for the Northern Gas Pipeline (draft Environmental Impact Statement, Supplement to the draft Environmental Impact Statement and additional information)
- recommended in this Assessment Report 79.

The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are commitments made by the Proponent.

Recommendation 2

The Proponent shall provide written notice to the Northern Territory Environment Protection Authority and the responsible Minister if it alters the Northern Gas Pipeline in such a manner that the environmental significance of the action may have changed, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

Recommendation 3

A Weed Management Plan for the control and management of weeds shall be prepared and implemented to the satisfaction of the Department of Primary Industry and Resources. The Weed Management Plan must identify the species of weeds, their location in and around the Northern Gas Pipeline and outline methods for avoiding and eradicating/controlling existing infestations. It must identify actions to prevent the introduction of new weed species from vehicles, machinery or any other method, and align with Statutory Weed Management Plans. The Weed Management Plan should specify equipment and vehicle wash-down locations and a rationale for their selection.

Recommendation 4

Any licence issued under the *Energy Pipelines Act* should include the following conditions:

- the maximum length of the open trench not exceeds a length capable of being practically inspected and cleared by fauna spotter / catchers teams
- fauna shelters be placed at intervals not greater than 500 m
- fauna ramps and/or earth plugs be placed at intervals not greater than 1 km
- all fauna spotter / catchers hold, or be listed on, a valid permit to take or interfere with wildlife issued under the *Territory Parks and Wildlife Conservation Act* and be experienced in the identification of fauna and assessment of fauna condition
- fauna spotter / catchers must complete the trench inspection and clearance within five hours of sunrise
- works on the trench not commence until trench inspections have been completed for the section or area intended to commence works

- a vet be on standby if fauna are in need of medical treatment, such as from injury.

Recommendation 5

Any licence issued under the *Energy Pipelines Act* should include a condition that impacts to all semi-permanent and permanent pools in the Ranken, James and Georgina Rivers that intersect or are proximate to the area of disturbance by the Northern Gas Pipeline be avoided.

Recommendation 6

The Proponent shall obtain approval of the Traffic Impact Assessment and Traffic Management Plan for the Northern Gas Pipeline from the Department of Infrastructure, Planning and Logistics, prior to the commencement of works.

Recommendation 7

The Proponent shall develop a communication and consultation strategy to engage impacted stakeholders on the potential impacts and management of unauthorised access to the Northern Gas Pipeline and surrounding areas.

Recommendation 8

The Proponent taking the proposed action is wholly responsible for implementation of all conditions of approval and mitigation measures contained in the Environmental Management Plan and must ensure all staff and contractors comply with all requirements of conditions of approval and mitigation measures contained in the Environmental Management Plan.

The Environment Management Plan, and sub-plans, should form part of the Pipeline Management Plan. In preparing each plan, the Proponent should include any additional measures for environmental protection and monitoring contained in this Assessment Report 79.

1 Introduction

Jemena Northern Gas Pipeline Pty Ltd (the Proponent) proposes to construct and operate a high pressure underground gas pipeline between the Amadeus Gas Pipeline commencing at Warrego approximately 45 km north-west of Tennant Creek, Northern Territory, and the Carpentaria Gas Pipeline near Mount Isa, Queensland. The Northern Gas Pipeline (the Project) would be 622 km in length; approximately 457 km would be in the Northern Territory. The Project has been assessed by the Northern Territory Environment Protection Authority (NT EPA) at the level of Environmental Impact Statement (EIS) under the *Environmental Assessment Act* (EA Act).

The NT EPA has prepared this Assessment Report (this Report) in accordance with section 7(2)(g) of the EA Act and clause 14(3) of the Environmental Assessment Administrative Procedures. The purpose of this Report is to ensure that matters affecting the environment to a significant extent are fully examined and reported. This Report is provided to the Northern Territory Ministers for Environment and Natural Resources (the Minister) and Primary Industry and Resources (the responsible Minister) to be taken into account in decisions made by the Northern Territory Government; it does not provide an environmental approval.

1.1 Environmental impact assessment process

Environmental Impact Assessment (EIA) is the process for identifying the potential environmental impacts and risks of a proposed action, evaluating the significance of those impacts and risks and determining appropriate avoidance, minimisation/mitigation and offset measures to reduce those impacts and risks to acceptable levels. The main purpose of the EIA is to inform decision-makers of the risks and potential impacts of a proposed action before any decisions are made and to engage and inform the public in the EIA process.

Through the assessment of the environmental impacts and risks of the Project, the Proponent must demonstrate:

- the potential impacts and risks can be satisfactorily managed within acceptable levels, e.g. impacts would not result in significant long-term or irreversible environmental detriment
- the effectiveness/feasibility of management measures in a precautionary/risk management framework
- that the assessment gives weighted consideration to:
 - values, potential impacts and risks
 - the likelihood of success of preventative actions and remedial measures
 - the validity and comprehensiveness of programs established to provide ongoing measures of the environmental effects of the Project.

The assessment of potential impacts and risks can be more reliably evaluated where there is a substantial baseline of relevant information. Where this information is limited or not available, assessment is inevitably constrained and less precise. In the absence of sufficient baseline information, and in keeping with the objectives of the *Northern Territory Environment Protection Authority Act* to promote ecologically sustainable

development (Section 1.4), the NT EPA adopts the precautionary principle.¹ If potential impacts are understood with a reasonable level of certainty, monitoring programs can be better informed to detect impacts, and adaptive management measures can be more effectively targeted to address those impacts.

The legislation establishing the framework to undertake the EIA process in the Northern Territory are the EA Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), when a proposed action is considered likely to have a significant impact on matters of national environmental significance. These Acts are administered by the NT EPA and the Australian Government Minister for the Environment and Energy (the Australian Government Minister), respectively.

1.2 Environmental impact assessment chronology

On 28 September 2015, the Proponent provided the Notice of Intent for the Project to the NT EPA for consideration under the EA Act. On 27 October 2015, the NT EPA decided that the Project required assessment at the level of an EIS.

The Construction of the North East Gas Interconnector Pipeline (EPBC 2015/7569) was referred to the then Australian Government Minister for consideration under the EPBC Act. On 23 October 2015, the delegate of the Australian Government Minister decided that the proposed action is a controlled action and required assessment and approval under the EPBC Act before it can proceed. The relevant controlling provision is listed threatened species and communities (sections 18 & 18A).

The proposed action cannot be assessed under the bilateral agreement between the Australian and Northern Territory Governments as part of the proposed action falls within another jurisdiction (Queensland). Throughout the EIA process, the NT EPA and the Australian Department of Environment and Energy have consulted and worked collaboratively, where practicable.

Draft Terms of Reference covering matters to be addressed in the EIS were subject to a public exhibition period between 27 November and 11 December 2015. On 24 December 2015, the delegate of the NT EPA directed the Proponent to prepare the EIS addressing the matters set out in the Terms of Reference.

The Proponent made the draft EIS for the Project available for public exhibition between 29 August and 9 October 2016. The Proponent prepared a single draft EIS document to address the public exhibition requirements in accordance with the EA Act and the EPBC Act. Written comments on the draft EIS were made by 13 Northern Territory advisory bodies (including comments made by staff of the NT EPA) and 35 written comments from interested persons or organisations. The Lock the Gate Alliance (Northern Territory) provided 797 written comments that were mostly based on a form letter under one cover. Copies of the written comments are provided at Appendix A and B of the Supplement to the draft EIS (the Supplement).

On 17 October 2016, the delegate of the NT EPA directed the Proponent to produce a Supplement to the draft EIS to take account of the written public comments. The Supplement becomes part of the draft EIS it supplements and is collectively referred to as the EIS. The NT EPA received the Supplement on 8 November 2016.

¹ Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

- (a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- (b) an assessment of the risk-weighted consequences of various options.

The NT EPA considered that it did not have sufficient or adequate information to complete the examination of the EIS and directed the Proponent to provide it with additional information on 28 November 2016. Additional information in response to the direction was received on 8 December 2016.

The making of this Report and providing it to the Minister marks the completion of the examination of the EIS by the NT EPA. The EIA chronology and EIS, and supporting documents, can be viewed on the Northern Gas Pipeline project page on the NT EPA website at:

<https://ntepa.nt.gov.au/environmental-assessments/register/jemena-northern-gas-pipeline>

1.3 Approval and regulatory framework

The Project will require approval and regulation by the Australian, Queensland and Northern Territory Governments. The framework for approval and regulation of the Project is provided at Chapter 3 of the draft EIS and is summarised below, with an emphasis on the obligations and requirements of the Northern Territory Government.

The NT EPA provides this Report to the Minister. The Minister is required to give a copy of this Report to the responsible Minister, together with any written comments made by the Minister in relation to this Report. The Minister has reporting obligations to the NT EPA under section 8B of the EA Act, if the Minister makes a written comment in relation to this Report.

The responsible Minister, taking into consideration this Report, will then decide whether to grant a licence for the construction and operation of the Project under the *Energy Pipelines Act* and if so, the conditions that may be applied. The *Energy Pipelines Act* is the primary legislation for the construction, operation, maintenance and cessation of use or abandonment of pipelines for the conveyance of energy-producing hydro-carbons, and for related purposes, in the Northern Territory. Section 8A(2) of the EA Act requires the responsible Minister to give the NT EPA notice of the decision as soon as practicable, but within seven days, after making the decision. Alternatively, if the decision by the responsible Minister is contrary to this Report, the responsible Minister must comply with reporting obligations to the NT EPA and the Legislative Assembly in accordance with section 8A(3) of the EA Act.

1.3.1 Scope of the Northern Territory assessment

The NT EPA assessed the potentially significant environmental impacts and risks associated with the construction and operation of a gas pipeline proposed to be built from Tennant Creek to Mount Isa, in accordance with requirements under the EA Act. The pipeline is designed to be used to transport hydrocarbons and will require licencing and regulation in accordance with the *Energy Pipelines Act*.

The matters relating to the environment the NT EPA considered necessary to be dealt with in the EIS for the Project were identified in the Terms of Reference (NT EPA, 2015) in accordance with clause 8(3) to (6) of the Environmental Assessment Administrative Procedures.

The Project referred to the NT EPA does not include the extraction or production of hydrocarbons and therefore these activities cannot be assessed in this Report. Should future projects for gas extraction in the Northern Territory be identified that might be transported by the pipeline in this Project, these projects would require referral to the NT EPA for a decision as to whether they would require EIA.

The Proponent is not currently contracted to transport gas from any new unconventional sources and states that the Project may proceed without any future development of unconventional onshore gas reservoirs in the Northern Territory. The Proponent has

stated that the Project has been sized to match the Northern Territory's current surplus gas production, which is sourced from offshore conventional sources including the Blacktip gas field in the Bonaparte Basin and the onshore Mereenie and Palm Valley gas fields in the Amadeus Basin.

At the time of this Report, the Northern Territory Government had implemented a moratorium on hydraulic fracturing of unconventional gas reservoirs. This moratorium included the use of hydraulic fracturing for exploration, extraction, production and includes diagnostic fracture injection testing. The future of unconventional gas resources is being investigated through an independent inquiry by the Northern Territory Government.

The Department of Primary Industry and Resources (DPIR) noted in its submission on the draft EIS that any proposals to develop unconventional gas resources and the potential cumulative impacts involved would be considered through a separate EIA process. The NT EPA has published guidelines regarding the referral of these types of proposals from the DPIR to the NT EPA for consideration under the EA Act (NT EPA, 2014).

1.3.2 Queensland Government

The sections of the Project within Queensland (i.e. approximately 165 km of pipeline, Mount Isa Compressor Station and associated facilities) require approval and regulation by an Environmental Authority issued under the *Environment Protection Act (Qld)*. The Proponent was granted an Environmental Authority in December 2015.

1.3.3 Australian Government

The Australian Government Minister will need to consider the Construction of the North East Gas Interconnector Pipeline (EPBC 2015/7569) for an approval decision under the EPBC Act.

The Australian Government has responsibility for managing greenhouse gas emissions throughout Australia. The Australian Government signed the Kyoto Protocol in March 2008 which committed Australia to reduce greenhouse gas emissions by 5 per cent below year 2000 levels between 2013 and 2020. A mandatory reporting program for greenhouse gases was established in the *National Greenhouse and Energy Reporting Act 2007*.

1.4 Ecologically sustainable development

The Australian Government affirmed its commitment to sustainable development at the United Nations conferences on environment and development, notably via the Rio Declaration and Agenda 21 in 1992 and the Johannesburg Declaration at the United Nations 2002 World Summit. Australia reaffirmed its commitment at the Summit to promote the integration of the three components of sustainable development – economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars.

Australia developed the National Strategy for Ecologically Sustainable Development (ESD) identifying five national principles (Table 1). The Strategy identified ways to apply the principles to a range of industry sectors and issues such as climate change, biodiversity conservation, urban development, employment, economic activity, and economic diversity and resilience.

In December 1992, the Northern Territory Government endorsed the National Strategy and agreed, along with all other States and Territories, to the Intergovernmental Agreement on the Environment.

The strategy defines ESD as:

‘Using, conserving and enhancing the communities’ resources so that ecological processes, on which life depends, are maintained and the total quality of life now and in the future can be increased.

ESD is development that aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.’

Table 1 – The principles of Ecologically Sustainable Development

ESD Principle	Definition
Integration principle	Consideration needs to be given to the long and short-term economic impacts as well as other environmental, social and equitable impacts.
Precautionary principle	Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by: <ul style="list-style-type: none"> (a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment (b) an assessment of the risk-weighted consequences of various options.
Inter- and intra-generational equity	The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.
Conservation of biological diversity and ecological integrity	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making
Improved valuation, pricing and incentive mechanisms	Should be promoted to ensure that the costs of environmental externalities are internalised and that the polluter bears the costs associated with environmental pollution.

The assessment of this proposal, its potential impacts (positive and negative) and the management measures used to enhance positive and reduce negative impacts takes into consideration the ESD principles. While adopting this Report and recommendations will assist to meet the ESD obligations, the continued project design and development, as well as the development and implementation of management and monitoring programs by the Proponent, should all aim to meet the objective of ESD.

2 Project

A detailed description of the Project is presented in Chapter 2 of the draft EIS. The following section provides an overview of the Project, and its components, that comprise the proposed action. The term ‘the Project’ is primarily used throughout this Report to describe the Northern Territory components and elements of the Project. However, it is also used interchangeably to describe relevant components and activities that are applicable to the entire 622 km of proposed pipeline, which includes sections or Project components in Queensland.

2.1 Proponent

The Proponent of the Project is Jemena Northern Gas Pipeline Pty Ltd, which is a wholly owned subsidiary of State Grid Corporation of China and Singapore Power (Australia)

Assets Pty Ltd. The Proponent stated that there are no proceedings against the Proponent or person proposing to take the action under Commonwealth, state or territory law with respect to the protection of the environment.

2.2 Project background

In October 2014, the Northern Territory Government launched a competitive process seeking private sector proposals for the development of a gas pipeline connecting the Northern Territory to the Eastern state gas pipeline networks known as the North East Gas Interconnector (NEGI). This was in response to private sector interest in Northern Territory gas, both supply and demand, and the Northern Territory Government's focus on commercialising its gas resources. The Government's objectives for the NEGI were to stimulate exploration and production of the Northern Territory's gas fields, promote economic and infrastructure development in Northern Australia, and provide employment opportunities in regional and remote areas of Northern Australia. The NEGI was considered a key project for the Northern Territory Government and was granted Major Project Status.

The Northern Territory Government led a competitive, three-stage tender process to appoint a private sector developer for the NEGI. From a final shortlist of four, the Proponent was selected as the successful proponent based on a range of assessment criteria, including cost to the Northern Territory, risk management approach, proposal deliverability, approach to local industry participation and broader economic benefits of the Project.

The NEGI was renamed by the Proponent to the Northern Gas Pipeline (i.e. the Project).

The Project is intended to deliver benefits to the Northern Territory, Northern Australia and the broader Australian economy, by:

- stimulating gas exploration and production in the Northern Territory by opening up a new market for Northern Territory gas - promoting economic and infrastructure development opportunities and extensive employment opportunities in regional and remote areas
- providing a new source of competitively-priced gas to customers with growing needs in the eastern Australian gas market
- providing a platform for the Proponent's longer-term plan to facilitate the direct delivery of Northern Territory gas to Wallumbilla by introducing additional gas and competition into a key gas trading location in Australia's eastern and northern gas markets.

2.3 Pipeline specifications and components

The Project would consist of a buried, 12-inch (323.9 mm) steel gas transmission pipeline, located in a 30 m wide pipeline construction right of way (ROW). The Project would be capable of delivering 90 TJ/day, operated to a maximum allowable operating pressure of 15.3 MPa and would have a design life of 30 years (Table 2). Individual pipe lengths will be welded together onsite; field coated and buried to a minimum depth of cover of 750 mm. Depth of cover will vary depending on the conditions of the terrain, erosion and engineering considerations and the surrounding land use, e.g. infrastructure crossings.

Table 2 – Pipeline design and specifications

Parameter	Specification
Length	622 km; 457 km in the Northern Territory and 165 km in Queensland
Standard construction corridor width	30 m
Area of disturbance (including access tracks and ancillary infrastructure)	Up to 2 470 ha; 1 753 ha in the Northern Territory and 717 ha in Queensland
Minimum depth of cover	750 mm to 3 000 mm
Nominal capacity	90 TJ/day
Pipeline diameter	323.9 mm
Minimum wall thickness	6.4 mm
Maximum allowable operating pressure	15.3 MPa
Corrosion protection	Impressed current
Design life	30 years

Construction of the Project, including above-ground facilities and access tracks, would require land clearing totalling approximately 2 470 ha; 1 753 ha in the Northern Territory and 717 ha in Queensland. The majority of land disturbance would be temporary as approximately 102 ha (68 ha in the Northern Territory) would remain cleared for operational purposes. In addition to the ROW, extra work space for temporary facilities would be required to support construction:

- accommodation camps for work personnel (five remote construction camps along the ROW and one construction camp near Warrego)
- access tracks to the construction ROW (upgrade of existing and construction of new)
- additional works areas (turn-around points, additional work space for crossings and, if required, temporary storage areas)
- water supply bores and dams for storing water required for dust suppression and hydrostatic testing (pressure testing) of the pipeline.

A number of facilities would be required at intervals along the Project for safety, maintenance and pipeline integrity purposes. These facilities would include two compression stations (including a nitrogen reduction skid at the Phillip Creek Compressor Station), five main line valves, and five cathodic protection stations. The locations for the infrastructure are presented in Table 2-1 (page 2-5) of the draft EIS and reproduced at Figure 1 of this Report.

2.4 Project location

The Project would extend from Warrego, approximately 45 km north-west of Tennant Creek in the Northern Territory, across the Northern Territory/Queensland border, to connect into the existing Carpentaria Gas Pipeline, at a location approximately 7 km south-west of Mount Isa, Queensland (Figure 1). The pipeline route runs south of the Barkly Highway, mostly through remote and sparsely populated cattle stations and Aboriginal land. The route is a predominantly 'straight-line' alignment with deviations around rocky hills, which occur to the east of Warrego and south-west of Mount Isa. A discussion on route selection and alternatives, access to services, land access, environmental and economic considerations was presented in section 2.18.1 of the draft EIS.

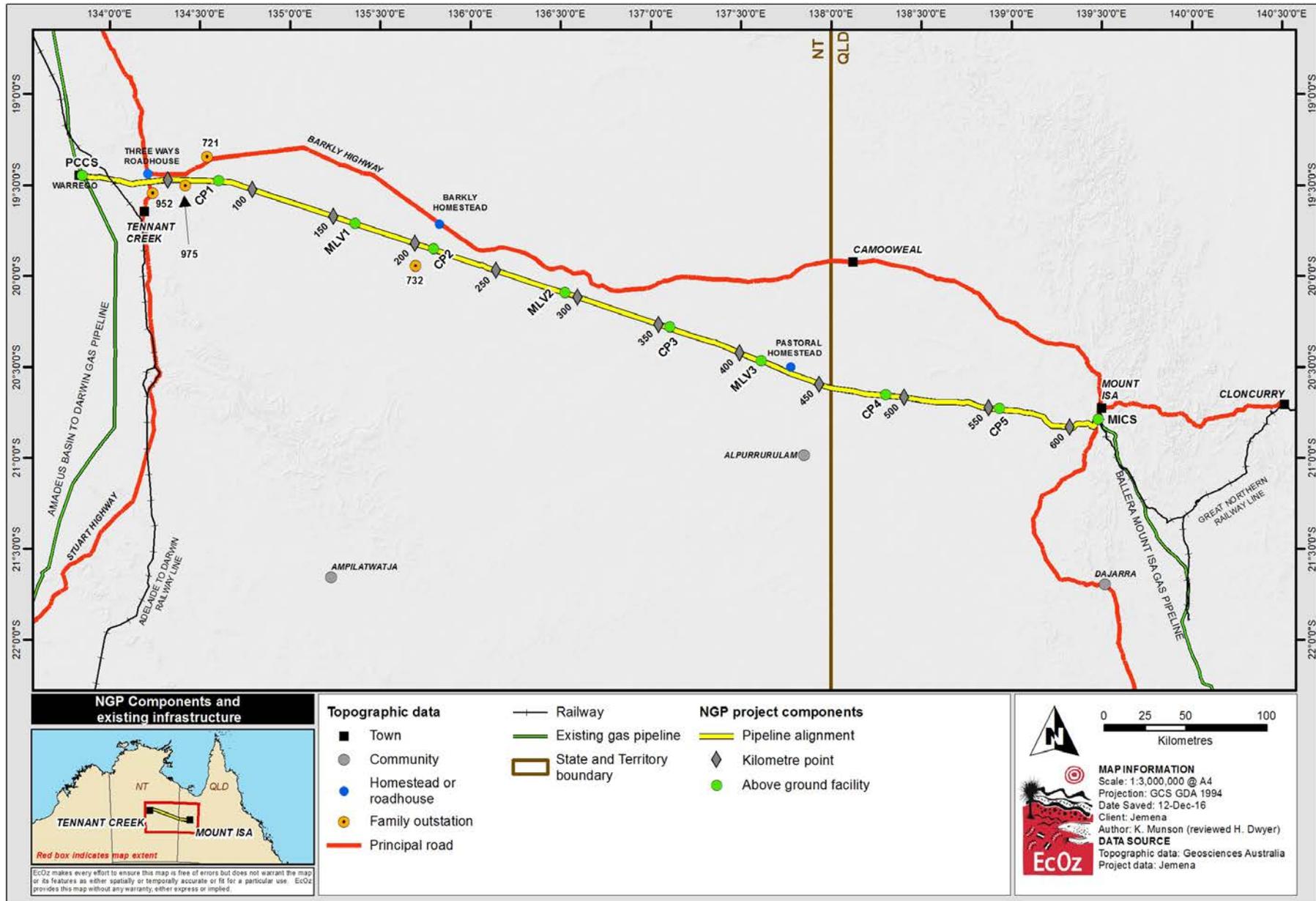


Figure 1 - Northern Gas Pipeline route, above-ground facilities, existing infrastructure and populated areas (source: EcOz Environmental Consulting Pty Ltd, 2016)

The Project would be located across two Local Government Areas; the Barkly Regional Council in the Northern Territory and Mount Isa City Council in Queensland. The main towns and populated places in the region are Tennant Creek, Threeways Roadhouse, Barkly Homestead Roadhouse, Camooweal and Mount Isa (Figure 1). The closest city to the Project is Mount Isa, which is approximately 7 km north east of the Mount Isa Compressor Station. Tennant Creek is 16.5 km to the south of the pipeline route and 41.5 km south east of the Phillip Creek Compressor Station. The region is characterised by a low level of industrial development, except for the areas around Mount Isa.

The majority of land traversed by the Project route is remote and sparsely populated land used for beef production. Parcels of Crown land, Aboriginal-owned land, and land subject to native title claims are also traversed. There are a number of small Aboriginal family outstations and pastoral homesteads in proximity to the pipeline route in the Northern Territory. The closest residential areas (sensitive receptors) are an Aboriginal family outstation located 3.4 km from the pipeline route (identified as Family Outstation 975, consisting of 2 houses) and a pastoral homestead located 3.5 km north of the pipeline route (consisting of 3 houses and a school) (Figure 1).

2.5 Schedule

Construction is scheduled to commence in early 2017 with the pipeline system planned to be operational in 2018 to achieve commencement of gas transportation services (commercial operation) in mid-2018. The exact timing is dependent on the timeliness of the required approvals, access agreements with relevant stakeholders and weather conditions. Construction of the Phillip Creek Compressor Station and Mount Isa Compressor Station (identified as PCCS and MICS, respectively, on Figure 1) is planned to extend into early 2018, as access to these locations is less dependent on Dry season weather conditions.

2.6 Construction

Project construction would occur in a rolling fashion; clearing and grading would occur ahead of construction, which would be followed by reinstatement. Construction would be in accordance with Australian Standards AS2885² and industry codes of practice (Australian Pipeline Industry Association, 2013).

Pre-construction activities would include:

- transportation of pipe, equipment and machinery
- establishing laydown areas
- construction of access roads/tracks from public roads/existing tracks to construction ROW
- establishing construction camps
- drilling water bores and construction of dams for construction water.

The sequence for the NGP construction operations would be:

² Meaning the following publications, and amendments:

- (a) the Australian Standards:
 - a. AS 2885.0-2008, Pipelines - Gas and liquid petroleum General requirements
 - b. AS 2885.1-2012, Pipelines - Gas and liquid petroleum Design and construction
 - c. AS 2885.3-2012, Pipelines - Gas and liquid petroleum Operation and maintenance
- (b) the Australian and New Zealand Standards:
 - a. AS/NZS 2885.2-2016, Pipelines - Gas and liquid petroleum Welding
 - b. AS/NZS 2885.5-2012, Pipelines - Gas and liquid petroleum Field pressure testing

- survey and setting out, potholing, fencing and temporary gates
- clear and grade to form the ROW
- drill and blasting will commence at the same time as the clear and grade, where required
- pipe will be strung (laid out) along the ROW, followed by bending, as required
- typically trenching activities would follow except in areas where rock is anticipated, where trenching occurs ahead of pipe stringing
- the pipe is welded into long strings (up to 1.5 km in length)
- welds are then subject to non-destructive testing prior to field joint coating
- the trench is prepared with a suitable bedding material (generally sourced from screened trench spoil) if required to protect the coating
- the pipe strings are welded together, welds are tested before the pipe is lowered into the trench
- the pipe is then padded and bedded and the trench back filled and compacted
- bulk earthworks where required to restore to original ground contours
- once a significant section of the pipeline has been completed, the pipe will be cleaned and hydrostatically tested before it is dried and capped ahead of commissioning
- the entire construction ROW will be progressively rehabilitated upon completion of the construction phase.

2.6.1 Clearing and grading

The construction ROW would be surveyed, cleared and graded to create a safe area for vehicular movement during construction activities, and would be maintained along the entire construction ROW. Environmental inspections would be undertaken along the ROW prior to clearing. The inspections would include identification of weeds and environmentally sensitive areas, which would be avoided or cleared under specific management actions.

Vegetation would be cleared and stockpiled at the edge of the ROW. Topsoil would be stripped and stockpiled in windrows along the ROW. After topsoil stripping, a level work surface would be graded with any surplus subsoil stockpiled in windrows separately to topsoil. Soil will be stockpiled such that backfilling and respreading will occur in order (i.e. subsoils replaced back trench and topsoil spread on surface).

Crossing crews would be with the front-end crew to prepare rail, road and watercourse crossings ahead of time (Section 2.6.4) and install required erosion and sediment controls and other infrastructure. Clearing and disturbance of major watercourses would not be undertaken until immediately prior to trenching and pipe installation to minimise the duration of watercourse disturbance.

2.6.2 Trenching

Trenching along the ROW would be undertaken using bucket wheel trenchers, rocksaws and excavators. The trenching, stringing and bending crew would progress along the ROW behind the front-end crew, and would be ahead of the welding crew. Trenching would be to depths that ensure the minimum depth of cover is achieved for respective locations along the pipeline.

Earthen trench breakers or similar would be left in the excavated trench line where fauna, vehicle or personnel movement is required or where steep slopes require the control of water runoff and trench flooding. In sloping terrain, and where required for long term stabilisation of the trench, trench breakers would be installed prior to backfilling to prevent water washing down the porous trench material and compromising the stability of the pipeline, causing subsidence or wash-out of the soils within the trench.

2.6.3 Pipe preparation and laying

Stringing is the term used to describe the laying out of the pipe lengths in preparation for welding. The pipe would be laid out adjacent to the trench on saw dust filled bags (or equivalent) to keep pipe sections off the ground and protect the coating. Following stringing, pipe sections would be joined, field coated and lowered into the prepared trench.

Trench preparation would entail ensuring the trench dimensions are sufficient, and the trench is free of debris and/or protrusions, which may damage the pipe. Where the trench spoil is not expected to damage the pipe, it would be used as bedding and padding. Where trench spoil is not of suitable quality padding machines would be used to break down the spoil, producing finer soil particle sizes.

The coated and welded pipe strings will be lowered-in such that the pipe is not unduly stressed and pipe coating is not damaged. The excavated trench spoil would be returned to the trench using bulldozers and/or graders. The material is progressively compacted during backfilling by tyre and track rolling or by using other compaction equipment. The backfilled trench may be mounded to allow for subsidence and settling in some areas.

As the pipe occupies space in the trench, there will be an excess volume of trench spoil. This spoil will be spread over the construction ROW during the bulk reinstatement, prior to the spreading of topsoil.

2.6.4 Construction of crossings

Bored, uncased road and railway crossings would be required for Warrego Road, Stuart Highway and the Adelaide to Darwin Railway. Buried services within the roadway easement would be located, and exposed if necessary, to prove their depth of cover and location in the crossing profile. Buried crossings would allow the pipeline construction to progress without impeding access along the main roads and railway line. Minor earthen roads would be crossed using open trenching techniques, subject to the approval of the relevant road authority and/or land holder.

The Project would cross several watercourses. The Proponent has indicated that open trenching techniques would be the preferred method for any watercourse that is not in flow, which would be determined by the Construction Contractor at the time of constructing the crossing. Open-cut crossings would involve the excavation of a trench in a similar fashion to that employed for standard trenching. The trench would be excavated so that the minimum cover above the pipeline to the bed of watercourse crossing is 1 200 to 2 000 mm, depending on the size of the watercourse. The cross sectional profile of watercourses subject to trenching would be reinstated to preconstruction condition.

2.6.5 Testing

The pipeline would be subject to strength and leak testing, known as hydrostatic pressure testing. This process involves filling a section of the pipeline with water and monitoring the pressure to detect leaks.

Prior to hydrostatic pressure testing, the pipeline would be pre-cleaned with cleaning pigs and checked to ensure it is free of dents, buckles or other obstructions. The test section will be flushed with approximately 1 ML of water to clean the pipe, removing any

dirt, dust and debris (although this is expected to be minimal as the pipeline is internally coated). The pipeline would then be filled with water, pressurised to greater than normal operating pressure and leak tested. Water would be reused for the test sections; ten test sections are planned, the locations are in Table 4-7 of the Supplement. At the completion of testing, hydrostatic test water would be sampled and analysed for potential contaminants, treated as required, and disposed to land.

2.6.6 Reinstatement and rehabilitation

Reinstatement of the construction ROW will occur progressively, with the exception of approximately 102 ha (68 ha in the Northern Territory), which would be required for operations and maintenance. Specific reinstatement requirements for areas potentially susceptible to erosion, such as major watercourse crossings and areas of dispersive soils, would be determined in Progressive Erosion Sediment Control Plans. All reinstated areas would be monitored following completion of construction activities, and it is anticipated that additional minor rehabilitation works and weed control activities would be required along the reinstated ROW and other areas during the first few years of operation. The intended outcome of reinstatement and rehabilitation measures would be to ensure all areas disturbed through construction are stable; re-profiled to a level consistent with surrounding soils; re-profiled to original contours and established drainage lines; and vegetated with groundcover which is not a declared weed, and which is established and self-sustaining.

Following construction of the pipeline, land holders would be able to resume use of the land. Excavating or erecting permanent structures or buildings over the buried pipeline would be prohibited in accordance with the requirements under the relevant legislation and pursuant to agreements with land holders.

2.7 Operation

The Project has been designed to be primarily remotely operated; each facility would be monitored and controlled from a remote control room 24 hrs/day. There would be sufficient remote and local manual isolation to maintain security of supply during normal and abnormal operations, during maintenance activities and to enable the safe shutdown, bypass and reduction in pressure during an emergency. Emergency shutdown systems would be capable of being trip function tested without curtailing or limiting pipeline flows of gas. The facility would be provided with services and auxiliaries (and their remote control) necessary for the satisfactory performance, availability and reliability of the station and for ongoing operations and maintenance, including power, communications, water, drainage and security.

Day-to-day operation and maintenance of the compressor stations and above-ground facilities would be performed by field staff based primarily in Tennant Creek and Mount Isa. The Proponent's control room staff would remotely perform a range of management and monitoring functions and manage pipeline throughput, daily gas accounting and planning for scheduled outages.

The Phillip Creek Compressor Station would consist of gas compression infrastructure to pressurise gas for transportation through the pipeline to the Mount Isa Compressor Station. The facility would also comprise various filtration and separation equipment to remove liquids and impurities to ensure gas meets the specifications. A flare and pipeline vent system would be constructed and designed to release of gas during commissioning, periodic testing, variations in incoming gas and in emergency situations. Pipeline gas would be used to power the Philip Creek Compressor Station. The Station will emit carbon monoxide, nitrogen oxides and small amounts of methane.

2.8 Decommissioning

The Project has a design life of at least 30 years. It could operate for longer if pipeline integrity is maintained. The Proponent has not indicated a preferred option for

decommissioning but has acknowledged that recovering the buried pipe would result in significant and unnecessary environmental impacts and is not an ideal option. The Proponent has committed to preparing and implementing a detailed decommissioning or abandonment plan and rehabilitation program, in consultation with land holders and the regulator at the time of decommissioning. The above-ground equipment and facilities would be removed and the land (including access tracks) returned to their pre-use state, i.e. open grassed grazing land.

2.9 Water use

The majority of water required for the Project will be during the construction phase, when construction water (i.e. dust suppression, erosion and sediment control, weed management wash-down, etc.), hydrostatic test water and potable water would be required. The average daily construction water use is estimated at 0.35 ML/day. It is estimated that 111 ML of water would be required over a 12-18 month construction period:

- 20 ML potable water
- 22 ML hydrostatic test water, which includes the 1 ML of pre-fill water
- 69 ML construction water.

Construction water would be sourced from existing supplies at Mount Isa and Tennant Creek, and existing dams and/or groundwater bores (or new, if required) along the construction ROW, as required. Potable water would be sourced from existing potable water suppliers, trucked to construction camps and stored in allocated potable water tanks.

Water requirements during the operational phase is predicted to be minimal with the exception of the Phillip Creek Compressor Station which will require up to 3 000 L/day for the nitrogen removal process. Water for operational requirements would be sourced from a groundwater bore that would be drilled near the Phillip Creek Compressor Station.

Phillips Creek Compressor Station is within the Tennant Creek Water Control District. The Proponent will need to be granted a bore construction permit to drill new bores and obtain a licence to take or use groundwater to extract water within the Water Control District, in accordance with the *Water Act*.

2.10 Roads and transport

Access to the pipeline corridor, work areas and construction camps would be required. The majority of heavy equipment would be transported along existing roads, which are generally sealed or gravel. Warrego Road, Stuart Highway and Barkly Highway would provide the main arterial route for transport of materials, equipment and personnel.

Although the Barkly Highway parallels the proposed pipeline corridor, in places there is a distance of up to 75 km between the road and the ROW. Existing tracks, and new access tracks would be upgraded or constructed, between the roads and the ROW to minimise the movement of heavy traffic and to allow access for operational personnel once the pipeline is constructed. Existing tracks would be upgraded as required, which may require a disturbance width of up to 10 m. It is expected that widening of access tracks and construction of new track would involve disturbance of approximately 243 ha of land in the Northern Territory.

Traffic along the construction ROW would be controlled with speed limits, designated radio channels, access gates, boundary fences and access tracks. Construction camps would be located as close to the ROW as possible, with personnel moving between the ROW and camps in light vehicles or small buses.

There would be limited traffic once the pipeline is operational, with staff movements limited to between Tennant Creek and the Philips Creek Compressor Station, and Mount Isa and the Mount Isa Compressor Station. In addition, use of unsealed access tracks to above-ground facilities would be infrequent and used mostly for routine inspection and maintenance.

2.11 Workforce

The peak construction workforce is predicted to be approximately 725 personnel. The Construction Contractor would engage a team of skilled pipeline and facilities construction personnel, who would largely be sourced from outside the region due to the skills and experience required. In addition to the core (skilled) construction team, the peak construction personnel will comprise semi-skilled personnel and labourers, who would be employed from the Project region, subject to availability.

The construction roster is likely to be a 28 day work cycle followed by nine days rest. The construction workforce not from the Northern Territory would fly in and out of Mount Isa, Tennant Creek or Alice Springs. A combination of scheduled and chartered flights would be utilised to accommodate personnel transportation.

Specialist environmental staff would be responsible for ensuring the Project's construction phase is undertaken in accordance with regulatory requirements and industry best-practice. Environmental inspections would be conducted pre-construction, during construction and post-construction to ensure adherence to environmental management plans, commitments made in the EIS and subsequent approval conditions. Operations phase environmental management planning would be overseen by the Proponent's corporate environmental management staff, with specialist consultants and contractors engaged, as required.

Specialist socio-economic impact personnel will be engaged and responsible for ensuring the implementation of the Economic and Social Impact Management Plan and the Cultural Heritage Management Plan, including the capacity building initiatives and for the continual implementation of the socio-economic risk mitigation and opportunity aspects of the Project

The Project construction and installation activities are staggered and therefore not all the work crews would be needed at any one time. The workforce numbers would ramp up over a 'mobilisation' period. Similarly, the workforce would wind down during the 'demobilisation' period. It is expected that the construction resources would be suitable to allow each crew to undertake their component of the construction process at a rate of approximately 5 km/day.

It is proposed that the majority of construction personnel would be accommodated in the six temporary construction camps located along the pipeline route. The Project would source and utilise local commercial accommodation providers in Tennant Creek and Mount Isa where it is available and feasible to do so. It is envisaged that up to 35 personnel would require commercial accommodation in Tennant Creek between March 2017 and May 2018.

All construction camps would have a footprint of 12 ha. Camps would be constructed and decommissioned progressively throughout the build. Each construction camp would consist of transportable buildings and ancillary services for water storage, power generation, communications and maintenance facilities. Existing cleared or degraded areas would be used as far as practicable for the siting of the construction camps but additional clearing for construction may be required. Proposed construction camp locations would be at Philip Creek Compressor station (kilometre point [KP]0), KP63, KP169, KP296, KP440 and KP572 (Qld).

Operation and maintenance of the pipeline and above-ground facilities will require a small team of field staff (~10 personnel) responsible for day-to-day pipeline operations and maintenance activities. A control room will remotely manage day-to-day project and maintenance operations, monitoring, management and scheduling of pipeline throughput (Section 2.7).

3 Regional setting

Detailed descriptions of the physical and ecological aspects of the Project region are presented in the draft EIS. The following section provides a broad overview of the regional setting of the Project.

The Project crosses two major climate classes: the summer dominant class of Northern Australia and the arid class of the interior of Australia. The summer dominant class of Northern Australia is characterised by summer rainfall with a marked wet summer and dry winter, and the arid class of central Australia is generally drier with low rainfall. Tennant Creek is within the arid class while Mount Isa is within the summer dominant class, but both are within the 'hot dry summer, mild winter' climate zone, and the rainfall is Wet season dominant with occasional Dry season rain.

The Project alignment is generally of low relief with the exception of the eastern end of the alignment and localised areas of low to moderate relief around Tennant Creek. Broadly, the Project traverses localised rocky hills landforms, near Tennant Creek, alluvial and rocky plains (silty and sandy soils) between approximately KP0 and KP350, and black soil plains (clayey soils) between KP350 and KP457 (the NT/QLD borders) (Figure 2).

The Project traverses the Davenport and Murchison Ranges, Tanami, Mitchell Grass Downs and Mount Isa Inlier bioregions. The land within and surrounding the Project site comprises natural grasslands, with 50% grass cover, some localised areas of 10% grass cover, and sparse to mid dense, dwarf to miniature tree cover.

The Project would occur mainly within the Barkly and Georgina River basins in the Northern Territory. The Georgina River flows into Queensland and debouches into Lake Eyre. Watercourses within the Project footprint are generally ephemeral and intermittent, and drain inland. Construction of the pipeline would involve three major watercourse crossings (stream order five and above; rivers), 12 minor watercourse crossings (stream order three and four; creeks) and a number of drainage line crossings (stream order one to two). The major watercourse crossings in the Northern Territory are at the Ranken, James and Georgina Rivers (Figure 3).

4 Environmental impact assessment

The purpose of this section is to evaluate the Project and to present the view of the NT EPA on the environmental acceptability of the Project. The environmental acceptability of this Project is based on analysis of the adequacy of information:

- outlining the proposed action (particularly which components or activities are likely to impact the environment)
- on the existing environment (particularly environmental values and sensitivities)
- identifying the potential environmental impacts and risks of the Project and evaluating the significance of those impacts and risks
- regarding proposed avoidance or minimisation/mitigation measures to reduce potential impacts and risks to acceptable levels.

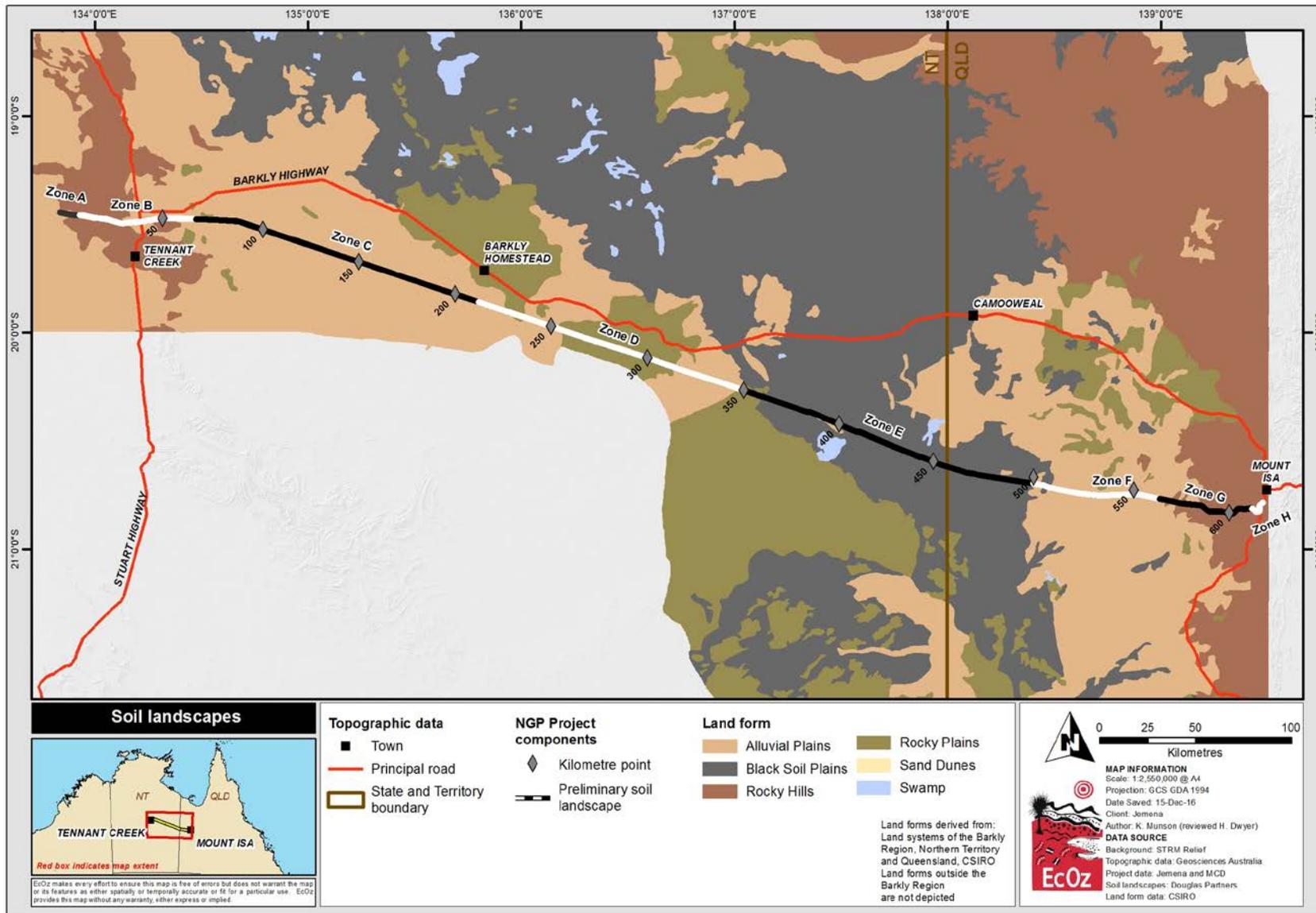


Figure 2 - Soil landscapes along the construction right of way (source: Jemena, 2016b)

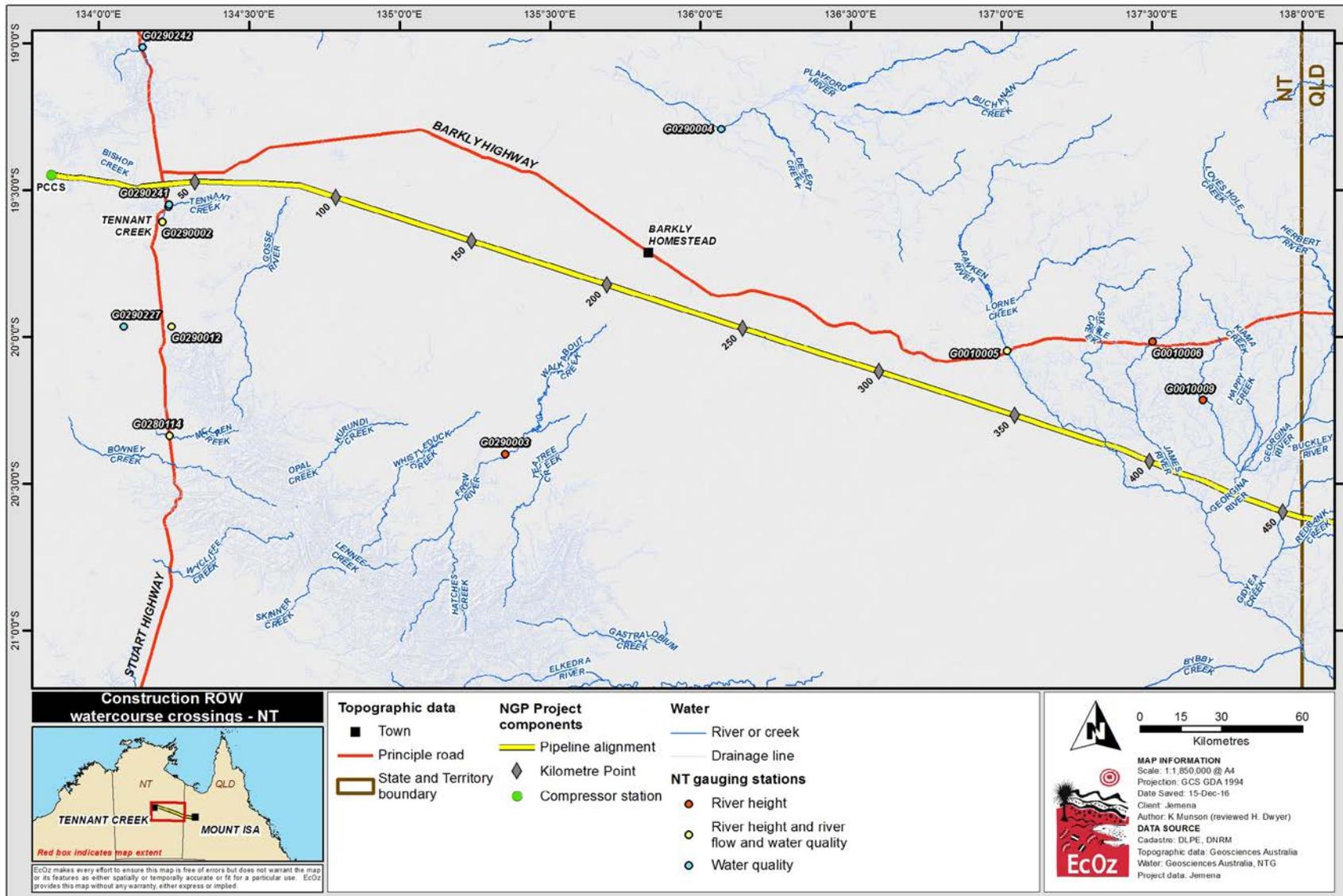


Figure 3 - Watercourses and crossing locations in the Northern Territory (source: Jemena, 2016b).

Conclusions drawn and recommendations made in this Report are derived from consultation on the final EIS with advisory bodies, the NT EPA's examination of the EIS and responses from the Proponent to comments/consultation. Recommendations are made in this Report to add to or emphasise any commitments made by the Proponent, where the proposed avoidance or minimisation/mitigation measures are considered insufficient or where a safeguard is deemed particularly important.

In this Report, the recommendations (in **bold**) are preceded by text that identifies concerns, suggestions and undertakings associated with the Project. For this reason, the recommendations should not be considered in isolation.

Minor and insubstantial changes are expected in the design and specifications of the Project following the conclusion of the EIA process. It will be necessary for approval mechanisms to accommodate subsequent changes to the environmental safeguards described in the final EIS and recommendations in this Report. If the Proponent can demonstrate that changes are unlikely to significantly increase the risks of the potential impacts on the environment, an adequate level of environmental protection may still be achieved by modifying the conditions attached to relevant statutory approvals governing the Project. Otherwise, further environmental assessment may be required.

Recommendation 1

The Proponent shall ensure that the Northern Gas Pipeline is implemented in accordance with all environmental commitments and safeguards:

- **identified in the Environmental Impact Statement for the Northern Gas Pipeline (draft Environmental Impact Statement, Supplement to the draft Environmental Impact Statement and additional information)**
- **recommended in this Assessment Report 79.**

The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are commitments made by the Proponent.

Recommendation 2

The Proponent shall provide written notice to the Northern Territory Environment Protection Authority and the responsible Minister if it alters the Northern Gas Pipeline in such a manner that the environmental significance of the action may have changed, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

4.1 Summary of potential impacts and risks

The NT EPA initially identified the following potential impacts and risks that contributed to the decision to assess the Project at the level of an EIS:

- potential impacts on biodiversity from land clearing and construction activities (e.g. trenching, etc.). Risks and mitigation measures had yet to be adequately addressed, especially in relation to the identification and protection of threatened species listed under the EPBC Act and the *Territory Parks and Wildlife Conservation Act* (TPWC Act) and in the control of declared weeds
- increased risk of soil erosion and dust generation. Some soils that occur along the proposed pipeline route are highly sensitive to disturbance and have poor recovery potential once disturbed
- potential impacts to water resources from sourcing water to support the construction of the pipeline and hydrostatic testing of the pipeline, including safe disposal of test waters

- the Project is likely to increase demand and/or impact on existing services and infrastructure, including roads, air transport networks and water supplies. The increased demand on the transport network has the potential to damage local infrastructure and impact on the safety of users, including seasonal tourists
- potential impacts to stakeholders, including land holders and Traditional Owners, due to land access and disruption from construction and maintenance activities
- potential social, cultural and economic impacts, including the risks of the Project not realising its projected economic and social benefits.

Information requirements based upon identified potential impacts and risks were described in the Terms of Reference for the Project (NT EPA, 2015). The Proponent submitted the EIS to address these requirements.

Chapter 5 of the draft EIS on risk assessment identified a total of 162 potential environmental, social and economic impacts for the planning, construction and operation of the Project. The Proponent undertook a risk assessment and concluded that following assessment, 129 residual risks remaining were rated as being low, 32 were rated as being moderate and one was rated as significant (the introduction and spread of weeds). No high or extreme risks were predicted by the Proponent following the application of risk/impact treatment and mitigation measures.

Submissions on the draft EIS identified amongst other things, potential impacts on biodiversity values and threatened species; water sourcing and sustainability; reinstatement and rehabilitation; clarification on project specifications; socio-economic aspects; stakeholder consultation and engagement; and environmental management. A summary of the key themes and issues raised is provided in Table 2-2 of the Supplement. A wide range of potential impacts and risks identified through the EIA process were addressed by the Proponent and considered by the NT EPA and advisory bodies. Where residual risks were considered to be low or not significant, they are not discussed in detail in this Report.

The remainder of this section of this Report discusses the risks and potential impacts, based on potential significance, raised throughout the EIA process and the Proponent's works and/or commitments to identify, avoid, mitigate, monitor and manage the potential impacts. The relevant topics include weeds (Section 4.3); trench and fauna management (Section 4.4); water use and sourcing (Section 4.5); watercourse crossings (Section 4.6); hydrostatic testing (Section 4.7); soils (Section 4.8); road transport (Section 4.9); economic and social impact assessment (Section 4.10); greenhouse gas emissions (Section 4.11) and environmental management (Section 4.12).

4.2 Vegetation and threatened species

4.2.1 Environmental objective

The NT EPA's Environmental Objective is to maintain the conservation status, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts (on the Project area and on adjacent areas that may be impacted).

4.2.2 NT EPA assessment

Vegetation within the Project footprint was characterised by the Proponent using the Native Vegetation Information System Major Vegetation Subgroups (MVS). The Project footprint traverses 7 MVS in the Northern Territory. The dominant vegetation groups within the Project footprint are *Eucalyptus* low open woodlands with hummock grass (MVS 18; 1191.6 ha), Mitchell Grass tussock grassland (MVS 34; 267.3 ha), and *Acacia* (+/- low) open woodlands and sparse shrublands +/- tussock grass (MVS 24; 156.3 ha).

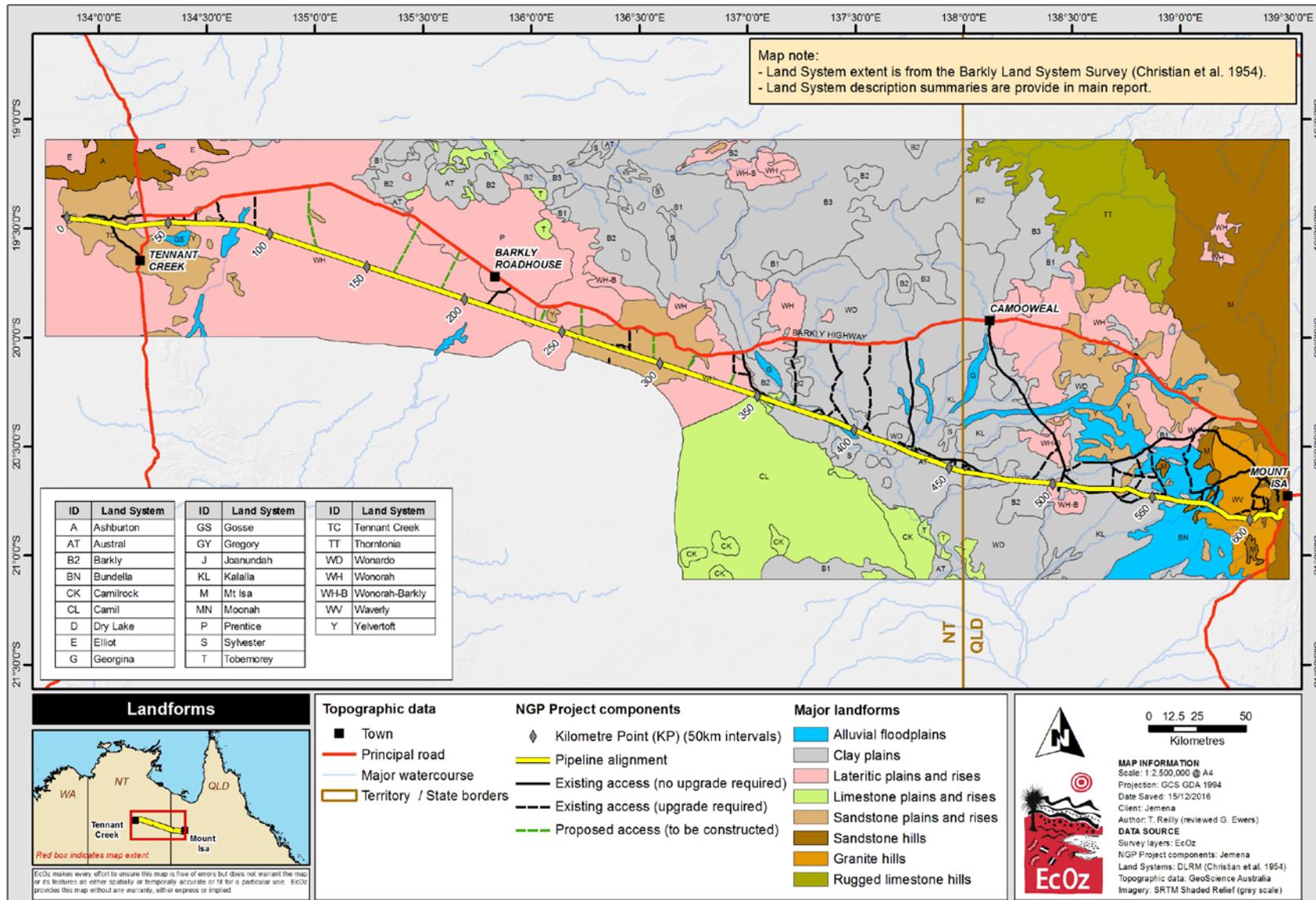


Figure 4 - Major landforms within the region of the Northern Gas Pipeline (source: Jemena, 2016b)

Habitat assessments and/or field surveys were conducted by EcOz Environmental Consulting Pty Ltd for the proposed pipeline route in early 2016. On 23 and 24 March 2016, the Project footprint was surveyed via helicopter to obtain a preliminary description of habitat types that occur in the general region of the Project footprint. High-resolution, geo-referenced footage of the construction ROW and a selection of proposed access tracks were also recorded. Footage was recorded at an approximate height of 150 m at a speed of 90 knots. Information collected during the survey was used to inform the design of targeted threatened species surveys and for the identification of sensitive vegetation types within the Project footprint.

With respect to existing general biodiversity values, nearly the entire construction footprint (apart from existing access tracks that are already cleared) is remnant native vegetation. Threatened Ecological Communities (listed under section 18A of the EPBC Act), national parks, conservation reserves, or other sites of conservation significance are not intersected by the Project footprint. There are some occurrences of riparian vegetation and wetlands, which are considered significant under the *Land Clearing Guidelines* (DNRETAS, 2010). The former relate to the clearing of 3.7 ha of riparian vegetation along the Ranken, James, Blue Bush and Georgina Rivers (Section 4.2.2.1). The latter are proximate to the Project footprint but are not directly intersected by Project activities.

The Proponent's searches on the Australian Government's Environmental Reporting Tool and the Infonet database identified the potential presence of 22 threatened species listed under the EPBC Act and/or the TPWC Act within 50 km of the Project. A likelihood of occurrence assessment was undertaken by the Proponent and nine species were ranked as having a 'high' or 'medium' chance of occurring within the Project footprint. Following targeted field surveys and/or habitat suitability assessment, it was identified that:

- Two threatened species were recorded within the Project footprint:
 - Carpentarian Antechinus (*Pseudoantechinus mimulus*; relevant to Queensland)
 - Tobermorey Melon (*Austrobryonia argillicola*; relevant to the Northern Territory).
- Two threatened species were not identified within the Project footprint. However, were considered likely to occur within the Project footprint:
 - Grey Falcon (*Falco hypoleucos*; relevant to the Northern Territory)
 - Plains Death Adder (*Acanthophis hawkei*; relevant to the Northern Territory and Queensland).
- Five threatened species were considered unlikely to occur within the Project footprint:
 - Painted Honeyeater (*Grantiella picta*)
 - Gouldian Finch (*Erythrura gouldiae*)
 - Brush-tailed Mulgara (*Dasycercus blythi*)
 - Latz's Grass (*Sporobolus latzii*)
 - Greater Bilby (*Macrotis lagotis*).

A summary of the habitat preferences for the threatened species identified as known or likely to occur within the Project footprint and the land units relevant to the Northern Territory is provided in Table 3. The Carpentarian Antechinus was considered to be unlikely to occur within the Northern Territory section of the Project footprint and is not considered further in this Report.

Table 3 – Habitat preferences for threatened species (modified after: Jemena, 2016b)

Species	Habitat preference and presence	Major landform in the Northern Territory (see Figure 4)
Plains Death Adder	Plains Death Adder habitat is present within the Project footprint (broadly) within the Mitchell Grass Downs bioregion (clay plains), which falls between KP355 and KP561, plus approximately 108 km of existing access tracks that will require 5 m widening. The total area of potential disturbance equates to approximately 820.1 ha. Targeted field surveys were not conducted for this species for various reasons. Nevertheless, the presence of regional records of the species and the fact that suitable habitat is traversed by the Project footprint indicates a reasonable likelihood that Plains Death Adder will be present.	Clay plains – KP355 to KP457.
Tobermorey Melon	Tobermorey Melon was recorded within clay plains drainage habitat of the Mitchell Grass Downs bioregion in the Northern Territory. Records of the species were spread across four catchments of the Ranken River, James River, Georgina River and Blue Bush Creek, and were considered part of one regional population. It is estimated that approximately 106.7 ha of suitable habitat that will be temporarily disturbed by construction works (no permanent disturbances will occur within drainage habitat).	Clay plains – KP355 to KP457.
Grey Falcon	Grey Falcon or potential nests were not identified within the Northern Territory Project footprint during field surveys (or in Queensland); however, the species was incidentally observed (foraging or flying over) on three occasions during field surveys outside the Project footprint confirming their current presence in the region. Grey Falcon could conceivably nest within the Project footprint; however, its preference for tall trees means that – regionally – suitable nesting habitat will be restricted to watercourses (or telecommunication towers). The Northern Territory Project footprint intersects 3.7 ha of drainage system habitat considered as potential nesting habitat for the species.	All landforms within the Project site have the potential to provide habitat.

An assessment of significance in respect to threatened species was provided in Section 8 of Appendix G of the draft EIS. Each of the above-mentioned species was assessed to determine whether or not the species occurrence would meet the criteria for being defined as an ‘important’ population in accordance with *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (Department of the Environment, 2013). The assessment gave consideration to key source populations either for breeding or dispersal, populations that are necessary for maintaining genetic diversity and populations that are near the limit of the species’ range. The results of the assessment concluded that:

- the criteria for the populations of Grey Falcon and Tobermorey Melon being important were not satisfied and these species were not considered significant for the purpose of impact assessment
- the known population of Plains Death Adder in the clay plains of the Mitchell Grass Downs bioregion between KP355 and KP561 (Figure 4) was identified as important and was considered for the purpose of impact assessment.

The Plains Death Adder is known from two disjointed areas of habitat in the Northern Territory; the species is known to occur from the cracking soils of the Barkly Tableland and the Adelaide, Mary and Alligator River floodplains. The species occurs over

720 000 km² (extent of occurrence) with the area of occupancy estimated to be approximately 233 480 km². The main threat to the Plains Death Adder is thought to be due to poisoning by cane toads (*Rhinella marina*) (TSSC, 2012). Declines of 89% were recorded in the population on the Adelaide River floodplain within five years of toads arriving. The status of the Plains Death Adder population on the Barkly Tableland is unknown.

The Department of Environment and Natural Resources confirmed the findings of the EIS and considered that the surveys in the Project area were generally adequate for the identification of species, habitat types and sensitive and significant vegetation presented in the EIS. Moreover, the Department considered the Proponent's assessment of the likelihood of occurrence of other threatened species, including aquatic species, and assessment of significance to be accurate and that the Project does not have the potential to pose a significant risk to any other species apart from those considered by the Proponent in the EIS. The Department supported the Proponent's finding that the Plains Death Adder is the only threatened species that may be at risk of a significant impact from the Project.

Based on the information provided in the EIS and advice from the Department of Environment and Natural Resources, the NT EPA is satisfied that the Proponent has adequately identified the key vegetation types, threatened species and provided an adequate assessment of biodiversity values of the Project area.

The NT EPA requested that the EIS quantify the Project's potential impacts to biodiversity values, discuss how the impacts would be avoided and mitigated, and outline whether the impacts following mitigation would be acceptable (NT EPA, 2015).

Chapter 6 of the draft EIS detailed the Proponent's impact assessment in respect to biodiversity values, which considered that the Project activities had the potential to give rise to direct and indirect impacts on biodiversity from:

- direct impacts from land clearing for Project construction, and the mortality of fauna in the pipeline trench, from vehicle strikes and bushfire
- indirect impacts such as habitat fragmentation, edge effects, the effects of noise and vibration, lighting, dust, erosion, reduced water quality and quantity, unsuccessful rehabilitation and the introduction of invasive species.

Reduction in the quality of ecosystems, loss of threatened species habitat and loss of sensitive or significant vegetation types could occur due to land clearing. The construction of the Project would require clearing of 1 753 ha in the Northern Territory. Over 90% of the proposed clearing would be contained within the narrow and linear ROW (either the 30 m wide clearing for the ROW or the 5 to 10 m wide clearing required for new or upgraded access tracks). Clearing within the disturbance footprint would occur gradually over the life of the Project and reinstatement and rehabilitation would occur progressively (Section 2.6.6). The habitats within the Project site are connected with similar habitats within the region, and the linear staging of clearing and rehabilitation allow for the migration of some fauna species into adjacent areas. The proposed progressive rehabilitation would allow for the creation of habitat for fauna species and the recolonisation of habitat by fauna following reinstatement and rehabilitation. It is estimated that over 95% of the Project area would be rehabilitated; approximately 68 ha would remain permanently cleared in the Northern Territory for operational purposes.

4.2.2.1 Sensitive and significant vegetation

The majority of vegetation communities within the Project footprint are regionally common and widespread. With regards to sensitive and significant vegetation types, it was identified that 3.7 ha of riparian vegetation would occur within the Project footprint. The Project has been aligned to avoid wetlands. Field surveys identified that the riparian

vegetation along the Ranken, James, Blue Bush and Georgina Rivers is regionally common, has been degraded by weeds and cattle, and does not have outstanding biodiversity value. While the construction may disturb a small number of large, hollow-bearing eucalypts in the narrow riparian zone of the major watercourses, this would be a very small proportion of that habitat asset in the surrounding area. The Proponent has committed to ensuring that all riparian vegetation will not remain permanently cleared.

The NT EPA considers the Proponent has taken reasonable actions to avoid potential impacts by locating the ROW away from identified sensitive and significant vegetation types, where practicable. Measures to reinstate and rehabilitate the impacted vegetation as soon as practicable after disturbance are appropriate.

4.2.2.2 Plains Death Adder

The Proponent identified that 450.7 ha of suitable habitat for the Plains Death Adder in the Northern Territory cannot be avoided due to the linear nature of the Project. Suitable habitat for the species includes open grasslands over cracking clay soils and it is acknowledged that the clay plains that provide suitable habitat for Plains Death Adder occur for some distance to the north and south of the proposed Project alignment (Figure 4) and that intersection with this habitat would largely be unavoidable, even if the Proponent considered major Project realignments.

The main risk to the Plains Death Adder is the loss of habitat associated with clearing and trenching activities through cracking clay soils. Clearing activities would result in the removal of less than 0.01% of the available habitat for the species in the Barkly Tableland. Construction of the pipeline would require the removal of surface vegetation which would re-establish once construction is complete. The impact of vegetation clearing is unlikely to have a significant residual impact on the Barkly Tableland population of the Plains Death Adder.

Construction activities would temporarily fragment habitat for the Plains Death Adder while the trench is open. Once construction activities within the ROW and the trench have been completed, it is expected that the Plains Death Adder would be able to move across the ROW unhindered. Observations of Plains Death Adders crossing the Arnhem Highway along the coastal floodplains suggest that the species can move across types of linear infrastructure. Given that the pipeline is planned to be buried, it is unlikely that suitable habitat for the Plains Death Adder would be fragmented.

The movement of vehicles along roads at night increases the risk of road-strike on the Plains Death Adder. Construction related vehicles associated with the Project are unlikely to be using roads at night when the species is most active. Personnel that are responsible for the salvage of wildlife from the trench would be driving at night increasing the risk of road-strike. While road-strike would result in the loss of the occasional individual, the impacts are unlikely to be significant due to the low volume of traffic using the ROW and roads.

Indirect impacts on biodiversity values from edge effects, the effects of noise and vibration, lighting, dust and erosion were considered in the Chapter 6 of the draft EIS. The residual risk rating for the identified risk areas were rated as low, which were largely supported by targeted studies provided in the EIS.

The Department of Environment and Natural Resources confirmed the multi-stage approach to impact assessment from indirect activities on biodiversity values was adequate and that the conclusions in the EIS are justified. Based on this advice, the indirect impacts from the above-mentioned Project activities are not considered significant, and do not require further consideration in this Report.

4.2.3 Conclusion

The NT EPA considers that the potential environmental impacts of the Project on general biodiversity associated with vegetation and threatened species have been adequately identified and that the evaluation of the significance of those impacts and risks has been appropriate. The NT EPA is satisfied that mitigation measures proposed in the EIS are adequate and the EPA considers that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.2.1). The NT EPA's assessment on weeds and trench and fauna management in respect to meeting the NT EPA's Environmental Objective are provided in Sections 4.3 and 4.4, respectively.

4.3 Weeds

4.3.1 Environmental objective

The NT EPA's Environmental Objective is to maintain the conservation status, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts (on the Project area and on adjacent areas that may be impacted).

4.3.2 NT EPA assessment

The spread of weeds along the ROW was considered to be a significant risk of the Project. Weed propagules are likely to be picked up and transported through all stages of the Project. As traffic movements along access tracks and the ROW will be most frequent during the construction phase, this is likely to be the period of highest risk. During the operational phase the opportunity for weed transfer would be less frequent. It is relevant to note that weeds are not considered a threatening process for the Plains Death Adder (TSSC, 2012).

Commenters identified that the draft EIS appeared to underestimate the potential for weed incursion along the pipeline construction route and weed hygiene measures were not clear or targeted. One commenter identified that sufficient detail regarding the control measures that will be employed to prevent the proliferation of existing weeds was not identified because weed surveys had not been completed at the time the draft EIS was exhibited.

In response, the Proponent provided further information on the weed identification protocols and management measures in the Supplement. Specifically, the commitments register was updated to include the following:

“Prior to any significant ground disturbance, the following revisions to the Weed Management Plan will occur, for the purpose of addressing specific comments received from DPIR [Department of Primary Industry and Resources] and DENR [Department of Environment and Natural Resources]:

- *Weed monitoring and control to occur during the early wet season for at least 2-years after construction has ceased*
- *For the Objective: No new weed species introduced*
- *Add: Performance indicator - Disturbed areas have less than or equal to the weed species present compared to the pre-clearing condition*
- *Add: Corrective Action - Treat new weeds prior to maturity and seed set*
- *Add: Recording and Reporting - Weed treatment records'*
- *For the Objective: No proliferation of existing weeds as a result of construction*

- *Add: Performance indicator - Disturbed areas have less than or equal to the percentage cover of weed species present compared to the pre-clearing condition*
- *Add: Corrective Action - Treat new weed infestations prior to maturity and seed set*
- *Add: Recording and Reporting "Weed treatment records"*

The Weed Management Plan submitted with the draft EIS outlined the survey methods that would be employed and the weed management measures that would be implemented through the Project construction phase. The above commitments to revise the Weed Management Plan would strengthen the measures provided and is supported by the NT EPA. It is acknowledged that a weed survey of the Project footprint was undertaken during the early Wet season of 2016/17 (i.e. Nov-Dec), which is the most appropriate timing to ensure all existing weed infestations are identified and mapped. Completion of the field survey and incorporating results into the Weed Management Plan is likely to further reduce the levels of residual risk through implementation of targeted site-specific weed management controls.

Further development of the weed management measures have been committed to by the Proponent. These measures would be developed in close consultation with relevant stakeholders and authorities, such as the Department of Environment and Natural Resources, the Northern Land Council, the Central Land Council and other relevant land managers (including land holders). The Proponent recognised that effective weed management is achieved through integrated and collaborative effort and envisages close cooperation with stakeholders. The final Weed Management Plan will form part of the Construction and Operational Environmental Management Plans.

Recommendation 3

A Weed Management Plan for the control and management of weeds shall be prepared and implemented to the satisfaction of the Department of Primary Industry and Resources. The Weed Management Plan must identify the species of weeds, their location in and around the Northern Gas Pipeline and outline methods for avoiding and eradicating/controlling existing infestations. It must identify actions to prevent the introduction of new weed species from vehicles, machinery or any other method, and align with Statutory Weed Management Plans. The Weed Management Plan should specify equipment and vehicle wash-down locations and a rationale for their selection.

4.3.3 Conclusion

The NT EPA is satisfied that the outcomes of the weed survey will be used to inform targeted weed mitigation measures and that the implementation of a Weed Management Plan, consistent with Statutory Weed Management Plans, is appropriate. The NT EPA considers that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.3.1), provided the Proponent implements the measures proposed in the EIS and Recommendation 3.

4.4 Trench and fauna management

4.4.1 Environmental objective

The NT EPA's Environmental Objective is to maintain the conservation status, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts (on the Project area and on adjacent areas that may be impacted).

4.4.2 NT EPA assessment

Excavation of a trench for the installation of the Project has the potential to act as a pitfall trap for fauna. Staff of the NT EPA, and other commenters, requested further information regarding the terminology associated with open trench and the duration and distance of trench openings. The intent of the latter query was to establish an understanding of the duration and conditions in which fauna would be susceptible or vulnerable to falling into the trench. The fauna that fall into the open trench during pipeline construction may be injured or killed as a result of the fall itself, or suffer stress, dehydration, or predation within the trench prior to their release.

The Proponent provided additional information in section 4.4 of the Supplement, which included a framework and objectives for a Trench Inspection Procedure to be implemented by the Construction Contractor. Broadly, the procedure detailed the process involved in checking for, and removing, fauna from the open trench by the fauna spotter / catchers. The objective of the procedure is to minimise harm to wildlife during trenching activities by promptly relocating healthy animals, and preventing the suffering of injured animals. It included details on the roles and responsibilities of persons involved in executing the procedure, details on regular (daily) and periodic inspections, general fauna handling and reporting requirements.

Specialist fauna handlers would undertake daily monitoring of all lengths of open trench throughout the Project including both the main trench and tie-in sections to ensure timely removal of wildlife, to reduce the risk of injury or mortality. In addition, monitoring would be undertaken immediately prior to the lowering and laying of the pipeline into the trench to ensure that any fauna are removed by the specialised fauna handlers.

In respect of the Trench Inspection Procedure, staff of the NT EPA and the Northern Land Council and Central Land Council (the Land Councils) requested targeted information from the Proponent on trench specifications, including duration and distances of the open trench, and associated fauna trench fall management measures. The information was requested to assess if the measures proposed would be suitable for the protection of general biodiversity values. The Proponent stated in the Supplement that *'...due to operational reasons, it is difficult to indicate how much trench will be open at any one time. Regardless of the length and time any section of trench is open; the Construction Contractor will ensure that the Trench Inspection Procedure will be adhered to.'*

The Department of Environment and Natural Resource was asked to provide comment on the adequacy of the Trench Inspection Procedure and respond to claims made by the Proponent on trench fauna management, as part of the consultation on the Supplement. The Department advised that the Proponent had provided sufficient detail to manage wildlife entrapment. However, the proposed measures were considered inadequate to manage animal welfare issues associated with entrapment. The Department provided advice on how the Proponent could improve the Trench Inspection Procedure, which was provided to the Proponent for response in the direction to provide additional information (NT EPA, 2016).

Further information on details and management options in respect of trench and fauna management was provided in the Proponent's response to the direction (Jemena, 2016d). Agreement was reached on recommendations to reduce the placement of fauna shelters to be at intervals not greater than 500 m and fauna spotter / catchers hold, or be listed on, a valid permit to take or interfere with wildlife issued under the *Territory Parks and Wildlife Conservation Act* and be experienced in the identification of fauna and assessment of fauna condition. The Proponent suggested revising the recommendation to complete trench inspections within four hours of sunrise to within five hours, due to work health and safety requirements, which is considered reasonable.

The NT EPA recommended that the installation of trench plugs and ramps should be made at maximum intervals of 1 km as recommended by studies on entrapments of fauna in trenches (e.g. Doody *et al.*, 2003, Swan and Wilson, 2012, Woinarski *et al.*, 2000). The Proponent responded that mandating trench plugs at a set interval would constrain pipeline construction by requiring a break in welded lengths that would then need to be reinstated later, requiring further time for access later and ongoing disruption to the land, land holder operations and the environment. A proposed revision by the Proponent was that trench plugs should be installed where required by the land holder or otherwise every 1.2 to 3 km apart depending on the land use and type. The NT EPA considers that it is important for land holders to be consulted in respect to the placement of trench plugs and ramps. However, the Proponent has yet to provide sufficient information to justify intervals of up to 3 km between trench plugs and ramps, which are informed by environmental protection initiatives.

The Proponent also provided responses to recommendations to restrict the length of the open trench to not exceed a length capable of being practically inspected and cleared by fauna spotter / catchers and that the maximum length of the open trench not exceeds 20 km in any case. The Proponent requested no restriction on the total amount of open trench to minimise delay in the construction of the Project and to allow it to meet its objective to complete construction in the 2017 Dry season. As an alternative, the Proponent suggested a commitment that for every 20 km of open trench, there will be a team of two fauna spotter / catchers performing daily inspections. The NT EPA considers the Proponent's revised commitment to be appropriate in the absence of specific details on the expected distance of open trench.

In addition to the adequacy of the Trench Inspection Procedure, commenters also raised concern about entrapment and drowning of fauna in the trench in the event of rainfall. The Proponent advised in the Supplement that in the event of a forecasted large rainfall event, it would not be possible to close the trench. Trench ramps and fauna shelters would remain in place, and may be used by fauna that become trapped in the trench. The NT EPA considers that the Proponent has acknowledged the heightened risk of fauna death following large rainfall events and that the embedded ramps and fauna shelters would lower mortality rates under all weather conditions.

Recommendation 4

Any licence issued under the *Energy Pipelines Act* should include the following conditions:

- **the maximum length of the open trench not exceeds a length capable of being practically inspected and cleared by fauna spotter / catchers teams**
- **fauna shelters be placed at intervals not greater than 500 m**
- **fauna ramps and/or earth plugs be placed at intervals not greater than 1 km**
- **all fauna spotter / catchers hold, or be listed on, a valid permit to take or interfere with wildlife issued under the *Territory Parks and Wildlife Conservation Act* and be experienced in the identification of fauna and assessment of fauna condition**
- **fauna spotter / catchers must complete the trench inspection and clearance within five hours of sunrise**
- **works on the trench not commence until trench inspections have been completed for the section or area intended to commence works**

- a vet be on standby if fauna are in need of medical treatment, such as from injury.

4.4.3 Conclusion

The NT EPA worked with the Proponent and the Department of Environment and Natural Resources throughout the EIA process to ensure that the potential impacts and risks associated with wildlife entrapment from trenching activities were adequately identified and managed. The NT EPA considers that the Proponent's environmental protection measures could be improved and strengthened, based on scientific literature on other linear infrastructure projects and advice from the Department of Environment and Natural Resources. The NT EPA makes Recommendation 4 in consideration of measures to reduce the potential impacts and risks with wildlife entrapment. Provided Recommendation 4 is actioned, the NT EPA is satisfied that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.4.1).

4.5 Water sourcing

4.5.1 Environmental objective

The NT EPA's Environmental Objective is to ensure available water supplies will be sufficient to fulfil the Project needs over the predicted life of Project, without causing environmental or social impacts.

4.5.2 NT EPA Assessment

The NT EPA identified the potential impacts to water resources from sourcing water to support the construction of the pipeline and hydrostatic testing of the pipeline as having the potential for a significant effect on the environment. A number of commenters on the draft EIS identified an unsustainable level of water extraction from groundwater in the Barkly region, an arid zone, which could significantly deplete the groundwater aquifers of that region.

At the time of making this Report, the Project water requirements and volumes were known (Section 2.9). However, the water sourcing locations and the agreements to support the water use for the construction and operation of the Project had not been confirmed. The Proponent, and its Construction Contractor, were actively investigating the use and quality of existing bores and dams (if present), or the potential to construct new bores, on Soudan Station, Barkly Down Station, Tennant Creek Station and two sites near Philip Creek (Jemena, 2016d) and were negotiating agreements with land holders and water providers, such as Power and Water Corporation.

The Proponent has recently engaged a hydrogeologist to assess the potential impacts of groundwater extraction from the Project. Fulton (2016) reported on a desktop assessment of potential groundwater impacts to existing users and/or the environment arising from estimated water extraction during construction at locations KP0, KP163, KP292 and KP413. Fulton (2016) found that modelling estimated that the measurable drawdown cone from construction phase groundwater extraction would extend 6370 m at KP0, 4650 m at KP292 and 2130 m at both the KP163 and KP413 sites. The drawdown cone represented the region within which drawdown may be measurable and did not inherently represent an impact zone. Any 'impact' would be influenced by a number of factors including the site hydrogeology, the magnitude of the drawdown at the bore/environmental dependency and for existing bores pumping rates, schedules and the available head (i.e. water column above the pump).

A review of the location of existing bores and potential environmental dependencies around the dam sites revealed that at KP0 several bores associated with the Warrego mine fall just within the zone of measurable drawdown. These bores are unlikely to be affected by groundwater production at KP0 because the predicted drawdown at their location was minimal (0.28 m) and the majority of the groundwater bores associated with

the Warrego mine were not constructed. The mine site is not currently operational, further reducing the potential impacts of groundwater drawdown at the Warrego mine site.

At all other proposed water storage sites, identified bores and potential environmental dependencies were located outside the measurable zone of drawdown. Fulton (2016) concluded that the proposed groundwater extraction for construction of the Project would have a low risk of affecting yields in existing bores and impacting existing users, or reducing the availability of water to environmental dependencies

The Proponent expects the final locations of water supply for construction will be made just prior to mobilisation for construction in March 2017 (Jemena, 2016d). The siting of the final locations would be informed by the findings of the hydrogeologist and follow formal land owner agreements being finalised.

The Proponent has committed to only extracting within sustainable rates of each respective bore, in accordance with land holder agreements. The latter is also related to another commitment by the Proponent to not source water from any Aboriginal Land Trust Areas without the agreement of Traditional Owners and Land Councils. The Proponent will also be required to obtain approvals to drill new bores and to take or use groundwater within the identified Water Control District, in accordance with the *Water Act* (Section Water use2.9).

4.5.3 Conclusion

While specific information on the water sourcing locations had not been determined at the time of making this Report, the NT EPA is satisfied that the Proponent has identified the Project water requirements; agrees with the conclusions made by Fulton (2016); and agrees with the Proponent's initial assessment that construction water requirements are relatively small by volume (i.e. 111 ML) and the potential for significant impact to occur from construction extraction is likely to be limited in duration as extraction would occur over a 12-18 month period. The NT EPA considers that engaging a hydrogeologist to undertake impact assessment on water sourcing is appropriate, especially to understand the potential impacts during the operational phase of the Project and to inform appropriate siting of water sourcing infrastructure for sustainable water extraction. A notice in accordance with clause 14A of the Environmental Assessment Administrative Procedures would be required to be submitted by the Proponent if there are variations to the proposed water sourcing strategy or siting of final water sourcing infrastructure that have the potential to alter the environmental significance of the Project (see Recommendation 2). Overall, the NT EPA considers that available water supplies will be sufficient to fulfil the Project needs over the predicted life of Project, without causing environmental or social impacts, and that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.5.1).

4.6 Watercourse crossings

4.6.1 Environmental objective

The NT EPA's Environmental Objective is to ensure surface water and groundwater resources are protected both now and in the future, such that the ecological health and land uses, and the health, welfare and amenity of people are maintained.

4.6.2 NT EPA Assessment

Construction of the Project in the Northern Territory would involve three major watercourse crossings at the Ranken, James and Georgina rivers, 12 minor watercourse crossings and a number of drainage line crossings (Section 2.6.4). A watercourse crossing survey report was prepared by EcOz Environmental Consulting Pty Ltd (Appendix K, Draft EIS), which included the results of survey efforts undertaken between 2 and 9 May 2016. The field survey involved accessing the proposed crossing locations

via helicopter and describing the physical characteristics of the banks, beds and riparian vegetation, including reconnaissance to identify the presence of pools.

The survey report noted that the identification of pools was limited due to a number of watercourses flowing at the time of the survey effort. The survey report noted that higher than average rains in March 2016 (last recorded rainfall on 15 March 2016) and rainfall in the region between 8 and 9 May 2016 was likely to have contributed to the flowing watercourses observed at the time of the survey. In respect to the former, the NT EPA is of the opinion that it is not unusual for late season or higher than average rain events to occur in the region. It demonstrates the unpredictable weather conditions of the Project area and the capacity of the systems to hold water. In respect to the latter, the NT EPA considers it highly unlikely that the localised rainfall, which was recorded on 9 May 2016 at weather stations (station numbers 015040, 015005 and 015004) proximate to the survey locations on the Ranken, James and Georgina Rivers, could have resulted in increased flows at the time of the survey, which were accessed on the morning of 8 May 2016. It is likely that the claims regarding the impact of the localised rainfall on the presence of flowing water related to watercourse crossings other than the Ranken, James and Georgina Rivers, that were surveyed late on 8 May or 9 May 2016, or later. Irrespective of the potential issues with the survey effort, what is notable is that water was present at the time of the survey and the Proponent was unable to confirm the presence or absence of pools at or near to the proposed crossing locations.

4.6.2.1 Environmental values

As a general principle, the NT EPA does not support the use of open trenching methods for any watercourse that is flowing, including base flow, or within close proximity to pools that support ecosystem function. It was requested that information be provided that clearly demonstrates measures have been taken to avoid and mitigate the risks associated with watercourse crossings. Further information was requested on the specific watercourse crossing locations, survey methods and targeted information on watercourse crossing methods.

Additional survey works to identify the locations of pools and characterise the environmental values of the James, Ranken and Georgina Rivers were not undertaken to inform the Supplement. It was noted in the Supplement that *'where pools are present at the watercourse crossings, a dam and pump crossing technique will be employed to minimise impacts on water flows and water quality'*. The criteria provided in Table 4-3 of the Supplement indicated that a dam and pump crossing technique would be used if the *'water is flowing in watercourse, watercourse in a creek or river (stream order 3+), and a pump is available to allow water to be pumped at a similar rate to flows, and provide for a dry work area'*. The dam and pump crossing technique was also identified as an alternative if the criterion for using the open cut trench technique could not be satisfied.

The NT EPA was not satisfied that the environmental values of the James, Ranken and Georgina Rivers had been sufficiently characterised and did not support the proposed criteria for determining conditions suitable for constructing the Project at these locations when water is present (NT EPA, 2016). Of importance was that semi-permanent and permanent pools, which persist throughout the Dry season are known to occur in these systems. The pools may possess unique geomorphologic/geological characteristics to support the longevity and persistence of water that could be impacted by construction activities for the Project. Further information on the environmental values of the above-mentioned rivers was not provided in the Proponent's response to direction (Jemena, 2016d).

At the time of making this Report, the NT EPA is still not satisfied that the environmental values of the James, Ranken and Georgina Rivers have been sufficiently characterised and is unable to conclude that the Proponent has all taken reasonable and practicable measures to avoid potential impacts to the environmental values of these systems, primarily because the Proponent had not provided sufficient information to identify

environmental values and facilitate impact assessment. In the absence of avoidance measures, the NT EPA considers the proposal to utilise a dam and pump crossing technique where pools are located to be inappropriate.

The NT EPA considers that further works are required to characterise the environmental values of the systems and to develop suitable avoidance and mitigation measures specific to each watercourse, which may include alternative crossing methods, such as consideration of horizontal directional drilling as an option. At a minimum, the NT EPA considers it necessary for site specific information on the watercourses to be obtained, including proximity of proposed construction works to semi-permanent and permanent pools. Where pools are identified within or proximate to the Project footprint, it would be appropriate for a buffer around each pool to be determined for which works would be prohibited. The buffer should be informed by the potential impacts to the geomorphology and hydrology of the identified pools.

4.6.2.2 Cultural values

The Northern and Central Land Councils identified that permanent or ephemeral waterbodies, and riparian vegetation, especially large eucalyptus trees, have value to the local Aboriginal people. The Councils expressed concern in its submission on the draft EIS that the Proponent had not given enough attention to minimising impacts on these values and recommended adequate consultation on these matters with the Traditional Owners.

It is understood that consultation with relevant stakeholders on the cultural values of watercourse crossing locations had progressed since the exhibition of the draft EIS (Jemena, 2016d). The Proponent advised that there are a number of waterholes in the vicinity of the Ranken, James and Georgina Rivers that are Aboriginal sacred sites that have been avoided following consultation with Traditional Owners and Land Councils. Similarly, where there are large eucalyptus trees that are of specific cultural value to Traditional Owners and Site Custodians, these have been noted, avoided and included in the agreed Sacred Site conditions. The conditions of the Authority Certificate implemented during the construction and operations phase of the Project will ensure the protection of these values, in accordance with the wishes of the Traditional Owners, Site Custodians and the Land Councils.

The NT EPA acknowledges that the cultural and environmental values of the James, Ranken and Georgina Rivers often overlap. For example, waterholes in the vicinity of the proposed watercourse crossings may hold both cultural and environmental value. While the NT EPA accepts claims that cultural values have been avoided without the public provision of specific details on culturally significant locations, negotiations and/or agreements, it considers that environmental values of the system were not evaluated adequately, particularly where they were co-located with cultural values. The NT EPA considers that the survey effort presented in the draft EIS used to identify the watercourse crossings was inadequate to inform project design (i.e. confirmation of presence or absence of pools to facilitate avoidance and mitigation measures). The Proponent did not undertake further works or provide additional information in the final EIS. Overall, the NT EPA is unable to assess the potential impacts and risks to the environment from watercourse crossing activities with a high level of certainty.

Recommendation 5

Any licence issued under the *Energy Pipelines Act* should include a condition that impacts to all semi-permanent and permanent pools in the Ranken, James and Georgina Rivers that intersect or are proximate to the area of disturbance by the Northern Gas Pipeline be avoided.

4.6.3 Conclusion

In the absence of a high level of certainty, the NT EPA has considered the available literature and data on the environmental condition of the James, Ranken and Georgina Rivers, in consultation with the Department of Environment and Natural Resources. It is highly likely that semi-permanent and permanent pools are present in these systems and that it is reasonable for the Proponent to implement measures to ensure that these pools are avoided by deviating the ROW around the pools or implementing alternative construction techniques, such as horizontal directional drilling, if pools are identified. It is appropriate for the Proponent to ensure that Recommendation 5 and the criteria for determining the suitable on-ground conditions to commence construction in watercourses are finalised and incorporated into the Environmental Management Plan (Section 4.12). The NT EPA makes Recommendation 5 and provided it is actioned, the NT EPA is satisfied that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.6.1).

4.7 Hydrostatic test water

4.7.1 Environmental objective

The NT EPA's Environmental Objective is to ensure surface water and groundwater resources are protected both now and in the future, such that the ecological health and land uses, and the health, welfare and amenity of people are maintained.

4.7.2 NT EPA Assessment

Hydrostatic testing of pipeline sections would be conducted to demonstrate pipeline strength and leak tightness. This would require single large volumes of water to be pumped into sections of the completed pipeline.

A number of commenters and staff of the NT EPA sought clarification on the procedures for hydrostatic testing of the pipeline, chemical composition of the source and resultant water and methods and risks of disposing of the water.

The Proponent provided additional information in section 4.8 of the Supplement, which confirmed that ten sections would be tested and that six temporary water storage dams would be used to store water for reuse in test sections. Three dams would be in the Northern Territory. The dams would be appropriately sealed to limit leakage to ground and appropriate infrastructure, such as fencing and signage would be erected to deter access. Water would be reused as much as possible to reduce the need to source water along the construction ROW.

Hydrostatic test water would not be discharged into, or near, a watercourse. No discharges are currently planned to occur in the Northern Territory; all water is planned for discharge at the end of the line in Queensland in accordance with a Hydrostatic Test Management Plan and in accordance with the requirements of the Environmental Authority under the *Environment Protection Act (Qld)*.

In addition, the Proponent identified the requirements for biocides, oxygen scavengers and other additives, and treatment options for their use. These would include Bactron B1710 or Bactron AUK-550, Nalco 780, ECOFLOC C0125S and Hydrosure DA-4070. The Proponent has identified appropriate dosage rates, and physiochemical (e.g. water temperature, aeration, etc.) conditions, that would be required to treat the water to an appropriate standard suitable for release to land.

4.7.3 Conclusion

The NT EPA is satisfied that the Proponent has provided a broad framework for the management of hydrostatic test water and that potential impacts to the environment in the Northern Territory are not significant. The NT EPA is satisfied that mitigation measures proposed in the EIS are adequate and the NT EPA considers that the Project

can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.7.1).

4.8 Soils

4.8.1 Environmental objective

The NT EPA's Environmental Objective is to ensure surface water and groundwater resources are protected both now and in the future, such that the ecological health and land uses, and the health, welfare and amenity of people are maintained.

4.8.2 NT EPA assessment

The NT EPA identified the increased risk of soil erosion as having the potential for a significant effect on the environment. In particular, some soils that occur along the proposed pipeline route are highly sensitive to disturbance and have poor recovery potential once disturbed. Areas susceptible to erosion include watercourses (see Section 4.6), steep slopes with shallow soils, and areas with fragile soil types, including sodic or dispersive soils. Vegetation clearing, vehicle movements, trenching activities and delays in implementing reinstatement are potential risk areas in respect to soil erosion associated with the Project.

Soil site inspections were undertaken by Douglas Partners between 3 and 9 May 2016. During the site inspections, the soil scientists and engineering geologist mapped rock outcrops, creek beds and slopes, landforms, vegetation types and potential for acid sulfate soils (Appendix L of the draft EIS). The survey identified silty and sandy soils primarily between KP0 and KP350 and clayey soils (black soils) between KP350 and KP457 (the NT/QLD borders) (Figure 2). As identified in Section 4.2.2.2 of this Report, the clayey soils occur to the north and south of the proposed alignment and it would be difficult to avoid without major realignment.

In general, most of the alignment in the Northern Territory is of low relief, with localised areas of low to moderate relief around Tennant Creek. Areas of steep slopes with shallow soil and evidence of acid sulfate soils (e.g. presence of acid, salt or waterlogged tolerant plant species, the presence of jarosite, water clarity or the corrosion of infrastructure) were not identified during the field surveys. Based on the field survey and the preliminary laboratory testing, the Proponent concluded that there was a low to moderate risk of erosion for the Project alignment in the Northern Territory; with the moderate risk areas for impact assessment being associated with the works in watercourses and the clayey soils, which may be dispersive.

4.8.2.1 Watercourses

The primary function of the ROW is to provide access for construction vehicles and plant equipment to complete all aspects of pipeline construction. This includes reinstatement which occurs after components of the Project are installed. The Proponent's approach to watercourse reinstatement, including construction of erosion and scour protection measures, is to aim to minimise alteration to the hydrodynamic profile of the watercourse.

The locations of the watercourse crossings would be selected to ensure they are appropriately located to avoid features that are likely to be more susceptible to erosion. The Proponent has committed to reinstating the trench and watercourse banks and bed once access is no longer required (i.e. completion of construction). Reinstatement would include scour protection, profiling of the bed and bank profile, respreading vegetation and installing erosion and sediment controls. Once this has occurred, access would be restricted to the watercourse to allow for revegetation to be maximised. The crossing locations would be subject to regular monitoring against reinstatement criteria, and corrective actions have been proposed in the event that reinstatement is ineffective. Overall, the Proponent's measures and commitments align with watercourse crossings

described in International Erosion and Sediment Control (2008) and other industry best practice guidelines (Australian Pipeline Industry Association, 2013).

4.8.2.2 Clayey soils

The Proponent has committed to undertake detailed soil surveys as part of the pre-clearance works (Section 2.6.1). Potential acid sulfate soils identified during the survey would be avoided. However, it is unlikely that such soils would occur along the proposed alignment, based on the results of the field survey and preliminary laboratory testing.

The Proponent provided a detailed framework for the Progressive Erosion and Sediment Control Plans in the draft EIS, which included targeted management measures for operating on clayey soils and dust mitigation. The Proponent has committed to ensuring that the Plans are updated prior to works and revised throughout the construction period to account for on-ground conditions. As with the reinstatement of watercourse crossing, the Proponent has committed to reinstating the ROW in accordance with International Erosion and Sediment Control (2008) and industry best practice guidelines (Australian Pipeline Industry Association, 2013).

All reinstated areas would be monitored following completion of construction activities, and the Proponent anticipates that additional minor rehabilitation works and weed control activities would be required along the reinstated ROW and other areas during the first few years of operation. The intended outcome of reinstatement and rehabilitation measures would be to ensure all areas disturbed through construction are stable; re-profiled to a level consistent with surrounding soils; re-profiled to original contours and established drainage lines; and vegetated with groundcover which is not a declared weed, and which is established and self-sustaining. The final acceptance criteria to determine successful reinstatement of areas susceptible to erosion would be measured either against the highest ecological value adjacent land use or the pre-disturbed land use:

- greater than or equal to 70% of native ground cover species richness
- greater than or equal to the total per cent of ground cover
- less than or equal to the per cent species richness of declared plant pest species
- where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then at least one regional ecosystem(s) from the same broad vegetation group, and with the equivalent biodiversity status or a biodiversity status with a higher conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present.

4.8.3 Conclusion

The NT EPA considers that the potential environmental impacts of the Project on soils have been adequately identified and that the proposed management measures are appropriate. The NT EPA is satisfied that measures proposed in the EIS are adequate for the provisions for watercourse crossing reinstatement, treatment of problematic soils, and permanent controls for high risk erosion areas, and supports the ongoing monitoring program to inform the final reinstatement criteria. The EPA considers that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.8.1).

4.9 Road transport

4.9.1 Environmental objective

The NT EPA's Environmental Objective is to ensure that risks to human health and safety are identified, understood and adequately mitigated.

4.9.2 NT EPA assessment

The NT EPA identified road safety as an issue associated with increased traffic movement from construction vehicles on the Barkly Highway, and other roads. The increased frequency of vehicles and their combined weight over time also has the potential to damage the local roads and road verges. Safety implications and social impacts of construction traffic using public roads were also identified as a significant risk.

Details of the anticipated traffic movements per day are provided in Chapter 2 of the draft EIS. The construction phase of the Project would involve increased numbers of vehicle movements, in particular road-trains and other heavy vehicles, compared to existing road conditions. There would also be a requirement for transportation of hazardous and dangerous goods to the construction ROW.

During the Project construction phase the increase in traffic compared to baseline conditions would result in interaction between light and heavy vehicle Project traffic and general traffic, which in turn will alter traffic flow and increase the risk of traffic incidents. There may also be an increased risk to pedestrians, especially in more isolated areas where local people may not be accustomed to heavy traffic volumes.

The timing of the peak construction phase, during the Dry season, corresponds with peak tourist season. The Stuart Highway and Barkly Highway receive tourist traffic over this period, including caravans and campervans. Tourists unfamiliar with remote road conditions may be at increased risk of contributing to road crashes. Altered traffic conditions may result in traffic deaths and may increase the likelihood of incidents at locations where the construction ROW crosses roads and tracks used by local people.

In the absence of any controls, traffic incidents and unauthorised access to the works area are possible and could result in incidents that cause serious injuries or fatalities. Both the likelihood and consequences associated with traffic incidents can be increased in remote areas when drivers are not expecting to encounter large/heavy vehicles and where emergency response times are often extended.

The Proponent provided a high level Traffic Management Plan for traffic management through the construction phase in the draft EIS. Commenters and the Department of Planning, Infrastructure and Logistics commented that the Proponent had not undertaken a Traffic Impact Assessment for the Project and the Traffic Management Plan was inadequate. The NT EPA also highlighted the requirement for detailed Traffic Impact Assessment to inform a targeted Traffic Impact Management Plan for the Project (NT EPA, 2016).

The Proponent has not completed, but has committed to completing, a Traffic Impact Assessment in accordance with AUSTRROADS (2016). The assessment would include details on access, vehicle types, volumes of existing vehicles and increased traffic and other relevant matters, including risk assessments to reflect how all roads and infrastructure will be affected. The Proponent claimed that up until recently, the Project did not have sufficient detailed information to commence the Traffic Impact Assessment. The construction program and land access negotiations needed to be significantly progressed to inform expected vehicle traffic across specific areas in the region. The Proponent has engaged a consultant to prepare the Traffic Impact Assessment and Traffic Management Plan. Drafts of these documents are intended to be completed by February 2017. The Proponent requested that the NT EPA consider allowing the EIS assessment to proceed, based on the commitment that the Traffic Impact Assessment and Traffic Management Plan will be submitted for separate review and approval by Department of Planning, Infrastructure and Logistics in late February 2017 (Jemena, 2016d).

Recommendation 6

The Proponent shall obtain approval of the Traffic Impact Assessment and Traffic Management Plan for the Northern Gas Pipeline from the Department of Infrastructure, Planning and Logistics, prior to the commencement of works.

The Project requires a number of access tracks to be constructed that would provide access from the Barkly Highway to parcels of Crown land, Aboriginal-owned land, and land subject to native title claims. There are a number of small Aboriginal family outstations and pastoral homesteads in proximity to the pipeline route in the Northern Territory (Figure 1). The Proponent intends to manage unauthorised access to the Project areas, such as for hunting, discreet travel, illegal activities, etc., through implementing a Traffic Management Plan, Traffic Guidance Schemes and Project Security Plan. In addition to these management plans it is essential that affected stakeholders are consulted on the potential impacts associated with unauthorised access to the Project, and potentially areas proximate to the Project. This would need to be resolved using the correct negotiation protocols with road service authorities, land councils, land holders and other stakeholders.

Recommendation 7

The Proponent shall develop a communication and consultation strategy to engage impacted stakeholders on the potential impacts and management of unauthorised access to the Northern Gas Pipeline and surrounding areas.

4.9.3 Conclusion

At the time of making this Report, the NT EPA is not satisfied that the potential impacts and risks associated with increased traffic movement from construction vehicles on the Barkly Highway, and other roads, has been suitably addressed by the Proponent. The potential impacts to road users, including safety concerns has the potential to result in extreme or catastrophic consequences. Given the public interaction with this Project, it would have been appropriate for public stakeholders to be informed and provide input into Project design and planning through the EIA process. It is unknown whether the Proponent and/or the consultant intend to consult with the public or whether the assessment of the Traffic Impact Assessment and Traffic Management Plan by the Department of Infrastructure, Planning and Logistics, would include public consultation. Based on the information supplied by the Proponent, the NT EPA is unable to conclude that the potential impacts and risks to the environment from traffic and use of the transport network have been suitably identified, and appropriately mitigated. Therefore, the NT EPA is not satisfied that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.9.1), principally that the risks to human health and safety are identified, understood and adequately mitigated. The NT EPA considers that an appropriately developed Traffic Impact Assessment and Management Plan and adequate consultation with stakeholders would enable the NT EPA's Environmental Objective to be met, and makes Recommendations 6 and 7 to this effect.

4.10 Socio-economic aspects

4.10.1 Environmental objective

The NT EPA's Environmental Objective is to monitor and manage the intended and unintended social and economic consequences, both positive and negative, of the Project.

4.10.2 NT EPA assessment

Chapter 9 of the draft EIS provided a summary of the social and economic risks associated with the Project. A detailed Social and Economic Impact Assessment was

provided as at Appendix D of the Supplement, and the Social and Economic Management Plan (Jemena, 2016a) was provided at a later date.

The Proponent detailed the framework for the management of socio-economic impacts and benefits from the Project. In particular, the draft EIS addressed the distribution of economic impacts, taxes, social consultation, short-term increases in employment and service provisions. The Proponent has undertaken regular social engagement and monitoring programs, including community complaints, social baseline and community perception surveys. The Proponent has developed a Community Development Management Plan, and has an External Affairs team responsible for external company communications with key stakeholders and communities in the Barkly and Mount Isa areas.

The social impact assessment identified additional socio-economic aspects to avoid, mitigate and/or manage that were specific to the Project. These included loss of access to land, impacts on social amenity and anxiety and uncertainty surrounding gas supplies. The Proponent proposed that the Section 22 agreement under the *Aboriginal Land Rights (Northern Territory) Act 1979* to be negotiated between the Proponent and the Land Councils for the Project is the primary vehicle for addressing a number of these impacts with Traditional Owners. The Proponent is also negotiating land access agreements with land holders (Section 4.5). The NT EPA notes that construction would not commence until such agreements are in place and considers that the aforementioned social considerations should form part of the negotiations to inform the proposed agreements.

4.10.3 Conclusion

Based on the information provided in the final EIS and commitments made by the Proponent to address social and economic impacts specific to the Project in the agreements and ongoing engagement, the NT EPA is satisfied that the Proponent has adequately identified the potential social and economic impacts from the Project. The Proponent has provided a thorough framework to monitor and manage the intended and unintended social and economic consequences, both positive and negative, of the Project. The NT EPA notes that it is important for socio-economic aspects to be subject to regular review and that grievances, disputes and complaints, and how they were resolved, are recorded and reported to the Land Councils and the Department of Primary Industry and Resources. The NT EPA makes Recommendation 7 to inform traffic management but to also strengthen the Proponent's framework for communication and engagement to manage socio-economic impacts. In consideration of Recommendation 7, the NT EPA is satisfied that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.10.1).

4.11 Greenhouse gas emissions

4.11.1 Environmental objective

The NT EPA's Environmental Objective is to minimise the emission of greenhouse and other atmospheric gases through the application of best practice.

4.11.2 NT EPA Assessment

The regulation of emissions of greenhouse gases from the production and use of gas are the responsibility of the Australian Government (Section 1.3.3). The emissions of greenhouse gases from the construction and operation of the Project were considered by the NT EPA in its assessment of the Project. Information on greenhouse gas emissions, including sources and projected quantities of greenhouse gases emitted by the Project were identified in the information requirements described in the Terms of Reference for the Project (NT EPA, 2015). An Air Quality Assessment, which included assessment of greenhouse gas emissions, was undertaken by Air Noise Environment

(Appendix V of the draft EIS). The findings were presented in Chapter 11 of the draft EIS.

The Project would produce greenhouse gas emissions from land clearing, operation of the Philip Creek Compression Station and gas combustion in the Northern Territory (Section 2.7). The Proponent identified emissions of methane and combustion emissions from the operation and maintenance of compressor stations and main line valves, as well as controlled release of gas during commissioning, periodic testing and in emergency situations (Section 2.7). The Philip Creek Compression Station would comprise filtration and separation equipment to remove liquids and impurities to ensure gas meets the specifications.

Annual greenhouse gas emissions during construction and operation were estimated based on methods outlined in the *National Greenhouse and Energy Reporting Act 2007*. Table 4 summarises the estimated total Scope 1 and 2 emissions during Project Year 1, Project Year 2 and for subsequent operations of the Project (data for Northern Territory and Queensland). Project Year 1 includes construction only. Project Year 2 includes construction and commissioning in the first half of the year and operation in the second half.

Table 4 – Estimated greenhouse gas emissions and total emissions from the Northern Territory for the period between 1990 and 2014 (modified after: Jemena, 2016c, and Department of Energy and Environment, 2016)

Year of Project	Scope 1		Scope 2		Total Emissions (tonnes CO ₂ -e)	Range of Annual Northern Territory Emissions 1990 – 2014 (tonnes CO ₂ -e)
	Energy Usage (GJ)	Emissions (tonnes CO ₂ -e)	Energy Usage (GJ)	Emissions (tonnes CO ₂ -e)		
Year 1	136 810	9 604	-	-	9 604	11 157 940 - 16 630 600
Year 2	929 093	72 229	19 656	4 313	76 542	
Annual Operation	1 689 985	103 462	39 312	8 627	112 089	

Total annual operational greenhouse gas emissions (Scope 1 and Scope 2) of 112 089 tonnes CO₂-equivalent represent 0.89% of Northern Territory total emissions and 0.02% of Australian total emissions when compared to emissions data from 2014 (Department of Energy and Environment, 2016). The Proponent proposed measures in the draft EIS to implement a regular maintenance regime to minimise the potential for gas leakage along the pipeline and at facilities, and implementation of a regular maintenance regime for gas engine alternators and compressor turbines to ensure they are operating at peak efficiency. The management and monitoring measures for air quality would also be in accordance with the industry codes of practice (Australian Pipeline Industry Association, 2013).

Based on the estimated emissions, the operation of the Project is expected to trigger the *National Greenhouse and Energy Reporting Act 2007* reporting threshold for a single facility of 25 000 tonnes CO₂-equivalent of greenhouse gases and 100 000 MJ of energy consumed. The Proponent has committed to monitoring and reporting greenhouse gas emissions in accordance with legislative requirements identified under the *National Greenhouse and Energy Reporting Act 2007*.

4.11.3 Conclusion

The NT EPA considers that the Proponent has identified the sources of greenhouse gases, quantified the estimated emissions and proposed reasonable and practicable management measures based on industry best practice. The NT EPA acknowledges that emissions of carbon dioxide and methane are inherent to the Project and that total projected greenhouse gas emissions for operational purposes would constitute an approximately 1% increase in the total greenhouse gas emissions of the Northern Territory based on 2014 data. The NT EPA considers that the Project can be managed in an acceptable manner to meet the NT EPA's Environmental Objective (Section 4.11.1).

4.12 Environmental Management

Chapter 13 of the draft EIS described the proposed environmental management measures that would need to be developed and implemented to address the potential environmental impacts associated with the Project. A number of provisional management plans have been considered through the course of the EIA process for the Project. The plans are broadly conceptual by the Proponent in acknowledgement that as the Project enters the design and implementation phases there would be more specificity around the aspects of Project. The Proponent has committed to reviewing and finalising the policies, plans and procedures prior to the commencement of the Project to ensure that they address all activities proposed to be undertaken on the Project site, and would be modified as necessary to account for on-ground conditions.

The ROW would be surveyed and marked to guide Project activities, primarily associated with land clearing. The environmental and cultural surveys would be undertaken along the ROW prior to clearing and a 'Green tag' system would be established. The inspections would include identification of weeds and environmentally sensitive areas, which would be avoided or cleared under specific management actions. The surveys would also identify and map problematic soils (i.e. dispersive or contaminated) and pre-construction environmental assessments, including photographs and GPS references, to establish as pre-construction baseline information and/or identify analogue sites for comparison during reinstatement and rehabilitation monitoring. The pre-clearing work would allow for avoidance measures to be implemented as a first priority and to allow targeted mitigation measures to be developed prior to disturbance.

The Proponent proposed several site-specific management plans and procedures that would also be required to be developed, which would include:

- Construction Environmental Management Plan
- Operational Environmental Management Plan
- Decommissioning Management Plan
- Biodiversity Management Plan
- Weed Management Plan
- Reinstatement Management Plan
- Rehabilitation Management Plan
- Acid Sulfate Soils Management Plan
- Dangerous Goods and Hazardous Substances Management Procedure
- Erosion and Sediment Control Plan (Primary and Progressive)
- Hydrostatic Testing Management Plan

- Water Management Plan (Construction)
- Cultural Heritage Management Plan
- Blasting Management Plan
- Construction Health and Safety Management Plan
- Emergency Preparedness and Response Plan
- Traffic Management Plan
- Economic and Social Impact Management Plan
- Air Management Plan
- Noise and Vibration Management Plan
- Waste Management Plan
- Air Quality Management Procedure
- Blasting Operating Procedure
- Contaminated Land Management Procedure
- Dangerous Good and Hazardous Substances Management Procedure
- Noise and Vibration Management Procedure
- Soil Management Procedure
- Trench Inspection Procedure
- Vegetation Clearing Procedure
- Vegetation Management Procedure
- Waste Management Procedure
- Water Quality (ground and surface) Management Procedure
- Weed and Pest Management Procedure.

The Environmental Management Plan provides overarching environmental management guidance that will be implemented through the extant Jemena Environmental Management System processes and procedures of the Proponent and the Construction Contractor.

The Proponent is responsible for ensuring that all employees, officers, subcontractors and agents associated with the Project are familiar with the elements of the approved Environmental Management Plan and the relevant permits and comply with these and the requirements of environmental legislation. The Environmental Management Plan and its procedures and controls would be audited by the Proponent throughout the Project; during construction, during testing, prior to operation and during operation. The audits would compare on-ground works with management commitments and performance objectives. Any non-conformance with these criteria would trigger the implementation of corrective actions, and associated reporting.

The NT EPA considers it essential to the performance of the Project that the requirements in management systems, plans and procedures are incorporated into the

Proponent's tendering and contracting procedures and that all contractors are fully aware of, and act in compliance with, relevant management plans. The information should be provided to all personnel as part of an induction process.

All management plans and procedures developed for the Project must be finalised and approved by, or developed to, the satisfaction of relevant Government agencies and stakeholders within specified timeframes. It is recommended that, as a minimum, the Northern and Central Land Councils should be key stakeholders to which management plans are submitted for comment prior to finalisation. These approved plans and procedures will be one of the primary tools by which the Proponent will implement management and monitoring commitments made in the EIS and the recommendations detailed in this Report.

Recommendation 8

The Proponent taking the proposed action is wholly responsible for implementation of all conditions of approval and mitigation measures contained in the Environmental Management Plan and must ensure all staff and contractors comply with all requirements of conditions of approval and mitigation measures contained in the Environmental Management Plan.

The Environment Management Plan, and sub-plans, should form part of the Pipeline Management Plan. In preparing each plan, the Proponent should include any additional measures for environmental protection and monitoring contained in this Assessment Report 79.

The NT EPA acknowledges the Proponent will be reporting regularly to the DPIR in accordance with the reporting obligations prescribed under the *Energy Pipelines Act* and Regulations. The NT EPA makes Recommendation 8 to ensure that environmental outcomes of the EIA are incorporated into the regular compliance investigations, audits and reporting of the environmental performance of the Project. It is the NT EPA's expectation that any reporting on the implementation of the Pipeline Management Plan should demonstrate that environmental impacts from the Project are no greater than those predicted in the EIA. This should be done through reporting performance of environmental aspects, including the effectiveness of the environmental safeguards and mitigation measures applied in respect of the Project, and an assessment of the accuracy of the forecasts of the environmental impacts of the Project.

4.12.1 Proponent's commitments

Chapter 14 of the draft EIS included the initial commitments provided by the Proponent. A number of the submissions on the draft EIS requested additional information in relation to management measures proposed for the Project, or requested that the Proponent consider additional management measures for particular aspects of the Project. In some instances, the responses involved the Proponent committing to additional or revised management measures.

The Commitments Register contained in the draft EIS was revised to reflect the additional or revised management measures and is contained in Appendix C of the Supplement. The commitments are derived from the mitigation measures referred to in the draft EIS, the Environmental Management Plans and additional commitments made based on comments from advisory bodies and commenters.

5 Conclusion

The NT EPA has reviewed the EIS for the Project and provided its views, and the views of relevant advisory bodies, on the impact assessment of the Project. The NT EPA considers that the Proponent has appropriately considered risks and potential impacts to biodiversity, soils and socio-economic aspects. However, the Proponent did not provide the necessary information to allow for the NT EPA to adequately assess the potential

impacts and risks to water resources from watercourse crossings. The NT EPA has provided a recommendation that any subsequent approvals include conditions to avoid impacts to semi-permanent and permanent pools, primarily to account for uncertainty.

The NT EPA was unable to conclude that the potential impacts and risks to the environment from traffic and use of the transport network have been suitably identified, and appropriately mitigated. The Department of Planning, Infrastructure and Logistics will be required to consider the Traffic Impact Assessment and Traffic Management Plan in isolation to the EIA process. Information gaps remaining from the EIA process require the Proponent, Government and stakeholders to rely on post-assessment data collection, analyses, consultation and monitoring to determine the significance of, and appropriate responses to, potential impacts. While the NT EPA acknowledges that steps to address these requirements are largely captured in the commitments made by the Proponent, the responsibility now sits with the Proponent to ensure that the commitments are executed to the satisfaction of Department of Planning, Infrastructure and Logistics and the Department of Primary Industry and Resources.

Notwithstanding the above statements, the NT EPA considers that the Project can be managed in a manner that avoids unacceptable significant environmental impacts. The NT EPA makes eight recommendations as an outcome of the EIA of the Project. These recommendations are primarily for the Proponent to address when entering into the next stage of the Northern Territory and Commonwealth assessment and approval processes and for the execution of the proposed action. The NT EPA considers it essential that the commitments, safeguards and recommendations detailed in the final EIS, this Report and in the final management plans approved by the Agency responsible for administering the *Energy Pipelines Act*, are implemented and subject to regular reporting and compliance auditing.

6 References

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