

# Jemena Northern Gas Pipeline Pty Ltd

## Northern Gas Pipeline

### Draft Environmental Impact Statement

#### CHAPTER 13 ENVIRONMENTAL MANAGEMENT PLAN

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## 13. ENVIRONMENTAL MANAGEMENT PLAN

This Environmental Management Plan (EMP) has been prepared to address Section 6 of the EIS ToR and to provide a consolidated framework for environmental management of the NGP Project. Implementation of the Project in accordance with the framework provided by this EMP will ensure that environmental risks are reduced to As Low As Reasonably Practicable (ALARP), and all environmental obligations are met including legislation, regulations and conditions of approval

This EMP has been developed in accordance with guidance provided in the NT EPA *Guidance for the Preparation of an Environmental Management Plan* (NT EPA 2015).

The abbreviations, acronyms and terminology used throughout this chapter are defined in the Table of Abbreviations and Acronyms, and Glossary sections of this EIS.

### 13.1 PROJECT OVERVIEW

The NGP Project will comprise a high pressure underground gas pipeline (approximately 622 km in length) and associated above-ground facilities. The pipeline will connect the existing Amadeus Gas Pipeline (AGP) at the Warrego Compressor Station in the Northern Territory to the existing Carpentaria Gas Pipeline (CGP) at Mount Isa in Queensland. The pipeline commences at a tie-in to the existing Australian Pipeline Authority Group (APA) Warrego Compressor Station on the AGP and terminates at the existing APA Mica Creek Meter Station on the CGP.

The following infrastructure and facilities will be constructed, described in order from west (Northern Territory) to east (Queensland):

- a 12-inch (323.9 mm) buried gas pipeline; approximately 457 km of which will traverse land in the Northern Territory with 165 km in Queensland
- a start of line (SOL) receipt/compressor station at Warrego, located 45 km north-west of Tennant Creek in the Northern Territory. Referred to as the Phillip Creek Compressor Station (PCCS), the site will cover an area of 9 hectares (ha) (300 m by 300 m).
- three main line valve (MLV) facilities at locations along the pipeline, two covering an area of approximately 0.12 ha (30m x 40m) each and one covering an area of approximately 0.24 ha (30m x 80m).
- an end of line (EOL) delivery station located to the south-west of the Mica Creek Meter Station in Queensland. Referred to as the Mount Isa Compressor Station (MICS), the site will cover an area of approximately 9 ha (300 m by 300 m).
- five cathodic protection (CP) stations, spaced between PCCS, MICS and the MLV sites, each covering an area of approximately 0.04 ha (20 m by 20 m). The CP sites will comprise buried anode beds, located some distance from the pipeline (generally less than 500 m), connected to the pipeline by buried cables.

#### 13.1.1 CONSTRUCTION

Construction is currently scheduled to commence in early 2017 and the pipeline system is planned to be operational in 2018. The exact timing is dependent on a number of factors including the timeliness of the required approvals, access agreements with relevant stakeholders and weather conditions.

Construction of the PCCS and MICS is planned to extend through to early 2018, as access to these locations is less dependent on dry weather conditions. Commissioning of the pipeline, PCCS and MICS will follow the construction period. The construction schedule is driven by the Project objective to achieve commencement of gas transportation services in 2018.

The construction footprint will comprise a 30 m wide pipeline construction Right of Way (ROW), with additional workspace as required for temporary facilities to support construction. Temporary facilities will include:

- accommodation camps for the work personnel
- access tracks (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.

The construction ROW and all temporary facilities, temporary access tracks and works areas will be progressively decommissioned and rehabilitated on completion of the construction phase<sup>1</sup>; the only components to be retained long term are access tracks to the permanent above-ground facilities (i.e. compressor stations, MLV and CP stations) and any access tracks or dams requested by the landholder.

Following construction of the pipeline, landholders will be able to resume use of the land. Excavating or erecting permanent structures or buildings over the buried pipeline will be prohibited in accordance with the requirements under the relevant legislation and pursuant to agreements with the landholders. Pipeline markers will be provided at fences, road crossings and other locations as required by *Australian Standard 2885 Pipelines – Gas and Liquid Petroleum (AS 2885)*.

### 13.1.2 OPERATIONS

Day-to-day operation and maintenance of the compressor stations and above-ground facilities will be performed by field staff based primarily at the PCCS and MICS. The field operations bases will be supported by Jemena's standard maintenance scheduling processes and procedures, in place on other pipeline assets. ROW and facility access will be via a combination of existing and Project-created access tracks, with use of helicopter where wet weather prevents access. Jemena's existing engineering resources will manage the new assets to align with current processes and offer support to field operations when coordinating key maintenance activities.

Control room staff will remotely perform a range of management and monitoring functions and manage pipeline throughput, customer billing, daily gas accounting and planning for scheduled outages.

### 13.1.3 DECOMMISSIONING

The pipeline has a design life of 30 years, but with ongoing integrity management, and subject to appropriate commercial drivers, the operational life is expected to be longer. If, and when, the pipeline is no longer required, it will be suspended and, if a decision is made to abandon the pipeline, all above-ground infrastructure will be disposed of appropriately in accordance with the legislative requirements applicable at the time.

<sup>1</sup> Final rehabilitation of the ROW and selected access tracks will take place progressively over an extended period (possibly a number of years) to allow Jemena to ensure the ROW is restored and rehabilitated. Some ROW and access tracks may remain subject to agreement with landholders.

Refer to Section 13.14 for a discussion of the proposed decommissioning process.

Threat of damage to the environment from operational maintenance and abandonment activities shall be identified and control measures developed. The Operational Environment Management Plan shall include procedures for protecting the environment from abandonment activities.

## 13.2 PURPOSE, SCOPE AND STRUCTURE

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This EMP has been prepared to address Section 6 of the EIS ToR for the NGP Project. The EMP provides a consolidated plan for environmental management to mitigate environmental risks identified during the EIS risk assessment (refer to Chapters six through 12 and also Appendix F1 and F2).

The EMP comprises a series of management sub-plans which outline the specific measures to be applied to avoid and minimise environmental impacts relevant to the NGP Project. Objectives, performance criteria and monitoring requirements are outlined for each relevant sub-plan. Reporting requirements, corrective actions and responsibilities are provided.

The EMP has been developed to support the EIS, and the management sub-plans are necessarily conceptual. As the project enters the design and implementation phases, there will be more specificity around aspects of project construction and operation and the management plans will likewise become more detailed. The EMP is an active document that will be updated and refined following the environmental assessment process, and to incorporate any relevant outcomes of the detailed design stage of the Project.

Specific Construction and Operational EMP's will be developed by the Construction Contractor and Jemena respectively. These will be guided by the content of this EMP, which details the overarching framework and targets of environmental management for the Project.

### 13.2.1 SCOPE

As part of the EIS process a risk assessment was undertaken to identify potential impacts to the environment as well as socio-economic, human health and safety, and heritage. The risk assessment process identified those activities and Project aspects that could result in a greater environmental risk, for which specific management measures should be implemented. The content of this EMP focusses on those risks ranked as moderate or above.

Key risks are identified for each environmental element, which link directly to components of the relevant EIS risk assessments. This EMP is supported by a number of more specific management plans, which are relevant to various stages of the Project, as summarised in Table 13-1.

**Table 13-1. Management plans supporting this EMP**

Environmental element	Management Plan	Relevant project phase		
		Construction	Operations	Decommission
Biodiversity	Biodiversity Management Plan	X		
	Weed Management Plan	X	X	
	Reinstatement Management Plan	X		
	Rehabilitation Management Plan		X	X
Water	Acid Sulfate Soils Management Plan (if required)	X		
	Dangerous Goods and Hazardous Substances Management Procedure	X	X	X
	Erosion and Sediment Control Plan (Primary and Progressive)	X		
	Hydrostatic Testing Management Plan	X		
	Water Management Plan (Construction)	X		
Heritage	Cultural Heritage Management Plan	X	X	
Health and safety	Blasting Management Plan	X		
	Construction Health & Safety Management Plan	X		
	Emergency Preparedness and Response Plan	X	X	
	Traffic Management Plan	X		
Socio-economic	Economic and Social Impact Management Plan	X		
Air	Air Management Plan	X	X	
Noise and Vibration	Noise and Vibration Management Plan Blasting Management Plan	X	X	
Waste	Waste Management Plan	X	X	
General	Construction Environmental Management Plan	X		
	Operational Environmental Management Plan		X	
	Decommissioning Management Plan			X

Specific management procedures that support the management plans, and provide specific detail on implementing management measures, include:

- air quality management procedure
- blasting operating procedure
- contaminated land management procedure
- dangerous goods and hazardous substances management procedure
- noise and vibration management procedure
- rehabilitation 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.

### 13.2.2 REGULATORY FRAMEWORK

The legislative requirements and approvals applicable to the NGP are summarised in Chapter 3 of this EIS. The Project is being assessed under the Environment Protection and Biodiversity Conservation Act 1999 (*Cth*) (EPBC Act) and the Environmental Assessment Act (*NT*) (EA Act). Primary approvals for the Project include the EIS (assessed under the EPBC Act and EA Act), Environmental Authority (*Qld*), pipeline approvals, land access and tenure approvals and sacred sites and cultural heritage approvals. Once the primary approvals processes are complete, there are a range of other approvals, permits and licences required for different aspects of the Project. Table 13-2 (Commonwealth), Table 13-3 (Northern Territory) and Table 13-4 (Queensland) below list the key approvals that may be required in relation to each of the key areas of risk assessed in this EIS.

An Approvals Register has been established and maintained for the NGP. Jemena and the Construction Contractor have established, and will maintain, registers of Legal and Other Requirements in accordance with their extant Environmental Management System (EMS) processes.

**Table 13-2. Commonwealth approvals, permits and licences**

Legislation	Project Relevance
Australian Jobs Act 2013	Under the Australian Jobs Act 2013 ( <i>Cth</i> ) for any major projects in excess of \$500 million capital expenditure, the proponent must submit an Australian Industry Participation (AIP) Plan to the AIP Authority for approval.
Civil Aviation Safety Regulation 1998	Under the Civil Aviation Safety Regulation 1998 ( <i>Cth</i> ) a proponent must submit an Application for Operational Assessment of a Proposed Plume Rise to allow CASA (under 139.370 of the Civil Aviation Safety Authority Act 1998 ( <i>Cth</i> )) to determine if any gaseous efflux may be a hazard to aircraft operations.
National Greenhouse and Energy Reporting Act 2007	Under this Act there are requirements for controlling corporations to register and report if they emit greenhouse gases, produce energy, or consume energy at or



Legislation	Project Relevance
	above specified quantities in a given financial year.
Radio-communications Act 1992	Licensing of radio communications is required under the Radio-communications Act 1992 ( <i>Cth</i> ). For the project this will relate to site communications for which the construction contractor will be responsible.

**Table 13-3. Northern Territory approvals, permits and licences**

Theme	Legislation	Project Relevance
<b>Biodiversity</b>	Territory Parks and Wildlife Conservation Act	Under the Act a permit to undertake scientific research is required to survey wildlife as a part of the biological survey program required for environmental approvals. Additionally, a permit to take or interfere with wildlife will be required to remove animals during pipeline trenching activities, or if any threatened plants need to be relocated.
<b>Water</b>	Water Act	This Act is administered by DLRM generally, and by the NT EPA for Waste Discharge Licences only. Tennant Creek is within a Water Control District (WCD) established under the Act. Jemena will need to obtain a Bore Construction Permit and Licence to Take or Use Groundwater to drill bores or extract water within the WCD. A Permit to Construct or Alter Works is required for construction or alteration of dams, water storages or other water control structures including waterways. This permit may be required for the NGP project if the works affect the flow or likely flow of water in the waterway A Waste Discharge Licence will be required for disposal of hydrostatic test water.
	North East Gas Interconnector Pipeline (Special Provisions) Act 2015	A special provision in this Act states that the Pipeline Licensee may construct and operate the pipeline across a waterway if the relevant Minister has given written approval. This approval is subject to the conditions that the construction does not prevent, restrict or interfere with the passage of vessels on the waterway, divert or use water in the waterway, or obstruct the flow of water in the waterway. This provision does not exclude the requirement for A Permit to Construct or Alter Works for construction in a waterway under the Water Act.
	Soil Conservation and Land Utilisation Act	This Act provides for the prevention of soil erosion, and for the conservation and reclamation of soil, and requires Erosion and Sediment Control Plans to be devised for development projects. Erosion and associated impacts on waterways is identified as a high risk activity during the NGP construction phase and the ToR require that an Erosion and Sediment Control Plan be developed.
<b>Health &amp; Safety</b>	Work Health and Safety (National Uniform Legislation) Act	Worksafe NT will need to, where relevant, licence and grant approval to various aspects of the project including hazardous work.
	Dangerous Goods Act	The storage and transport of explosives requires an approval to be obtained from Worksafe NT.
	Food Act & Regulations	The Act and supporting regulations stipulate the requirements for food handling and the supply of food to personnel staying in the construction camps. Jemena will be required to register as a registered food business with the Northern Territory Department of

Theme	Legislation	Project Relevance
		Health (DoH).
	Public and Environmental Health Act	On-site wastewater management and disposal, and camp water supply and use, are regulated under this Act by DoH. Approvals will be required during the design phase of the construction camps and prior to commencement of operations for onsite wastewater management systems. The camps will also be registered with DoH as commercial visitor facilities. An Environmental Management Plan (EMP) will be developed for the camps and submitted to DoH for approval. The EMP will outline specific management measures for staff accommodation facilities, camp mess and food supply, on-site wastewater management, waste disposal and fuel storage.
	Traffic Act & Regulations/Control of Roads Act	These Acts and supporting regulations require all personnel to abide by general traffic laws. Additionally, the regulations outline requirements specifically relevant to transporting equipment and machinery, such as securing of loads and oversize vehicles. Permits or exemptions may be required from the Department of Transport for works in a road reserve and vehicle size and mass standards Control of Roads Act regulates the opening or closing of roads for the purposes of construction.
	North East Gas Interconnector Pipeline (Special Provisions) Act 2015	This Act includes a special provision for construction and operation of a pipeline under or across a road. This requires the consent of the Transport Minister and may be subject to conditions as deemed by the Minister.
Other	Waste Management and Pollution Control Act	This Act provides for the protection of the environment by encouraging effective waste management, and pollution prevention and control practices. The Act establishes environmental nuisances as an offence, which is relevant to managing potential nuisance impacts associated with noise and dust emissions during the project construction phase. The Project activities will not require licencing under the Act.

Table 13-4. Queensland approvals, permits and licences

Theme	Legislation	Project Relevance
Biodiversity	Nature Conservation Act 1992  Nature Conservation (Wildlife Management) Regulation 2006	A <i>Permit to take a protected animal or plant</i> is required under this Act. This permit was obtained from the DEHP for the ecological surveys undertaken for the EIS. Under s332 of the Nature Conservation (Wildlife Management) Regulation 2006 a person is excluded from tampering (which includes damaging) with an animal breeding of a protected animal unless a <i>Species Management Program</i> is in place.
Water	Environmental Protection Act 1994  Environmental Protection Regulations 2008	This Act provides the framework for environmental assessment of Environmentally Relevant Activities (ERAs). The Project includes a number of ERAs governed by the Act. Jemena was granted an Environmental Authority (EA) for the NGP in December 2015. The EA, granted by DEHP, is subject to a number of conditions, including management of waste and wastewater and activities in a waterway.

Theme	Legislation	Project Relevance
		The Act also requires Jemena to obtain approval for fuel storage and a Licence to Store Dangerous Goods During Construction.
	Environmental Protection (Water) Policy 2009	The EPP (Water) defines waterways for which specific environmental values and water quality objectives are outlined in a Healthy Waters Management Plan or a Water Quality Improvement Plan, which are developed for specific watercourses and catchments. No such plans are in place for the watercourses crossed by the pipeline alignment.
	Fisheries Act	The Act provides for the protection of declared fish habitat areas, none of which are within the NGP construction footprint. The act also regulates Temporary Waterway Barrier Works in conjunction with the Sustainable Planning Act (see below).
	Sustainable Planning Act 2009	The Act outlines the requirements for development permits and assessments, and also provides codes for self-assessable development. The <i>Code for Self-Assessable Development for Temporary Waterway Barrier Works</i> relates to the NGP watercourse crossings in Queensland. All proposed crossings are self-assessable under this code, therefore approvals or permits are not required. However, reporting requirements do apply and will be completed at the time of construction.
	Water Act 2000	This Act is the key legislative document for use of surface and groundwater in Queensland, and provides the framework for sustainable use and management of water resources. Under the Act water resource plans are established for the use of water resources in certain regions. The Georgina and Diamantina Water Resource Plan applies to the NGP construction footprint. A water licence will be required for any water extraction that occurs in Queensland.
Heritage	Aboriginal Cultural Heritage Act 2003	The Aboriginal Cultural Heritage Act 2003 (Q/d) places a "Duty of Care" on all people to avoid harming Aboriginal cultural heritage irrespective of the existence of Native Title, or the existence of Native Title claims. The treatment of cultural heritage sites and/or artefacts found within the project area (during the cultural heritage surveys) will be negotiated and agreed upon in a Cultural Heritage Management Plan (CHMP).
	Queensland Heritage Act 199	Non-Indigenous cultural heritage is governed by the Act. DEHP is responsible for the management of heritage places by identifying and protecting them. A search of the Queensland Heritage Register has revealed there are no Registered Sites within the project area.
Health and Safety	Explosives Act 1999	Numerous approvals and permits are required for the transport, storage and use of explosives including: <ul style="list-style-type: none"> <li>• Authority to store explosives</li> <li>• Authority to use explosives</li> <li>• Authority to transport explosives</li> <li>• Shotfirer Licence</li> <li>• Blasting notification</li> </ul>
	Food Act 2006 Food Regulations 2006	As with the Northern Territory, the construction camp in Queensland will require a food safety certificate and food business licence from the Queensland Department of Health.
	Transport Infrastructure Act 1994 Transport Infrastructure	A number of permits will be required for the construction phase including: <ul style="list-style-type: none"> <li>• Road Corridor Permit (State controlled road)</li> </ul>

Theme	Legislation	Project Relevance
	(State-controlled Roads) Regulation 2006	<ul style="list-style-type: none"> <li>• Road access location application (State controlled road)</li> <li>• Approval for road works or to interfere with a road (State controlled road)</li> <li>• Approval for temporary/permanent road closures (State controlled road)</li> <li>• Excess Dimension of Vehicle Permit</li> <li>• Excess Mass of Vehicle Permit</li> <li>• Notice of high vehicle load</li> <li>• Additional permits will be required from the Mount Isa City Council:</li> <li>• Permit to interfere with a road or its operation</li> <li>• Permit to use local government road for regulated purpose</li> <li>• Permit to alter or improve local government road</li> <li>• Permit to install a gate or grid across a public road.</li> </ul>
	Work Health and Safety Act 2011	An Operational Approval to Establish or Operate a Drugs Facility will be required for the first aid facility at the construction camp.

### 13.3 ENVIRONMENTAL MANAGEMENT FRAMEWORK

This EMP provides overarching environmental management guidance that will be implemented through the extant Jemena Environmental Management System (EMS) processes and procedures of Jemena and the Construction Contactor.

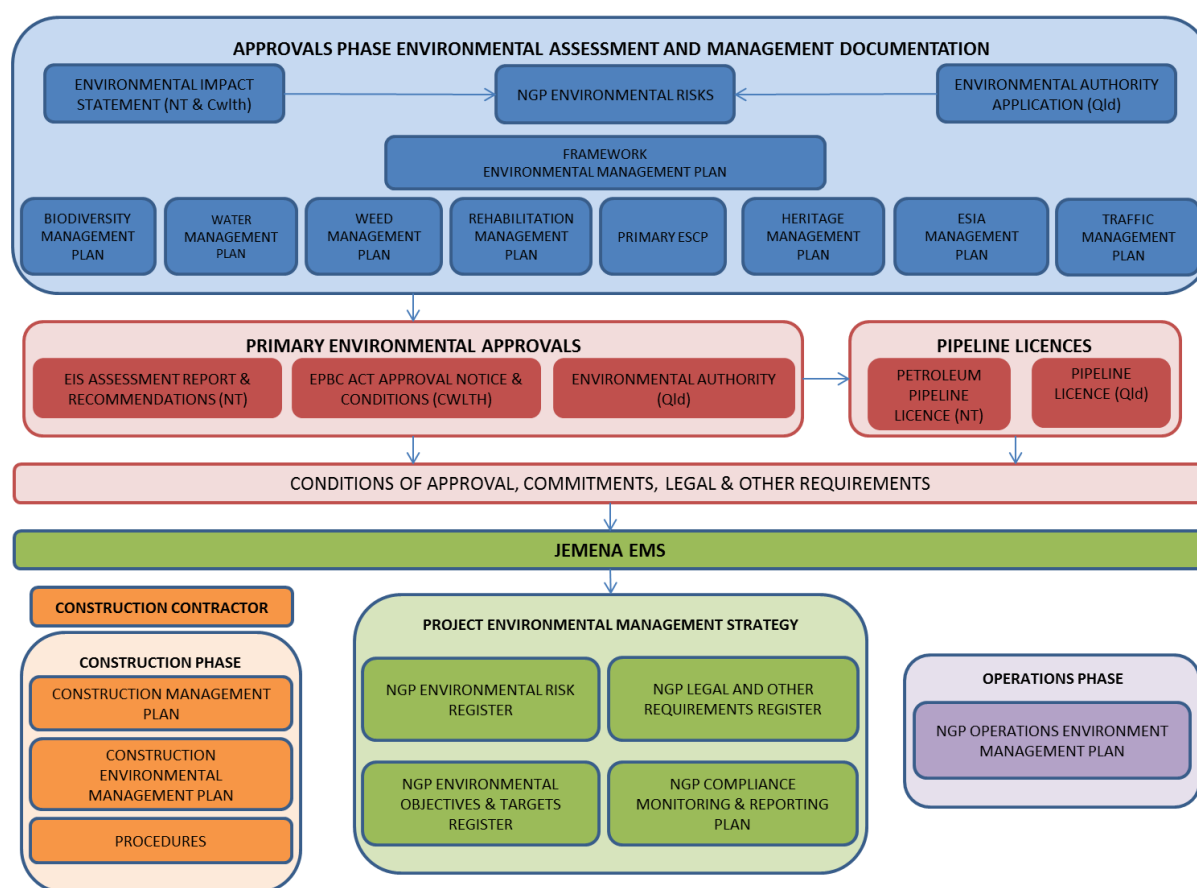
#### 13.3.1 ENVIRONMENTAL MANAGEMENT SYSTEM

The Jemena EMS forms part of the companies Health, Safety, Environment and Quality (HSEQ) Strategy. The EMS provides a framework for identifying and managing environmental risks, and for compliance monitoring and reporting.

During construction, the constructors and any sub-contractors will operate under the Construction Contractors EMS, which provides the structure and supporting documents for environmental management for all aspects relevant to construction. The EMS forms part of the Construction Contractors Management System which is accredited to *AS/NZS ISO 9001-2008 – Quality Management System*, *AS/NZS ISO 14001-2004 – Environmental Management System* and *AS/NZS 4801:2001 – Occupational Health and Safety Management System*.

#### 13.3.2 ROLE OF THIS EMP

The NGP project environmental management framework is illustrated in Figure 13-1 below.



**Figure 13-1. NGP Project environmental management framework**

### 13.3.3 ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT

Jemena is responsible for over-arching compliance monitoring and reporting in accordance with the primary environmental approvals and pipeline licences. Jemena is responsible for planning and design, operational and decommissioning phases. Jemena will develop an Operational EMP (OEMP) which will detail operational environmental management requirements prescribed through the environmental approvals processes.

The Construction Contractor and any sub-contractors will operate under a Construction EMP (CEMP) and supporting procedures which meet or exceed the expectations of the Jemena EMS. The CEMP establishes a framework for the provision of environmental induction and training, complaints management and, meeting the NGP project internal and external environmental monitoring and reporting requirements. Project-specific roles and responsibilities for environmental management are assigned, including those of the environmental manager, environmental advisors and supporting staff.

### 13.3.4 TRAINING AND AWARENESS

All construction staff and sub-contractors will be inducted through the Project Induction Training prior to commencing works. The induction will include an explanation of the environmental management framework and requirements of management plans, including this EMP, procedures and policies. Each person will be made aware of and have an understanding of their obligations and duties, and all personnel will receive training of a type and level of detail that is appropriate for the environmental aspects of their role.

Similar training will be provided for operational staff suitable to their roles and the requirements of the OEMP.

### 13.3.5 INCIDENTS

Incident reporting is managed through the Jemena and Construction Contractors EMS(s). Any incident that occurs during the project will be investigated, reported and remediated as appropriate. Any incidents that occur during construction will be managed by the Construction Contractor and outcomes reported to Jemena. Similarly, any incidents that occur during operation will be managed by Jemena.

The incident reporting process requires an assessment of the scale of the incident, which guides the appropriate response.

Any incidents that cause, or may cause, pollution resulting in material or serious environmental harm (as defined under the Waste Management and Pollution Control Act [NT]), or that require reporting under the Queensland Environmental Authority (EA), will be reported to the NT EPA pollution hotline or Queensland Pollution hotline respectively.

Jemena is committed to actively engaging with all stakeholders; refer to Chapter 4. Any complaints received from the community will be investigated and outcomes reported back to the complainant. Jemena's complaints processes detail the requirements for recording complaints, investigating and responding to them and the timeframes for each step.

An Incident and Complaints Register will be maintained for each phase of the project to track incidents, complaints and remedial actions.

## 13.4 MONITORING, AUDITING AND REPORTING

### 13.4.1 MONITORING RESPONSIBILITY

The primary responsibility for monitoring the potential impacts of the Project will be with Jemena. Jemena will be responsible for ensuring that all employees, officers, subcontractors and agents associated with the project are familiar with the elements of the approved EMP and the relevant permits and comply with these and the requirements of environmental legislation.

The Construction Contractor will be expected to comply with the Jemena EMS and all commitments made in the EIS. They will also operate under a number of management plans and procedures, which will be tailored to the specific Project requirements as outlined in this EMP and other sections of the EIS.

During construction, the Construction Contractor will be responsible for daily and weekly monitoring requirements that are stipulated in this EMP. Daily and weekly monitoring will be in the form of checklists and inspections of active construction areas. Operational monitoring, for example traffic movements, fuel and chemical storage and use, and training logs, will also form part of the monitoring framework. Databases will be developed for the storage of monitoring data. Where relevant, compliance criteria will be included in the database for immediate comparison of monitoring data and identification of non-compliances.

During construction, environmental compliance will be with this EMP and all commitments and outcomes of the environmental approvals process. Records of environmental monitoring and audit reports will be provided to Jemena during the construction phase, Jemena will be responsible for tracking environmental compliance.

Once construction is complete, Jemena will be responsible for the operational environmental monitoring and management programs.

#### 13.4.2 AUDITING

The EMP and its procedures and controls will be audited by Jemena throughout the Project; during construction, during testing, prior to operation and during operation. A specific schedule for auditing will be developed prior to commencement of construction and will reflect any commitments or requirements identified through the EIS.

The audits will specifically compare on-ground works with management commitments and performance objectives. Any non-conformance with these criteria will trigger the implementation of corrective actions, and associated reporting where required. Where management measures are not achieving objectives and performance criteria, the EMP will be updated.

#### 13.4.3 REPORTING

Both internal and external reporting requirements are identified within this EMP. Internal reporting requirements will include:

- communication, consultation and training outcomes
- daily and weekly inspection checklists
- monthly and annual report on monitoring, environmental compliance, incidents and corrective actions
- records and logs of construction and operational activities
- internal incident reports
- monitoring data.

External reporting is required to meet conditions of approval and statutory requirements. These will be confirmed following receipt of the conditions of approval, but are expected to include:

- annual report on compliance with environmental authority and other approvals
- incident report where environmental harm has occurred.

#### 13.4.4 ACHIEVING ENVIRONMENTAL OBJECTIVES

Objectives are outlined within the EMP that provide the target for environmental management. The monitoring, auditing and reporting processes aim to assess whether environmental objectives are being achieved. This EMP stipulates performance criteria for each relevant management section against which monitoring or auditing data can be compared.

Where monitoring and auditing identifies that performance criteria are not being met, corrective actions must be implemented. Corrective actions will be assigned as appropriate for the nature and scale of the non-conformance. Generally, minor non-conformances will require the management actions to be implemented, additional toolbox talks or training for staff, or additional remedial works to occur. Where the non-conformance is major, an incident investigation will be undertaken to determine the causes and impacts of the non-conformance and outline specific remedial and corrective actions to avoid a reoccurrence.



Where monitoring, auditing and reporting finds that the management measures stipulated in this EMP are not achieving the environmental objectives this EMP will be reviewed and updated accordingly.

Jemena is responsible for assessing whether environmental objectives are being achieved.



## 13.5 BIODIVERSITY

### 13.5.1 ENVIRONMENTAL VALUES AND RISKS

The biodiversity values that occur within the Project footprint, and potential impacts and risks to biodiversity associated with project activities are described in Chapter 6 of this EIS. A brief summary of biodiversity values is provided below.

Threatened species relevant to the Project are listed under the Territory Parks and Wildlife Conservation Act (NT) (TPWC Act) and the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act). A desktop study was undertaken for threatened species to enable likelihood of occurrences to be established for each species record for the Project area. The results of this desktop study informed targeted threatened species surveys within the construction footprint of the Project. The results of the surveys, conducted in April and May of 2016 indicate that:

- two threatened species were recorded within, or nearby to, the construction footprint; a herb (*Austrobryonia argillicola*) and Carpentarian Antechinus (*Pseudantechinus mimulus*).
- three threatened species were not recorded during the surveys; however, based on habitat assessment, it was considered that there is a high chance they occur within the construction footprint at some time. These are the Painted Honeyeater (*Grantiella picta*), Grey Falcon (*Falco hypoleucos*) and Plains Death Adder (*Acanthophis hawkei*).
- of these threatened species, only two were assessed as having *important populations* occurring, or likely to occur, within the construction footprint:
  - Plains Death Adder (*Acanthophis hawkei*) in the black soil country between KP 355 and KP 561
  - Carpentarian Antechinus (*Pseudantechinus mimulus*) in the rocky country between KP 614 and KP 616.

Existing threatening processes that impact biodiversity values in the region are fire, weeds and introduced animals. Land degradation resulting from pastoral activities is also apparent – the degree depending on the management of pastoral stations (e.g. stocking rates, provision of artificial water points and prescribed burning) and the sensitivity of biodiversity to grazing and cattle impacts.

The environmental risk assessment identified the following potential impacts with a pre-mitigation risk rating as moderate or above:

#### Planning

- loss of biodiversity values and/or threatened species due to an inadequate assessment of the existing environment leading ill-informed risk assessment and lost opportunities for impact avoidance.
- reduction in habitat quality (long-term) for flora and fauna due to weed introduction and/or proliferation caused by pre-construction survey activities.

#### Construction

- temporary reduction in the quality of ecosystems due to bushfire.
- reduction in the quality of ecosystems (long term or permanent) due to:

- inadequate reinstatement causing erosion and/or failure of rehabilitation
- weed introduction and/or proliferation
- reduced water quality caused by chemical spill, sedimentation from erosion or uncontrolled release of water.
- loss of threatened species due to disruption of a breeding cycle caused by the construction ROW or trench creating a barrier to dispersal.
- reduction in the quality of ecosystems due to bushfire caused by
  - construction activities
  - the proliferation of weeds creating higher fuel loads and therefore more intense fires.
- reduction in the quality of ecosystems and loss of sensitive vegetation types due to reduced water availability because of extraction of water for construction activities from natural sources and/or because of altered surface water flows due to construction activities.

### Operations

- reduction in the quality of ecosystems (long term or permanent) due to
  - weed introduction and/or proliferation caused by operational usage of vehicles
  - failure of rehabilitation (because of insufficient natural revegetation).
- reduction in the quality of ecosystems (temporary) due to a bushfire caused by pipeline failure.

These risks are largely associated with the construction phase of the Project, and therefore a Biodiversity Management Plan has been developed to provide detailed mitigation measures for implementation by the Construction Contractor (refer to Appendix H). A framework for managing potential biodiversity impacts through each project phase is provided in the sections below.

Risk analysis of threatened species concluded that there are only a few additional, specific mitigation actions required to minimise the impact of trenching on Carpentarian Antechinus. Otherwise, the mitigation measures presented in this biodiversity section of the EMP are sufficient to reduce the risk to threatened species to an acceptable level.

***A Biodiversity Management Plan (Construction) has been developed to specifically address potential impacts to biodiversity from construction activities. Refer to the Biodiversity Management Plan (Construction) (Appendix H) for detail on the construction phase management measures and related monitoring and reporting requirements. A summary is provided below.***

***A Weed Management Plan (Construction) has been developed that outlines specific requirements for weed management during the construction phase of the Project. Refer to the Weed Management Plan (Construction) (Appendix J) for further information. A summary is provided below.***

## 13.5.2 MANAGEMENT MEASURES

## Biodiversity management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Adequately assess the existing biodiversity and threatened species values to inform the project design phase.</li> <li>Minimise disturbance of sensitive or significant habitat through project design.</li> <li>Avoid the introduction of new weeds and/or proliferation of existing weeds during survey activities.</li> </ul>	<ul style="list-style-type: none"> <li>Locate the construction footprint (including ROW, access tracks and temporary camps and water storage dams) in areas outside of sensitive environments or important threatened species habitat.</li> <li>Locate the sites for permanent facilities outside of areas of sensitive or important threatened species habitat.</li> <li>Minimise the number of access tracks and utilise existing tracks wherever possible.</li> <li>Locate new access tracks in already cleared areas or areas of low habitat value.</li> <li>Plan and design watercourse crossings to minimise disturbance to riparian vegetation, beds and banks.</li> <li>Develop a Weed Management Plan.</li> <li>Complete a Threatened Species Survey and develop targeted biodiversity management measures to minimise impacts to threatened species.</li> <li>Undertake threatened species surveys by suitably qualified people, with input from experts for relevant species.</li> <li>Develop and implement weed hygiene procedures for pre-construction survey activities.</li> <li>Findings of Threatened Species surveys inform management measures in Biodiversity Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

## Biodiversity management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>Weed management</b>			
<ul style="list-style-type: none"> <li>Prevent the introduction of new, or spread of existing, weed species.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct a weed survey along all areas to be disturbed prior to commencement of construction.</li> <li>Develop and implement the Weed Management Plan, including weed wash-down specifications and weed control with input from the weed survey.</li> </ul>	<ul style="list-style-type: none"> <li>Inspections of construction footprint to check weed management has been implemented.</li> </ul>	<ul style="list-style-type: none"> <li>No new weed species identified within the construction footprint.</li> <li>No spread of existing weed species as compared to pre-disturbance weed survey data</li> </ul>
<b>Vegetation clearing</b>			
<ul style="list-style-type: none"> <li>Minimise vegetation clearing as much as possible, and promote and maintain stable vegetation cover in reinstated areas.</li> <li>Minimise the impact on threatened species habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that vegetation clearing protocols include appropriately stock-piling cleared vegetation, topsoil and trench spoil to facilitate rehabilitation.</li> <li>Implement the Biodiversity Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>Inspections of construction footprint to ensure correct alignment of pipeline and clearing is within 30 m ROW and other specified areas required for the project.</li> <li>Inspections of construction footprint to check clearing controls are implemented.</li> <li>Inspections to ensure that progressive reinstatement is undertaken.</li> <li>Audits of disturbed areas to check that clearing and construction is in accordance with controls.</li> </ul>	<ul style="list-style-type: none"> <li>No vegetation clearance or ground disturbance outside of approved construction footprint.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Trenching</b>	<ul style="list-style-type: none"><li>• Minimise the impact on threatened species</li><li>• Manage trenches to minimise impacts on fauna.</li></ul>	<ul style="list-style-type: none"><li>• Daily monitoring and clearing of trench for fauna species.</li><li>• Inspections to ensure that progressive reinstatement is undertaken.</li><li>• Audits to ensure procedures are implemented and progressive reinstatement is occurring.</li></ul>	<ul style="list-style-type: none"><li>• No threatened species deaths caused by construction activities.</li></ul>
<b>Other Construction activities</b>			
<ul style="list-style-type: none"><li>• Manage construction activities to minimise bushfire risk</li><li>• Minimise impacts of noise, vibration, blasting and air emissions on fauna</li></ul>	<ul style="list-style-type: none"><li>• Water carts will be available during welding and grinding activities and days of high fire danger to reduce the risk of bushfires.</li><li>• Vehicles and machinery fitted with fire extinguishers.</li><li>• Earth pipe (e.g. grit blasting) where works may generate static electricity.</li><li>• Construction to be carried out within cleared work areas.</li><li>• Implement fire prevention and control procedures.</li><li>• Implement Noise and Vibration, Blasting and Air Management Plans to minimise impacts to fauna and flora from increased noise, vibration and dust during construction.</li></ul>	<ul style="list-style-type: none"><li>• Monthly audits to ensure that the Noise and Vibration, Blasting and Air Management Plans controls are being implemented.</li></ul>	<ul style="list-style-type: none"><li>• No bushfires caused by construction activities.</li><li>• Noise, vibration, blasting and air management measures are implemented as per management plans</li></ul>

Objective	Management actions	Monitoring	Performance indicators
	<ul style="list-style-type: none"> <li>Use dust suppression trucks where required</li> </ul>		
<b>Wastes</b>			
<ul style="list-style-type: none"> <li>Manage the storage of wastes and hazardous materials.</li> <li>Minimise the risk of contamination of water and habitat within the Project area.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Waste Management Plan.</li> <li>Develop and implement a Dangerous Goods and Hazardous Substance Management Procedure.</li> <li>Store and handle fuels and hazardous materials in accordance with applicable legislative requirements and relevant guidelines.</li> <li>Locate storage areas away from drainage lines and waterways and bund all hazardous substance and fuel storage areas.</li> <li>Comply with relevant safety data sheet and Australian Standard AS1940-2004.</li> <li>Develop and implement Spill Management Plan prior to commencement of works.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure that the Waste Management Plan, Dangerous Goods and Hazardous Substance Management Procedure and Spill Management Plan controls are being implemented.</li> </ul>	<ul style="list-style-type: none"> <li>No non-compliances with the Waste Management Plan, Dangerous Goods and Hazardous Substance Management Procedure and Spill Management Plan.</li> </ul>
<b>Transport</b>			
<ul style="list-style-type: none"> <li>Minimise impacts on threatened species.</li> <li>Minimise the risk of contamination of water and habitat within the construction footprint.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Traffic Management Plan</li> <li>Develop and implement Standard Operating Procedures (SOPs) for transport of chemicals and hazardous substances.</li> <li>Implement Safe Work Method Statements (SWMS) governing the safe use of vehicles within the Project site, including: <ul style="list-style-type: none"> <li>reduced speed limits within the sites</li> <li>appropriate speed limits when travelling to and from site, and within camps</li> <li>vehicle movement along the ROW will ordinarily be between the hours of 0600 and 1800.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure that the Traffic Management Plan, SOPs and SWMS controls are being implemented.</li> </ul>	<ul style="list-style-type: none"> <li>No non-compliances with the Traffic Management Plan, SOPs and SWMS controls.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Water</b>			
<ul style="list-style-type: none"> <li>Minimise soil erosion and sedimentation.</li> <li>Minimise the risk of contamination of water and habitat in the construction footprint.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement Water Management Plan (Construction).</li> <li>Develop and implement a specific progressive Erosion and Sediment Control Plan (ESCP) for watercourse crossings.</li> <li>Progressively reinstate watercourse crossings as soon as construction of crossing is complete including access through water courses when no longer required to minimise duration of disturbance.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure that the Water Management and ESCP Plans controls are being implemented.</li> <li>Weekly inspections to ensure that progressive reinstatement is undertaken.</li> </ul>	<ul style="list-style-type: none"> <li>Site specific erosion and sediment control plans developed for all watercourses and high risk areas.</li> <li>Construction footprint is progressively reinstated.</li> </ul>
<b>Reinstatement</b>			
<ul style="list-style-type: none"> <li>Reinstate the construction footprint progressively and continue to monitor and manage reinstated areas.</li> </ul>	<ul style="list-style-type: none"> <li>Undertake progressive reinstatement of all areas not required for access to permanent facilities or requested by the landowner or manager to be retained.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure that progressive reinstatement is undertaken, and to monitor and manage reinstated areas.</li> </ul>	<ul style="list-style-type: none"> <li>Construction footprint is progressively reinstated.</li> </ul>

## Biodiversity management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Prevent the introduction of new, or spread of existing, weed species.</li> <li>Prevent bushfire due to pipeline failure.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Weed Management Plan that includes follow up weed monitoring.</li> <li>Monitor and maintain pipeline infrastructure, and implement fire/explosion control measures in accordance with AS 2885 as per Section 13.9.2.</li> </ul>	<ul style="list-style-type: none"> <li>Rehabilitation monitoring as per Section 13.13.</li> </ul>	<ul style="list-style-type: none"> <li>No new weed species identified within the Project footprint.</li> <li>No spread of existing weeds as compared to pre-disturbance weed survey data.</li> <li>No bushfires due to pipeline failure.</li> </ul>



## 13.6 WATER

### 13.6.1 ENVIRONMENTAL VALUES AND RISKS

The water values that occur within the Project footprint, and potential impacts and risks to water associated with project activities are described in Chapter 7 of this EIS. A brief summary of water as relevant to the project is provided below.

Construction of the pipeline and facilities will involve six river crossing (stream order five and above), 12 creek crossings (stream order three to four) and a number of minor drainage line crossings (stream order one and two). All watercourses crossed during construction are ephemeral to intermittent, and crossings will be constructed via open trench.

Water use during the construction phase is estimated as (total volumes):

- 69 ML for construction purposes (e.g. dust suppression)
- 20 ML of potable water
- 22 ML of hydrostatic test water

Water will be sourced mainly from existing suppliers at Mount Isa and Tennant Creek, or from existing pastoral property groundwater bores.

Construction and hydrostatic test water will be stored in up to eight low consequence dams along the construction ROW, each with a capacity of 12 ML, which will be reinstated unless the landholder requests that they remain. Potable water will be stored in allocated potable water storage areas at each construction camp.

The following wastewater streams will be generated as a result of construction activities:

- the six construction camps will require on-site wastewater treatment and disposal via irrigation (estimated at a total of 20 ML)
- pre-fill and hydrostatic test water will require disposal to land; pre-fill water will be disposed to land at the end of each test section while hydrostatic test water will be stored in low consequence dams and reused for each test section. Hydrostatic test water will be discharged to land upon completion of the final test section.
- should rainfall occur, or shallow groundwater be intercepted, during trenching the trench will require dewatering.

Construction will require land clearing and earthworks, which poses an erosion risk, particularly in high risk areas and where dispersive soils may be uncovered. Erosion within the construction footprint could result in sedimentation of the watercourses, and subsequent impacts on water quality, downstream users and aquatic ecosystem health.

The majority of the construction footprint will be reinstated following construction, and water use will be minimal for the majority of operational activities. The exception to this is the PCCS, which will require approximately 4,800 L/day for use in gas processing. It will produce the same volume of wastewater (called produced water); up to 200 L/hour. This will be filtered and pumped to onsite evaporation ponds for disposal via evaporation.

Decommissioning water requirements are currently unknown, but it is assumed that they will be minimal as decommissioning will leave the pipe in situ (after it has been made safe), and remove above ground infrastructure, prior to rehabilitating the entire Project footprint. Decommissioning risks have not been assessed as the details of the decommissioning process and legislative requirements that will be applicable at the time (forecast to be in excess of 30 years from now) are not known with enough certainty to inform assessment of risk. As such management measures are not included, but will be addressed at the time of decommissioning.

The environmental risk assessment identified the following potential impacts to water with a pre-mitigated risk of moderate or above:

### Planning

- watercourse crossings not adequately assessed leading to insufficient detail for development of Progressive Erosion and Sediment Control Plans.
- soils are not adequately mapped and problematic soils are not identified leading to inaccurate information for the development of specific management plans.
- physical damage to watercourses when accessing survey activities.

### Construction

- spills of chemicals or hazardous substances, and subsequent reduction in surface or groundwater quality
- sediment or vegetative material entering local watercourses or groundwater aquifer, and subsequent reduction in water quality, due to:
  - ground disturbance
  - erosion of exposed soils
  - an uncontrolled release from temporary low consequence storage dams
  - trench dewatering
  - interception of shallow groundwater during trenching.
- contaminated wastewater entering surface or groundwater, and subsequent reduction in water quality, associated with the generation and disposal of wastewater from construction camps and/or hydrostatic test water
- exposure of problematic soils (e.g. dispersive, acid sulfate or contaminated) during surface and sub-surface excavations and subsequent reduction in water quality due to inadequate handling and/or treatment of problematic soils
- alteration of surface water hydrology and sedimentation of watercourses, and subsequent impacts on water quality, downstream users and aquatic ecosystems, associated with open trenching, particularly across watercourses
- drawdown of groundwater water associated with sourcing construction water, and subsequent impacts on other groundwater users, groundwater dependent ecosystems and areas of ground-surface water interaction.

## Operations

- failure of soil management and rehabilitation, resulting in erosion and scour of soils, sediment entering watercourses, and subsequent reduction in water quality
- chemicals or hazardous substances entering groundwater or surface water due to a failure of the pipeline and release of contaminants, and subsequent reduction in water quality
- uncontrolled release of produced water from the PCCS, resulting in contaminated produced water entering groundwater or surface water, and subsequent reduction in surface and ground water quality<sup>2</sup>;
- drawdown of groundwater water, and subsequent impacts on other groundwater users, groundwater dependent ecosystems and areas of ground-surface water interaction, due to the sourcing and extraction of operational water<sup>3</sup>.

The framework for managing potential water impacts through each project phase is provided in the sections below.

***A Water Management Plan (Construction) has been developed to specifically address potential impacts to water from construction activities. Refer to the Water Management Plan (Construction) (Appendix O) for detail on the construction phase management measures and related monitoring and reporting requirements. A summary is provided below.***

***A Primary Erosion and Sediment Control Plan (ESCP) has been developed that outlines the overarching erosion and sediment management approaches for the Project. Refer to the Primary ESCP (Appendix P) for further information. A summary is provided below.***

<sup>2</sup> Approximately 200 L/hr of water will be produced at the PCCS as part of the nitrogen reduction process. Produced water will be filtered on-site and then directed to an on-site evaporation pond for disposal.

<sup>3</sup> The only major operational water requirements will be at the PCCS, which will require 4,800 L/day. This water will be sourced from a borehole to be drilled near the PCCS site.

### 13.6.2 MANAGEMENT MEASURES

#### Water management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Adequately assess the existing environment and water values to inform the project design phase.</li> <li>Prepare for the construction and operational phases.</li> </ul>	<ul style="list-style-type: none"> <li>Watercourse crossing assessments are undertaken by a suitably qualified person, for all watercourses (stream order 3+) crossed by the construction ROW.</li> <li>Information from watercourse crossing assessments is used to inform the Water Management Plan and Progressive Erosion and Sediment Control Plans (ESCP).</li> <li>Soil assessment and landscape mapping is undertaken by a suitably qualified soil scientist, and is undertaken for the entire construction footprint.</li> <li>Information from soil landscape mapping is used to inform the Progressive ESCP.</li> <li>Soil sampling is undertaken to identify areas of problematic soils, and allow specific management plans to be developed as required.</li> <li>Existing tracks will be used for survey access.</li> <li>No driving along watercourses or disturbance of watercourses</li> <li>Plan construction works across watercourses in order of preference: <ul style="list-style-type: none"> <li>In times when there is no water present</li> <li>In times of no flow</li> <li>In times of low, but in a way that does not impede low flow.</li> </ul> </li> <li>Develop a Hydrostatic Testing Management Plan</li> <li>Identify sources of hydrostatic testing and construction water, and undertake an assessment of the sustainable yields of those sources.</li> <li>Develop water extraction agreements with existing water suppliers.</li> <li>Determine the location and volumes of water storage dams, and determine their consequence category<sup>4</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-construction monitoring of standing water levels in groundwater bores that will be used as source water.</li> <li>Pre-construction watercourse crossing surveys and soil landscape mapping.</li> <li>Pre-construction soil sampling for identification of problematic soils.</li> </ul>	<ul style="list-style-type: none"> <li>The Water Management Plan and Progressive ESCP are developed and informed by site specific data prior to construction commencing.</li> <li>Standing water level data obtained from groundwater bores prior to extraction.</li> <li>Specific management plans are developed for problematic soils, if identified.</li> </ul>

<sup>4</sup>The consequence category of dams will be assessed in accordance with the Qld Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (DEHP 2013) prior to design and construction. Only low consequence dams will be constructed.

## Water management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>Chemical or hazardous substances</b>			
<ul style="list-style-type: none"> <li>Minimise impacts to surface water quality as a result of contamination or pollution.</li> <li>Minimise impacts to groundwater quality as a result of contamination or pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Traffic Management Plan and Dangerous Goods and Hazardous Substance Management Procedure prior to commencement of works; to include measures for management of substances and spill response procedures.</li> <li>Develop and implement standard operating procedures for transport of chemicals and hazardous substances, and ensure chemicals and hazardous materials are transported in accordance with relevant guidelines.</li> <li>All fuels and hazardous materials will be stored and handled in accordance with relevant Safety Data Sheets, Australian Standard AS1940-2004, applicable legislative requirements and relevant guidelines.</li> <li>Storage areas for fuel and hazardous substances will be bunded and located away from sensitive receiving environments, including surface watercourses, areas of shallow groundwater, sinkholes and limestone outcrops.</li> <li>No refuelling will occur near sensitive receiving environments, or within 100 m of a watercourse or 200 m of a sinkhole.</li> </ul>	<ul style="list-style-type: none"> <li>Daily inspections of machinery, refuelling areas and storage areas for spills or signs of contamination.</li> <li>Weekly inspection checklists.</li> <li>Regular environmental audits.</li> </ul>	<ul style="list-style-type: none"> <li>No contaminants released to waterways.</li> <li>All spills cleaned up immediately in accordance with the Spill Management Procedure.</li> </ul>
<b>Sediment and/or vegetative material</b>			
<ul style="list-style-type: none"> <li>Minimise impacts to surface water quality as a result of sedimentation.</li> <li>Control and manage drainage, erosion and sediment within construction footprint.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement Water Management Plan (Construction).</li> <li>Develop and implement Primary and Progressive ESCP in accordance with the IECA Guidelines. Progressive ESCP are to be developed, as a minimum, for major watercourse crossings, high erosion risk areas, gently sloped areas that may have dispersive soils, and the compressor stations.</li> <li>The Progressive ESCP is to include inclement weather controls if rainfall is predicted. This includes installing diversion bunds around open trench areas and active construction areas, installing diversions and necessary sediment controls</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspection checklists.</li> <li>Specific inspections during rainfall events, where appropriate.</li> <li>Regular environmental audits.</li> <li>Monitoring and maintenance as per Primary ESCP (Appendix P) and Progressive</li> </ul>	<ul style="list-style-type: none"> <li>All controls and devices in Erosion and Sediment Control Plans installed.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Manage surface water flows and water discharges to avoid altered hydrology and impacts to watercourses.</li> </ul>	<p>through open water crossings, and covering stockpiles.</p> <ul style="list-style-type: none"> <li>Minimise the area of exposed soils with progressive reinstatement.</li> <li>Undertake a soil survey of the construction ROW prior to construction to identify, and map, areas of problematic soils. Develop and implement a dispersive soils Progressive ESCP in accordance with IECA Guidelines where identified.</li> <li>Implement monitoring program and maintenance measures as required.</li> </ul>	<p>ESCP (to be developed prior to construction</p>	
<b>Surface water flows</b>			
<ul style="list-style-type: none"> <li>Control and manage drainage, erosion and sediment within construction footprint.</li> <li>Manage surface water flows and water discharges to avoid altered hydrology and impacts to watercourses.</li> <li>Minimise impacts to biodiversity relevant to water, including GDE's, riparian vegetation and aquatic ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>Watercourse crossings will be constructed in the following order of preference: <ul style="list-style-type: none"> <li>In times when there is no water present</li> <li>In times of no flow</li> <li>In times of flow, but in a way that does not impede low flow</li> </ul> </li> <li>Reinstate watercourse crossings as soon as construction of crossing is complete to minimise duration of disturbance. Reinstate watercourse profile back to pre-disturbance profile as far as possible.</li> <li>The Progressive ESCP for major watercourse crossings is to provide specific details on the methods for watercourse crossings, treatment of soils and cleared vegetation, backfill and reinstatement requirements, and contingencies for rainfall.</li> <li>Only activities directly required for linear infrastructure construction are to be undertaken within watercourses.</li> <li>Minimise duration of open trench across watercourse crossings through installing crossing and backfilling in the shortest practicable time.</li> <li>Source surface water from approved sources in accordance with agreements. Do not extract water from watercourses.</li> <li>If trench dewatering is required, dewater via erosion and sediment controls.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspection checklists.</li> <li>Specific inspections for discharges and during rainfall events, where appropriate.</li> <li>Regular environmental audits.</li> <li>Water monitoring as per Water Management Plan (Construction) (Appendix O)</li> <li>Monitoring and maintenance as per Primary ESCP (Appendix P) and Progressive ESCP (to be developed prior to construction</li> </ul>	<ul style="list-style-type: none"> <li>All controls and devices in Erosion and Sediment Control Plans installed</li> <li>All pipeline watercourse crossings are installed in accordance with approval conditions</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Groundwater drawdown</b>			
<ul style="list-style-type: none"> <li>Extract water within sustainable yields of aquifers to minimise impacts to groundwater quantity and other users.</li> <li>Minimise impacts to biodiversity reliant on groundwater, including GDE's, riparian vegetation and aquatic ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>Source groundwater from existing groundwater bores as much as possible.</li> <li>Source water in accordance with agreements with supplier.</li> <li>Assess the sustainable yields of groundwater bores prior to extraction, and ensure extraction rates are within sustainable yields for each respective bore. Details of groundwater extraction are to be in Hydrostatic Test Management Plan and CEMP.</li> <li>Monitor standing water levels prior to, during and after extraction to assess drawdown. Establish control standing water level monitoring sites to determine natural seasonal variation.</li> <li>Where new bores will be drilled, engage a licenced water bore driller to install the bores.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspection checklists.</li> <li>Regular environmental audits.</li> <li>Water monitoring as per Water Management Plan (Construction) (Appendix O)</li> </ul>	<ul style="list-style-type: none"> <li>All groundwater extraction in accordance with approval conditions and agreements.</li> </ul>
<b>Wastewater</b>			
<ul style="list-style-type: none"> <li>Minimise impacts to surface water quality as a result of contamination, pollution, or sedimentation.</li> <li>Minimise impacts to groundwater quality as a result of contamination or pollution.</li> <li>Manage water resources to recycle and reuse where possible, reducing demands on</li> </ul>	<ul style="list-style-type: none"> <li>Install and maintain suitably sized and designed onsite wastewater treatment plants for each camp.</li> <li>Water to be treated to a suitable quality for release via irrigation (as per Northern Territory <i>Guidelines for Wastewater Works Design Approval</i>).</li> <li>Treated wastewater will only be released to allocated and approved irrigation areas, in accordance with a <i>Wastewater Works Design Approval</i>, to be obtained from the NT Department of Health prior to irrigation.</li> <li>No treated wastewater to be irrigated near a watercourse, on areas of limestone or dolomite outcrop, or near sinkholes.</li> <li>Hydrostatic testing will be conducted in accordance with Australian Pipeline Industry Association (APIA) code of <i>Environmental Practice: Onshore Pipelines</i> (2013).</li> <li>Develop and implement a Hydrostatic Testing Management Plan outlining: <ul style="list-style-type: none"> <li>Volume and source of test water.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspection checklists.</li> <li>Specific inspections for discharges and during rainfall events, where appropriate.</li> <li>Regular environmental audits.</li> <li>Water monitoring as per Water Management Plan (Construction) (Appendix O).</li> </ul>	<ul style="list-style-type: none"> <li>No contaminants released to waterways.</li> <li>No unauthorised discharge of hydrostatic test water or treated wastewater outside of approval conditions and water quality release parameters.</li> </ul>



Objective	Management actions	Monitoring	Performance indicators
resources.	<ul style="list-style-type: none"> <li>Proposed method and location of reuse/or disposal.</li> <li>Proposed management measures to avoid and minimise environmental impacts for testing procedures.</li> <li>Where hydrostatic test water will be released, water will first be sampled and analysed to ensure that the quality meets acceptable standards for release to land as per Water Management Plan (Construction).</li> <li>Pre-fill water is to be filtered via sediment filters prior to release to land.</li> <li>Discharge water to approved locations only.</li> <li>Obtain a Waste Discharge Licence, the conditions of which will dictate discharge controls in the Northern Territory. All discharges in Queensland are to be in accordance with the Environmental Authority.</li> <li>All testing of hydrostatic water quality will be conducted by a laboratory with NATA accreditation where an available laboratory is available for testing of each particular analyte.</li> <li>Hydrostatic test water and pre-fill water will be released in a manner that does not cause visible scouring or erosion.</li> <li>Vehicle washdown bays will be constructed to capture and recycle all wastewater. No discharge will occur from washdown bays. Washdown facilities will capture weed and seeds in a sump to ensure they are not spread to surrounding environment. Sump residue will be removed and disposed of at a licenced facility.</li> </ul>		
<b>Water storage dams</b>			
<ul style="list-style-type: none"> <li>Minimise impacts to surface water quality as a result of contamination, pollution, or sedimentation.</li> <li>Manage surface water</li> </ul>	<ul style="list-style-type: none"> <li>Engineer and design water storage dams to accommodate projected quantities, and to include sufficient free board to accommodate additional filling during rainfall events.</li> <li>Only low consequence dams are to be constructed, in accordance with the Queensland <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams</i> (DEHP 2013). This will ensure that risks of failure and</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspection checklists.</li> <li>Specific inspections for rainfall events</li> <li>Regular environmental audits.</li> <li>Water monitoring as per Water Management Plan</li> </ul>	<ul style="list-style-type: none"> <li>The consequence category of all dams is 'Low'.</li> <li>All controls and devices in Erosion and Sediment Control Plans installed.</li> </ul>



Objective	Management actions	Monitoring	Performance indicators
flows and water discharges to avoid altered hydrology and impacts to watercourses.	<p>consequence of failure is low.</p> <ul style="list-style-type: none"> <li>After rainfall events, monitor and conduct controlled releases as required.</li> <li>Develop and implement an ESCP in accordance with IECA Guidelines.</li> </ul>	<p>(Construction) (Appendix O).</p> <ul style="list-style-type: none"> <li>Monitoring and maintenance as per Primary ESCP (Appendix P) and Progressive ESCP (to be developed prior to construction.</li> </ul>	

### Water management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<b>Sediment and/or vegetative material</b>			
<ul style="list-style-type: none"> <li>Control and manage drainage, erosion and sediment within Project footprint.</li> </ul>	<ul style="list-style-type: none"> <li>Operate and maintain the pipeline in accordance with AS2885. Reinstate ROW and temporary access tracks in accordance with ESCP.</li> <li>Develop and implement an OEMP and Rehabilitation Management Plan to outline requirements for monitoring and maintenance of the reinstated construction footprint.</li> <li>Rectify any erosion identified within the reinstated construction footprint, as required to maintain a stable landform.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of surface water bodies that would be a receiving environment from operational activities.</li> <li>Conduct inspections of the pipeline alignment for erosion, particularly at watercourses.</li> </ul>	<ul style="list-style-type: none"> <li>All controls and devices in Erosion and Sediment Control Plans installed and monitored.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Chemicals and hazardous substances</b>			
<ul style="list-style-type: none"> <li>Minimise impacts to surface water quality as a result of contamination or pollution.</li> <li>Minimise impacts to groundwater quality as a result of contamination or pollution</li> </ul>	<ul style="list-style-type: none"> <li>Operate and maintain the pipeline in accordance with AS2885.</li> <li>Monitor pipeline and facilities for leaks or failures.</li> <li>Develop and maintain operations safety and environment procedures.</li> <li>Conduct regular inspections of the pipeline, facilities and ancillary infrastructure to assess integrity and operational efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of surface water bodies that would be a receiving environment from operational activities.</li> </ul>	<ul style="list-style-type: none"> <li>All storage and handling of fuels, chemicals and hazardous substances is in accordance with relevant safety data sheet (SDS) and Australian Standards.</li> <li>No contaminants released to waterways</li> <li>All spills cleaned up immediately in accordance with the Spill Management Procedure</li> </ul>
<b>Surface water flows and groundwater drawdown</b>			
<ul style="list-style-type: none"> <li>Extract water within sustainable yields of aquifers to minimise impacts to groundwater quantity and other users.</li> <li>Minimise impacts to biodiversity reliant on groundwater.</li> <li>Avoid extraction that would result in altered surface water flows.</li> </ul>	<ul style="list-style-type: none"> <li>Source MICS operational water from approved sources in accordance with agreements.</li> <li>No water will be extracted from watercourses.</li> <li>Source groundwater for PCCS from a groundwater extraction bore in consultation with a hydrogeologist.</li> <li>If a new bore is required, engage a water bore driller who is licenced under the Water Act (N7) to drill and construct the bore in accordance with regulatory requirements.</li> <li>Assess the sustainability of groundwater resources to inform location of groundwater extraction.</li> <li>Extract water within the sustainable yield of the aquifer.</li> <li>Pump test bore prior to use to assess groundwater drawdown.</li> <li>Monitor standing water levels in bores prior to and during use to provide data on</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of groundwater standing water levels prior to and during groundwater extraction.</li> <li>Monitoring of surface water bodies that would be a receiving environment from operational activities.</li> </ul>	<ul style="list-style-type: none"> <li>All groundwater extraction in accordance with approval conditions.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Manage water resources to recycle and reuse where possible.</li> </ul>	<ul style="list-style-type: none"> <li>changes in groundwater levels.</li> <li>Recycle water through compressor stations where possible to minimise demand.</li> </ul>		
<b>Wastewater</b>			
<ul style="list-style-type: none"> <li>Minimise impacts to surface water quality as a result of contamination, pollution, or sedimentation.</li> <li>Minimise impacts to groundwater quality as a result of contamination or pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Compressor stations will capture any wastewater within the facility.</li> <li>Produced water at PCCS will be filtered on-site and then directed to an on-site evaporation pond for disposal by evaporation.</li> <li>Evaporation pond will be engineered and designed to accommodate expected water volumes, with sufficient freeboard for expected rainfall volumes.</li> <li>Evaporation pond will be lined to prevent leakage, tested for leaks prior to use, and a leakage detection system will be installed beneath the pond.</li> <li>No water will be discharged to land or watercourses unless prior approval is obtained.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of surface water bodies that would be a receiving environment from operational activities.</li> </ul>	<ul style="list-style-type: none"> <li>No wastewater discharges unless prior approval is obtained.</li> </ul>

## 13.7 HISTORIC AND CULTURAL HERITAGE

### 13.7.1 ENVIRONMENTAL VALUES AND RISKS

The historic and cultural heritage values that occur within the Project footprint, and potential impacts and risks to historic and cultural heritage values associated with project activities are described in Chapter 8 of this EIS. A brief summary of historic and cultural heritage values is provided below.

In May 2016, Jemena submitted an application to the Aboriginal Areas Protection Authority (AAPA) for an Authority Certificate for the Northern Territory portion of the NGP Project. Consultations have also been undertaken with Traditional Owners and Custodians of the land traversed by the Project, and their representative Land Councils, since May 2015. Sacred Sites Clearance Surveys were undertaken, and an agreement will be finalised with the Land Councils to ensure that the Project is constructed in a manner that protects Sacred Sites through all phases of the project. Conditions of the AAPA Authority Certificate and Land Council agreements will be included in the Cultural Heritage Management Plan (CHMP).

Desktop research on historical occupation and use of the region traversed by the Project indicates that there is a long history of occupation and a well-developed trade network, resulting in a high likelihood of stone artefacts in the region. Archaeological field surveys commenced in late April 2016 and continued throughout the period May to July sufficient to cover the entire project footprint known to date.

The archaeological report, and results analysis, was not finalised at the time of writing this report. Preliminary results indicate that the survey has identified a suite of sites with variations in site abundance in different landforms across the project area. The vast majority of sites are stone artefact scatters and isolated stone artefacts. These are being documented in order to assess their significance consistent with the requirements of the Heritage Act (NT). Consistent with best practice heritage management and in accordance with the legislation, Jemena will make applications for Work Approvals (NT) as required for the Project.

The environmental risk assessment identified the following potential impacts with a pre-mitigation risk rating as moderate or above:

#### Planning

- early survey works and field access impacting heritage via:
  - Unauthorised entry onto Sacred Sites or Aboriginal Land
  - Uninvited entry into Aboriginal living areas
  - Damage to cultural heritage sites, places or objects during low impact ground disturbing works.

#### Construction

- unauthorised entry onto Sacred Sites
- uninvited entry into Aboriginal living areas
- damage to known cultural heritage sites, places or objects during clearance and ground disturbance activities
- discovery and disturbance of previously undiscovered cultural heritage sites, places or objects during clearance, disturbance or trenching activities

- discovery and disturbance of skeletal remains during clearance, ground disturbance or trenching activities.

#### Operations

- remote area driving for operation and maintenance activities impacting heritage via:
  - unauthorised entry onto Sacred Sites or Aboriginal land
  - damage to cultural heritage sites, places or objects.

***These risks are largely associated with the construction phase of the Project and therefore a Cultural Heritage Management Plan has been developed to provide detailed mitigation measures for implementation by the Construction Contractor (refer to Appendix Q). The CHMP will be finalised once all of the survey work has been undertaken, negotiations have been completed with Traditional Owners and Land Councils and the approvals obtained under the Aboriginal Sacred Sites Act and the Heritage Act. A framework for managing potential impacts through each project phase is provided in the sections below.***

## 13.7.2 MANAGEMENT MEASURES

### Historic and cultural heritage management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Identify and avoid unauthorised interaction with, or disturbance of, known cultural heritage sites, places or objects.</li> <li>Obtain all necessary Sacred Site and Aboriginal land access permissions to identify specific management and access requirements.</li> <li>Stipulate requirements for accessing Sacred Sites and Aboriginal land.</li> </ul>	<ul style="list-style-type: none"> <li>Sacred Site Surveys undertaken by Land Councils and reports received setting out Restricted Work Areas and Exclusion Zones.</li> <li>Cultural Heritage Survey Agreements in place with Aboriginal Parties, to identify Restricted Work Areas and Exclusion Zones.</li> <li>Compliance with the Aboriginal Land Act for the issue of access permits for Aboriginal land access pre-construction.</li> <li>No pre-construction works to be undertaken without Sacred Site clearance or without heritage site clearance by an archaeologist.</li> <li>Plan construction footprint, including access tracks, to avoid areas of identified cultural heritage significance.</li> <li>Identification of family outstations and inclusion of access restrictions in project land access line list.</li> <li>Authority Certificate obtained under the Sacred Sites Act and conditions incorporated into project management plans, including contracts and subcontracts for the construction phase.</li> <li>An archaeological survey is to be undertaken of the construction footprint by archaeologists to identify any heritage sites, places or objects within the construction footprint.</li> <li>The results of the heritage survey will inform whether Work Approvals from the NT Heritage Branch, will be required. Works approvals may include: <ul style="list-style-type: none"> <li>site protection (e.g. through marking out and fencing off of heritage site areas in close proximity to construction activities), i.e. the establishment of No-Go Zones <ul style="list-style-type: none"> <li>relocating and/or reinstating heritage objects</li> <li>destruction of sites.</li> </ul> </li> </ul> </li> <li>The details of Work Approvals will be incorporated into the CHMP.</li> </ul>	<ul style="list-style-type: none"> <li>Cultural heritage surveys</li> </ul>	<ul style="list-style-type: none"> <li>All known sacred heritage cultural heritage sites, places or objects within, or near, the construction footprint and identified, mapped and provided to Jemena, Construction Contractors and relevant stakeholders.</li> <li>Pipeline alignment and infrastructure is designed to avoid cultural heritage sites, places or objects.</li> </ul>

## Historic and cultural heritage management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Comply with all requirements of Sacred Site and Aboriginal land access agreements and permits.</li> <li>Avoid impacting on known or unknown cultural heritage sites, places or objects, except where authorised.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Construction Phase Cultural Heritage Management Plan (CHMP), to include: <ul style="list-style-type: none"> <li>Incorporating site management conditions in Work Approvals under the Heritage Act.</li> <li>Archaeological Heritage Field Hands working alongside Traditional Owners during clear and grade in high risk areas.</li> <li>Identify and manage heritage site areas in close proximity to construction activities.</li> <li>Inclusion of procedures for management of further site discovery for additional work areas required and during clear and grade activities, which may include: <ul style="list-style-type: none"> <li>implementation of Works Approvals granted</li> <li>employment of experienced Aboriginal archaeological field survey hands</li> <li>Work Approval program oversight by an archaeologist with standing in the NT</li> <li>archaeological survey, reporting and application for Work Approval for new work areas if required</li> </ul> </li> <li>Inclusion of procedures for skeletal remains discovery and management. This will include, as a minimum: <ul style="list-style-type: none"> <li>Stopping works immediately</li> <li>Establishment of a 50 m radius exclusion zone</li> <li>Immediate notification of the NT Police and Heritage Branch.</li> <li>Project activities would continue around the immediate vicinity to allow for the continuation of the project</li> </ul> </li> <li>All construction activities will be undertaken in accordance with Sacred Sites Act Authority Certificates.</li> <li>Project activities in Restricted Works Areas will be undertaken in accordance with agreements, Work Approval and Authority Certificate conditions.</li> <li>Exclusion Zones will be mapped and designated as No-Go Zones, with flagging</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Archaeological Field Hands and Traditional Owners are to conduct monitoring during ground disturbance works in accordance with Authority Certificate Conditions and Work Approval conditions.</li> <li>Conduct monitoring in accordance with Cultural Heritage Management plan.</li> </ul>	<ul style="list-style-type: none"> <li>No vegetation clearance or ground disturbance outside of approved construction footprint</li> <li>No disturbance of known cultural heritage sites, places or objects within, or near, the construction footprint, except in accordance with Work Approvals.</li> <li>All project personnel inducted in key cultural heritage management requirements</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
	<p>and delineation as required.</p> <ul style="list-style-type: none"> <li>• Authority Certificate conditions will be incorporated into Project Construction Management Plans and incorporated into all subcontracts.</li> <li>• Cultural heritage sites, places or objects near construction footprint are to be pegged and flagged off, and marked as no-go zones on construction maps. This must be completed prior to construction commencement.</li> <li>• Agreement with the Central Land Council regarding the issue of Project permits to access the Warumungu and Wakaya Aboriginal Land Trust lands.</li> <li>• Identification of family outstations and inclusion of access restrictions in project land access line list.</li> <li>• Restricted Works Areas, Exclusion Zones and No-Go Zones to protect known cultural heritage sites, places or objects within, or near, the construction footprint will be provided to the Construction Contractors for inclusion on construction maps.</li> <li>• Cultural heritage and the requirements of permits and approvals are included in the induction for all construction employees.</li> </ul>		



### Historic and cultural heritage management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Comply with all necessary Sacred Site and Aboriginal land access requirements.</li> <li>Avoid impacting on known or unknown cultural heritage sites, places or objects.</li> </ul>	<ul style="list-style-type: none"> <li>Inclusion of access restrictions for operations workers in project area in accordance with Sacred Site Authority Certificate.</li> <li>Individual permit access in accordance with Aboriginal Land Act and Land Agreement conditions and local relationship development.</li> <li>Workers restricted to public roads and pipeline ROW and respect of Authority Certificate conditions. No ground disturbing activities outside of ROW and approved additional work areas.</li> <li>Implement Cultural Heritage Management plan.</li> <li>Maintain heritage database.</li> <li>Cultural heritage and the requirements of permits and approvals are included in the induction for all operations personnel.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct monitoring in accordance with Cultural Heritage Management Plan</li> </ul>	<ul style="list-style-type: none"> <li>No disturbance of heritage areas or items</li> </ul>

## 13.8 SOCIO-ECONOMIC

### 13.8.1 SOCIO-ECONOMIC VALUES AND RISKS

The socio-economic values that occur within the Project footprint and potential impacts and risks to socio-economic values associated with project activities are described in Chapter 9 of this EIS. A brief summary of socio-economic values is provided below.

Social and economic values exist in three areas:

1. Culture and heritage – in the existing cultural lives, e.g. the customs and traditions, of the people (Aboriginal and non-Aboriginal) who live in the region and the historic cultural values often expressed through specific sites, e.g. sacred sites and / or evidence of past occupation that is held important in accordance with the relevant laws.
2. Community social health and well-being – in the existing environment of social amenity, social cohesion and community resilience.
3. Economy and development – in the existing economic status of the people who live in the region and their hopes and plans for economic development in the region in the future.

The approach taken to identifying risk and opportunity was based on standard risk methodology consistent with ISO 31000:2009. The risk model was slightly modified to suit Jemena's approach to risk management and the opportunity model, while following the same approach, is a completely new and bespoke model designed specifically for the Project.

There were a total of 84 social and economic risks (including Cultural and Heritage risks) associated with the project. Those that had a high level of inherent risk, i.e. before mitigation, related to the potential impact on the Tennant Creek economy, the impacts of the approach to the accommodation of the Phillip Creek Compressors Station (PCCS) workforce. In addition there were a number of risks with a significant inherent risk level, most often associated with community social health and well-being impacts associated with workforce management, the risks associated with local people and businesses missing out on economic opportunities with the project and some potential diseconomies caused by the project.

There are several risks that, in the construction phase, retain a moderate ranking, as follows.

First, the impact of increased wages and benefits circulating in the community and that this causes an increased incidence in the use of alcohol and drugs, which in turn results in increased anti-social behaviour / negative interaction with the health and criminal justice system. A related risk, that remains moderate after mitigation is that remote community members working on the project gravitate to centres such as Tennant Creek and Mount Isa during rostered breaks and engage in the same consequences but also the incidence of employment abandonment. Jemena will continually seek to mitigate these risks through the various strategies outlined in the risk register and Economic and Social Impact Management Plan (ESIMP).

Second, the risk of increased traffic incidents in Tennant Creek and along the Barkly and Stuart Highways, e.g. through the interaction between the project transport, local and tourist traffic. This risk will be managed through the Project Traffic Management Plan and communications strategy.

Third and last, from an economic perspective, there will remain the risk that local people and businesses are not successful in obtaining jobs and contracts, that the Barkly labour market and business capacity is overshadowed by the much larger Mount Isa capacity and that the project labour demand drains skilled workers from existing industries, including the pastoral industry, tourism, local government and other local businesses. Jemena will seek to obviate or mitigate these impacts through the implementation of the

various capacity building programs, transparent implementation of its Regional Employment Plan, promotion of the SME Business Investment Fund and clear communication about demand through the proposed CRGs. Fundamentally, however, Jemena cannot control the market, nor the choices of individual people and business, their desire and ability to be competitive.

All of the socio-economic risks and opportunities will be managed through the strategies contained in the ESIMP, the CHMP and other associated plans. The risks in the area of Cultural and Heritage and the associated mitigation plans are set out in Section 13.7 above.

The risks associated with the areas of community social health and well-being and economy & development are included below, noting that there will be some overlap in the area of “Human health and safety”, which is addressed in Section 13.9.

### 13.8.2 MANAGEMENT MEASURES

#### Socio-economic management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>To monitor and manage the intended and unintended social and economic consequences, both positive and negative, of the project.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of communications strategy and plan, including regular updates through Community Reference Groups, established in 2016 and implemented throughout the Project Construction Phase.</li> <li>SIA consultations, ESIA Report and finalisation of operational ESIMP.</li> <li>Land negotiations held through well established and proponent funded Land Council and Aboriginal representative body processes and in accordance with the ALRA and NTA.</li> <li>Land negotiations with other landowners held through established and transparent, proponent funded processes.</li> <li>Proponent actively pursues local employment through existing approach to local content.</li> <li>Proponent uses best endeavours to obtain all approvals and progress the project within the current market conditions.</li> <li>Keep local business and community regularly briefed on Project progress.</li> </ul>	<ul style="list-style-type: none"> <li>Information received from community stakeholders through CRGs, 1300 contact number or directly.</li> <li>Actual employment and contracting outcomes collected through contractor monthly reporting on local content outcomes.</li> <li>Progress quarterly reports to the NT Government.</li> </ul>	<ul style="list-style-type: none"> <li>Number of community briefings held and newsletters published.</li> <li>Community booklets distributed.</li> <li>SIA consultations completed.</li> <li>CRGs established.</li> <li>Agreements reached with Land Councils and other landowners.</li> <li>Incidence of directly attributable risk</li> </ul>

### Socio-economic management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>Social health and wellbeing</b> <ul style="list-style-type: none"> <li>To monitor and manage the intended and unintended social consequences, both positive and negative, of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>Land agreement benefits are managed through well-established Land Council and Aboriginal representative body processes.</li> <li>Jemena NGP Regional Employment Plan and SME Business Growth Program implementation.</li> <li>Money management and associated education of local workforce through Jemena's Project Ready Training Program and liaison with community support agencies.</li> <li>Develop strategies in consultation with remote community workers and community organisations that support and help coordinate workers during rostered breaks including town based support for workers returning to the project.</li> <li>Transparent implementation of Jemena's Regional Employment Plan, including selection processes for the Project Ready Training Program and transparency communication of employment recruitment processes by contractors through the NGP Jobs online portal.</li> <li>Jemena to discuss potential impacts with community organisations to assess level of impact and possible mitigation strategies, e.g. potential participation of workforce in existing community events.</li> <li>Risk managed through the Project Traffic Management Plan including Project communications at key points, e.g. roadhouses in Tennant Creek and along the Barkly Highway.</li> <li>Any petrol used is to be stored in securely locked storage areas and specifically monitored through security plan.</li> <li>Security plan established for the Project activities and Project communications about risks.</li> <li>Implementation of Workers Accommodation Plan to optimise positive impact on Tennant Creek economy and avoid negative impacts on community.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of land agreement implementation issues through CRGs and direct contact with Land Councils.</li> <li>Monitoring of negative events arising from increased income circulation through CRGs and networks with local community organisations.</li> <li>NGP Jobs Portal usage and system statistics.</li> <li>Risks associated with the pipe laydown yard reported through Tennant Creek CRG.</li> <li>NGP Jobs Portal usage and system statistics.</li> </ul>	<ul style="list-style-type: none"> <li>Number of incidents of identified risks arising from distribution of land agreement benefits, or increased wages.</li> <li>Risk management strategies in place with local community organisations for remote community workers visiting regional centres.</li> <li>Number of incidents arising from remote community workers visiting regional centres.</li> <li>Number of security incidents associated with pipe laydown yard at Tennant Creek.</li> <li>Actual number of accommodation nights used in Tennant Creek with commercial accommodation.</li> <li>Number of community briefings held and newsletters published.</li> <li>Community booklets distributed.</li> <li>SIA consultations completed.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
	<ul style="list-style-type: none"> <li>A combination of Project signage and gates will be used to control unauthorised access to the construction site. Security plan established for the pipeline and compressor station construction activities.</li> <li>Implementation of communications strategy and plan, including regular updates through Community Reference Groups, established in 2016 and implemented throughout the Project Construction Phase.</li> </ul>		<ul style="list-style-type: none"> <li>CRGs established and number of meetings held.</li> </ul>
<b>Economy and development</b>			
<ul style="list-style-type: none"> <li>To monitor and manage the intended and unintended social consequences, both positive and negative, of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of Jemena's approach to local content including the Small Medium Enterprise (SME) Business Growth Program, including inclusion of local content requirements in all Tier 1 and Tier 2 contracts, continued assessment and scrutiny of contractor local content plans.</li> <li>Continued communication with the local business community about opportunities with the Project, including timing and scope.</li> <li>Communicate support opportunities to all businesses, particularly new small businesses, including the risk of early failure and the importance of adopting strategies to manage this in their business plans.</li> <li>Implementation of Communications Strategy &amp; Plan, including regular updates through a Community Reference Group, established in 2016 and implemented throughout the Project Construction Phase.</li> <li>Transparent implementation of Jemena's Regional Employment Plan, including: <ul style="list-style-type: none"> <li>Selection processes for the Project Ready Training Program (P RTP).</li> <li>Transparent communication of employment recruitment processes by contractors through the NGP Jobs online portal.</li> </ul> </li> <li>Implement the contract for the manufacture of pipe skids and sand / sawdust bags in Tennant Creek – achieving the intended social outcomes (The TC Social Enterprise opportunity).</li> <li>Contractual provisions for subcontractors to maximise the use of labour from the Barkly and Mount Isa.</li> </ul>	<ul style="list-style-type: none"> <li>Actual employment and contracting outcomes collected through contractor monthly reporting on local content outcomes.</li> <li>ICN collected statistics.</li> <li>Monitoring of contractor and subcontractor implementation success through local content reporting.</li> <li>NGP Jobs Portal statistics.</li> <li>Monitoring of contractual provisions through local content reporting.</li> <li>Monitor impacts on regional RPT flights through Tennant Creek CRG and directly to Jemena.</li> <li>Monitor price and demand fluctuations in Tennant Creek</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of SME Business Investment Fund.</li> <li>Number of business community briefings / workshops held.</li> <li>Number of businesses assisted through the SME Business Investment Fund.</li> <li>Number of local and Indigenous people employed and local goods and services contracts let.</li> <li>Contract let, successful establishment, manufacture and delivery of pipe skids and bags from Tennant Creek.</li> <li>P RTP indicators include: <ul style="list-style-type: none"> <li>Number of people who apply.</li> <li>Number of people commenced.</li> </ul> </li> </ul>

Objective	Management actions	Monitoring	Performance indicators
	<ul style="list-style-type: none"> <li>Construction contractor to organise charter flights to and from Tennant Creek.</li> <li>Briefing of local government, businesses, pastoral industry and community organisations regarding the timing and extent of Project labour demand.</li> <li>Establish Workers' Accommodation Plans for Tennant Creek and Mount Isa that: <ul style="list-style-type: none"> <li>Provide the broadest possible benefits for local accommodation providers.</li> <li>Do not result in utilities demand outside of existing capacity.</li> <li>Do not have a negative impact on other industries and services.</li> <li>Do not have an overly negative impact on the price and availability of private accommodation.</li> </ul> </li> <li>Access track crossing discussed with landowners and coordinated plan put in place to minimise disruption.</li> <li>Project liaison with pastoralists to coordinate project construction activities with mustering.</li> <li>Conduct pre-construction survey of known infrastructure locations and clearing delineate on ground prior to commencement of works.</li> <li>Close liaison with land occupants and service infrastructure noted in construction Land Line List.</li> <li>Feasibility question to be addressed during ESIA consultations and in general community consultations and communications. Discussion with NT Power Water Corporation required.</li> </ul>	<p>commercial accommodation during Project peak demand.</p> <ul style="list-style-type: none"> <li>Monitoring of landowner impact through direct and regular liaison with individual liaison with landowners.</li> <li>SIA Consultations to determine whether the perception of gas supply exists and also if raised through CRGs.</li> </ul>	<ul style="list-style-type: none"> <li>Number of people who complete.</li> <li>Number of graduates employed.</li> <li>REP indicators include: <ul style="list-style-type: none"> <li>P RTP indicators.</li> <li>Number of local and Indigenous people employed.</li> </ul> </li> <li>Incidents of complaint or deviation from agreed arrangements with landowners.</li> </ul>

## Socio-economic management – Operation phase

Objective	Management actions	Monitoring	Performance indicators
<b>Social health and wellbeing</b>			
<ul style="list-style-type: none"> <li>To monitor and manage the intended and unintended social and economic consequences, both positive and negative, of the project</li> </ul>	<ul style="list-style-type: none"> <li>Consult community and explain operations safety and environmental management practices.</li> <li>Keep community informed of operational activities as required.</li> <li>Minimise unauthorised use of easement and access tracks through progressive rehabilitation.</li> </ul>	<ul style="list-style-type: none"> <li>Response to community concerns through 1300 contact line.</li> <li>Ongoing liaison with landowners.</li> </ul>	<ul style="list-style-type: none"> <li>Incidence of complaints / concerns about safety and environmental management.</li> <li>Incidents / evidence of use of easement for unauthorised traffic.</li> </ul>
<b>Economy and development</b>			
<ul style="list-style-type: none"> <li>To monitor and manage the intended and unintended social and economic consequences, both positive and negative, of the project</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of Jemena's approach to local content including the SME Business Growth Program in the lead up to the Operations Phase.</li> <li>Implementation of Jemena's Regional Employment Plan, in the lead up to the Operations Phase including:               <ul style="list-style-type: none"> <li>the NGP Jobs Portal;</li> <li>Jemena Gas Operator Training Program;</li> <li>contractual provisions for subcontractors to maximise the use of labour from the Barkly and Mount Isa.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Actual employment and contracting outcomes leading into operations phase monitored through quarterly reports to the NT Government for first six months of operations, i.e. end 2018.</li> </ul>	<ul style="list-style-type: none"> <li>Number of local employees and contracts.</li> </ul>



## 13.9 HUMAN HEALTH AND SAFETY

Note: This section addresses human health and safety factors specifically relevant to the community. Health and safety of the construction and operational personnel is not addressed in detail, as this aspect of the Project is governed by a national regulatory framework and pipeline industry standards which prescribe the processes and requirements to be applied during each Project phase. Risks relevant to people and community well-being, specifically community structure, community participation and social networks, are addressed in Section 13.8.

### 13.9.1 ENVIRONMENTAL VALUES AND RISKS

The human health and safety values that occur within the Project footprint, and potential impacts and risks to human health and safety associated with project activities are described in Chapter 10 of this EIS. A brief summary of human health and safety values is provided below.

The majority of the Project activities will occur in remote and sparsely populated areas. The nearest residential receptors to the Project activities are a homestead south of Mount Isa (1 km east of the pipeline) and houses on the outskirts of Mount Isa (1.2 km from the MICS). In the Northern Territory the nearest residential receptors are an Aboriginal family outstation located near Tenant Creek (3.1 km south of the pipeline ROW) and the Austral Downs Station homestead (3.5 km north of the pipeline, near MLV2).

The Three Ways Roadhouse is located 5 km north of the pipeline while the Barkly Roadhouse is located 17 km north of the pipeline. While these are not major population hubs they are busy service areas, particularly in the dry season when tourism peaks in the region.

Air quality and noise and vibration are discussed in Sections 13.10 and 13.11. Baseline air quality and noise assessments indicate that there are few existing sources of emissions within the project area, and ambient air quality is generally good, while ambient noise levels are low.

Existing health services in the region are the Tennant Creek Hospital, a 20 bed hospital which provides health services for the Barkly region, and the Mount Isa Hospital, a large regional hospital that services the city and surrounding region. Some small community clinics are located throughout the region. Accessibility to emergency services in the region surrounding the Project relies heavily on roads, with the Barkly Highway and Stuart Highway providing the main arterial transport routes. Royal Flying Doctor Service bases in Alice Springs and Mount Isa provide emergency medical evacuation.

Community health hazards resulting from the NGP Project were identified with reference to the determinants of health; factors which influence the health of an individual or population (enHealth 2012, Spickett et al. 2011). The Project activities that may influence the determinants of health listed above were identified as potential health hazards. The health hazards identified for the Project with a pre-mitigated risk rating as moderate or above are:

#### Construction

- increased traffic and use of road network – injury or fatalities caused by traffic incidents
- unauthorised access to the works area – injuries caused by interaction with works
- exposure to particulate matter (including dust) emissions - respiratory issues
- exposure to noise emissions – reduced community well-being through increased noise levels
- exposure to contaminated land or water – poisoning or disease

- fire and explosion incidents – injury or fatality caused by fire or explosion
- increased burden on local health services – reduced access to services for local population
- anti-social and risk taking behaviour by Project workers accommodated in Tenant Creek and/or construction camps – reduced community health and well-being

#### Operations

- exposure to noise emissions from compressor stations and pipeline facilities – reduced community well-being through increased noise levels
- exposure to gas emissions from compressor stations and pipeline facilities – respiratory issues
- exposure to contaminated produced water from PCCS – poisoning or disease
- uncontrolled release of gas, fire or explosion caused by pipeline failure or third party interference – injury or fatality through exposure to fire or explosion.

### 13.9.2 MANAGEMENT MEASURES

#### Human health and safety management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>Transportation</b> <ul style="list-style-type: none"> <li>Manage construction traffic to minimise impacts to sensitive receptors and avoid accidents.</li> <li>Provide measures for minimising accidents and unauthorised access to Project areas.</li> </ul>	<ul style="list-style-type: none"> <li>Implement an approved Traffic Management Plan.</li> <li>Traffic controls and driver vehicle safety controls will be implemented in accordance with Traffic Guidance Schemes.</li> <li>Implement and enforce traffic controls (e.g. speed limits, diversions, signage).</li> <li>Develop approved Project traffic routes, and select traffic routes away from sensitive receptors where possible.</li> <li>Manage hours of operation to minimise night time driving in populated areas.</li> <li>Manage fatigue in workers and drivers through fitness for work and fatigue management measures, which will include measures to minimise fatigue risk related to climatic and outdoors work, medications, alcohol or drugs, and rest.</li> <li>Assess driver competency prior to operating vehicles and machinery.</li> <li>Establish and sign exclusion zones around working areas to restrict access.</li> <li>Equip vehicles with appropriate communication equipment and in-Vehicle Monitoring Systems to enable contact with emergency services or site first aid.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly review to ensure compliance with the Traffic and Noise and Vibration Management Plans.</li> </ul>	<ul style="list-style-type: none"> <li>No non-compliances with approved Traffic Management Plan.</li> <li>All noise and community complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>
<b>Air quality</b> <ul style="list-style-type: none"> <li>Minimise the impacts of air quality on human receptors during construction of the pipeline.</li> </ul>	<ul style="list-style-type: none"> <li>Enforce speed limits on unsealed roads and use dust suppression (water carts) for roads, the construction ROW and active earthworks areas as required.</li> <li>Implement the Air Quality Management Plan (Appendix W)</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> <li>Communicate with potentially affected residents to inform them of construction activities, potential air quality impacts (e.g. dust), duration of activity, and contact details for complaints or information.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure compliance with the Traffic Management Plan</li> <li>Daily observations of road conditions and dust suppression activities</li> </ul>	<ul style="list-style-type: none"> <li>All dust and air quality complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Noise emissions</b>			
<ul style="list-style-type: none"> <li>Minimise the impacts of noise emissions on human receptors during construction of the pipeline.</li> </ul>	<ul style="list-style-type: none"> <li>Implement Noise and Vibration Management Plan.</li> <li>Implement a Blasting Operations Management Plan.</li> <li>Where noise criteria may be exceeded and impact on potential receptors, negotiate 'alternative arrangements' prior to works. Alternative arrangements may include notifications prior to works, restriction of work hours, alternative accommodation or other arrangements as agreed.</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> <li>Communicate with potentially affected residents to inform them of construction activities, potential noise impacts, duration of activity, and contact details for complaints or information</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure compliance with the Noise and Vibration and Blasting Operations Management Plans</li> </ul>	<ul style="list-style-type: none"> <li>All noise complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>
<b>Existing services</b>			
<ul style="list-style-type: none"> <li>Avoid accidental interference with existing services.</li> </ul>	<ul style="list-style-type: none"> <li>Dial Before You Dig to be conducted prior to all excavation works.</li> <li>Locate and mark existing underground services.</li> <li>Check with landholders for potentially unmarked services.</li> <li>Undertake trenchless crossings under rail and major road crossings to avoid impacts to existing infrastructure and transportation.</li> <li>Establish road diversions in accordance with an approved Traffic Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>Daily pre-start inspections to include access points, barricades and signage of access restriction points.</li> <li>Take 5's and hazard observations undertaken by workers.</li> </ul>	<ul style="list-style-type: none"> <li>No accidental interference with existing underground services.</li> </ul>
<b>Community</b>			
<ul style="list-style-type: none"> <li>Minimise project impact on community health and well-being from anti-social and risk taking behaviour by project</li> </ul>	<ul style="list-style-type: none"> <li>Restrict access to work areas, sign and barricade active work areas, and sign access roads to clearly mark active work areas and warn of access restrictions for public.</li> <li>Install temporary fencing where risk of accidental entry is high.</li> <li>Undertake a community awareness program for general construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>On-ground monitoring of unauthorised access to construction areas (by public), adherence to traffic controls, and any occurrences of anti-</li> </ul>	<ul style="list-style-type: none"> <li>Access to active construction areas is controlled with measures such as signage, gates and traffic management.</li> <li>No occurrences of non-</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>personnel.</li> <li>Provide measures for minimising accidents and unauthorised access to Project areas.</li> </ul>	<ul style="list-style-type: none"> <li>Communicate with all relevant stakeholders throughout the construction phase.</li> <li>Store and handle all chemicals, fuels and hazardous substances in accordance with the Dangerous Goods and Hazardous Substance Procedure.</li> <li>Provide a designated contact for community information and complaints.</li> </ul>	<p>social behaviour (by safety officers).</p>	<p>compliance with traffic controls.</p> <ul style="list-style-type: none"> <li>All community complaints are responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>
<b>Fire</b>			
<ul style="list-style-type: none"> <li>Minimise the risk of accidental fires during construction.</li> <li>Construct the pipeline such that risks of third party interference, fire or explosion are minimised.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure a water cart / tank is onsite during pipeline welding and grinding activities.</li> <li>Vehicles and machinery fitted with fire extinguishers.</li> <li>Deploy water trucks as required during periods of high fire danger.</li> <li>Earth pipe (e.g. grit blasting) where works may generate static electricity.</li> <li>Dedicated smoking areas and butt bins in locations away from flammable material.</li> <li>Facilities construction to be carried out within cleared, fenced compounds.</li> <li>Implement fire prevention and control procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly inspections to ensure management actions are being implemented and are effective.</li> </ul>	<ul style="list-style-type: none"> <li>No uncontrolled bushfire as a result of construction activities.</li> <li>No incidents of unauthorised fires on site.</li> </ul>
<b>Health services</b>			
<ul style="list-style-type: none"> <li>Identify and consult with stakeholders relevant to human health and safety.</li> <li>Minimise impacts to, and avoid over-burdening, existing community health services.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement Project Emergency Response Plans and Project-specific Health &amp; Safety Management Plan</li> <li>Project First Aid and Paramedic support provided.</li> <li>On-site paramedic engaged.</li> <li>First aiders in all crews.</li> <li>First aid facilities at camps and first aid and snake bite kits in all vehicles and machinery.</li> <li>Stringent workplace health and safety controls to minimise injuries.</li> <li>Emergency response plans established and emergency scenario drills conducted.</li> <li>Consultation and coordination with Northern Territory Department of Health, Police, Fire and Emergency Services health services and external response</li> </ul>	<ul style="list-style-type: none"> <li>Take 5's and hazard observations undertaken by workers.</li> <li>Daily alcohol, and random drug testing, for work personnel.</li> <li>Lost time injuries and records of workplace injury.</li> <li>Food hygiene monitoring as per food safety laws.</li> <li>Potable water monitoring as</li> </ul>	<ul style="list-style-type: none"> <li>No notifiable diseases reported to health authorities.</li> <li>All key emergency and health services provided with monthly updates.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
	agencies to develop effective health service provision.	<p>per Water Management Plan (Construction) (Appendix O).</p> <ul style="list-style-type: none"> <li>Records and tracking of incidents, and analysis of trends in incident reports.</li> </ul>	
<b>Work personnel accommodation</b>			
<ul style="list-style-type: none"> <li>Minimise project impact on community health and well-being from anti-social and risk taking behaviour by project personnel.</li> </ul>	<ul style="list-style-type: none"> <li>All workers to comply with Project Code of Conduct, which includes instant dismissal for antisocial or illegal behaviour.</li> <li>All workers will be drug and alcohol tested during pre-employment medicals, daily onsite alcohol testing, and random drug testing.</li> <li>Personnel will be transported home for rostered breaks to avoid idle time in towns.</li> <li>Health and education campaigns will be run for the work personnel that will include sexual health, mental health, and physical health (diet and exercise).</li> <li>Recreational activities will be provided and encouraged.</li> <li>Construction camps will be dry camps, and all workers will comply with Camp Rules and Code of Conduct, which include instant dismissal for anti-social behaviour.</li> <li>Waste will be managed as per Section 13.12.</li> <li>All camps to be designed and operated under relevant food and housing regulations and industry standards, and standard food hygiene practices will be implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Daily alcohol, and random drug testing, for work personnel.</li> <li>Food hygiene monitoring as per food safety laws.</li> <li>Potable water monitoring as per Water Management Plan (Construction) (Appendix O).</li> </ul>	<ul style="list-style-type: none"> <li>Anti-social behaviour is actively discouraged and managed as per Code of Conduct.</li> <li>Drug and alcohol testing is undertaken, and positive results are managed as per Code of Conduct.</li> <li>No illnesses from food and water supplied by camp.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Emergencies</b>			
<ul style="list-style-type: none"> <li>Provide the framework for emergency response and planning.</li> </ul>	<ul style="list-style-type: none"> <li>Consultation &amp; Communication with external emergency response agencies.</li> <li>Emergency Response Plan/s will be implemented in the event of an emergency.</li> <li>Train staff in emergency response, including allocating roles and resources.</li> </ul>	<ul style="list-style-type: none"> <li>Records of communication with emergency and health services.</li> <li>Records of staff training.</li> </ul>	<ul style="list-style-type: none"> <li>All key emergency and health services provided with monthly updates.</li> <li>Emergency training and drills are undertaken to ensure staff are trained in implementing Emergency Response Plan.</li> </ul>

## Human health and safety management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<b>Air quality</b>			
<ul style="list-style-type: none"> <li>Minimise the impacts of air quality on human receptors during operation of the pipeline</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement Air Quality Management Plan.</li> <li>Undertake a regular maintenance program to ensure equipment operates effectively.</li> <li>Monitor and record equipment operating parameters.</li> <li>Regularly test emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Aerial surveys, ground patrols and monitoring of infrastructure and facilities.</li> </ul>	<ul style="list-style-type: none"> <li>Compliance with Air Quality Plan.</li> <li>All noise or other community complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>
<b>Noise emissions</b>			
<ul style="list-style-type: none"> <li>Minimise the impacts of noise emissions on human receptors during operation of the pipeline</li> </ul>	<ul style="list-style-type: none"> <li>Implement Noise and Vibration Management Plan.</li> <li>Where appropriate to do so, install silencers, mufflers and enclosures around vents and turbines.</li> </ul>	<ul style="list-style-type: none"> <li>Aerial surveys, ground patrols and monitoring of infrastructure and facilities.</li> </ul>	<ul style="list-style-type: none"> <li>All noise or other community complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>
<b>Fire/explosion</b>			



Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Operate and maintain the pipeline such that risks of third party interference, fire or explosion are minimised.</li> </ul>	<ul style="list-style-type: none"> <li>Pipeline design in accordance with AS 2885 with increased depth of burial and additional wall thickness applied as required by location specific threats.</li> <li>Signage installed to mark location of pipeline, and additional physical barriers installed in areas where excavations or accidental third party interference is a high risk.</li> <li>Register the pipeline on Dial Before You Dig.</li> <li>Conduct regular surveys and patrols of pipeline and facilities to assess for maintenance issues, potential leaks or damage.</li> <li>Maintain all infrastructure in optimum condition.</li> <li>24/7 monitoring of the pipeline for gross leak detection, with automated alarms.</li> <li>Securely fence compressor stations and pipeline facilities.</li> <li>Install and maintain automated fire and leak detection and alarm systems.</li> <li>In the event that a fire or explosion occurs, implement the pipeline isolation plan.</li> </ul>	<ul style="list-style-type: none"> <li>Records and tracking of incidents, and analysis of trends in incident reports.</li> <li>Operational monitoring of fire and leak detection systems.</li> <li>Aerial surveys, ground patrols and monitoring of infrastructure and facilities.</li> </ul>	<ul style="list-style-type: none"> <li>No damage to the pipeline as a result of third party interference.</li> </ul>
<b>Emergencies</b>			
<ul style="list-style-type: none"> <li>Provide the framework for emergency response and planning.</li> </ul>	<ul style="list-style-type: none"> <li>Develop an Emergency Response Plan to be implemented in the event of an emergency.</li> <li>Train staff in emergency response, including allocating roles and resources.</li> </ul>	<ul style="list-style-type: none"> <li>Records of staff training.</li> </ul>	<ul style="list-style-type: none"> <li>All staff are trained in Emergency Response Plan requirements during Project inductions.</li> </ul>
<b>Community</b>			
<ul style="list-style-type: none"> <li>Actively engage with the community to keep all stakeholders informed of Project.</li> </ul>	<ul style="list-style-type: none"> <li>Provide a designated contact for receipt and follow-up of complaints.</li> <li>Develop and implement a community awareness and engagement program, particularly in areas where there is a high risk of third party interference.</li> </ul>	<ul style="list-style-type: none"> <li>Records of complaints and resolution / follow up actions.</li> <li>Records of community awareness and engagement program.</li> </ul>	<ul style="list-style-type: none"> <li>All noise or other community complaints responded to within 48 hours and corrective actions closed out within timeframes.</li> <li>No damage to the pipeline as a result of third party interference.</li> </ul>

## 13.10 AIR

### 13.10.1 ENVIRONMENTAL VALUES AND RISKS

The air quality values that occur within the Project footprint, and potential impacts and risks to air associated with project activities are described in Chapter 11 of this EIS. An Air Quality Assessment Report was undertaken for the EIS, and is provided in Appendix V. A brief summary of air quality values is provided below.

The pipeline predominantly traverses through remote areas where there are a limited number of anthropogenic air emission sources. For the majority of the route extending from Warrego to immediately west of the Mount Isa region, road traffic and unpaved surface emissions from nearby roads represents the nearest existing air emission sources with similar types of air emissions to the Project (i.e. carbon monoxide, nitrogen dioxide and particulate matter). These roads include the sealed Stuart Highway, Barkly Highway and other local unpaved roads.

At the eastern end of the NGP area, the Mount Isa air shed is influenced by operations of the Mount Isa Mine. Air emissions from the mine include particulates from excavation activities and combustion emissions from operation of heavy machinery and processing equipment. Other key air emission sources closest to the NGP are two power stations located on Powerhouse Road (east of Diamantina Development Road). These power stations have a potential to emit combustion products from gas turbine equipment.

The key air quality indicators identified for the Project are carbon monoxide, nitrogen dioxide and particulate matter (TSP, PM10 and PM2.5). During the operational phase, small amounts of methane will be emitted during gas processing.

The environmental risk assessment identified the following potential risks with a pre-mitigation risk rating as moderate or above:

#### Planning

- air quality impacts not adequately assessed leading to lost opportunities for impact avoidance

#### Construction

- reduction in local air quality and nuisance and/or health impacts due to the emission of particulate matter (dust) and diesel exhaust

#### Operations

- reduction in air quality due to methane emissions from gas venting at compressor stations and MLV sites
- reduction in air quality due to combustion emissions from operation and maintenance of the PCCS and MICS facilities.

***An Air Quality Management Plan has been developed to provide detailed mitigation measures for implementation by the Construction Contractor and Jemena, during construction and operations respectively (refer to Appendix W). A framework for managing potential air impacts through each project phase is provided in the sections below.***

## 13.10.2 MANAGEMENT MEASURES

## Air management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Adequately prepare for the construction and operation phase.</li> </ul>	<ul style="list-style-type: none"> <li>Complete air quality assessment to identify opportunities for mitigation through design.</li> <li>Engage a suitably qualified person to undertake modelling based on accurate Project details.</li> <li>Model a number of scenarios to identify worst-case scenarios, which will inform the risk assessment and mitigation measures.</li> <li>If Project details change, revise the modelling and re-assess risks as required.</li> <li>Plan for dust suppression during construction.</li> <li>Plan vegetation clearing to minimise the extent and duration of exposed soils.</li> <li>Locate construction camps away from sensitive receptors (existing residents).</li> <li>Locate new access tracks away from sensitive receptors (existing residents).</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Risk assessment and management plans are informed by Project specific modelling.</li> </ul>

### Air management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>Dust and particulate matter</b>			
<ul style="list-style-type: none"> <li>Minimise impacts on the community and construction work personnel due to poor air quality resulting from particulate matter, dust, odour and gases.</li> <li>Minimise impacts to air quality.</li> <li>Minimise creating emissions related hazards (e.g. dust).</li> </ul>	<ul style="list-style-type: none"> <li>Limit vehicular movements to designated roads and access tracks, and implement speed limits on unsealed roads near sensitive receptors.</li> <li>Utilise water sprayers to control dust on unsealed roads, access tracks and within active construction areas as required.</li> <li>If transporting soils in trucks ensure they are covered to minimise dust emissions.</li> <li>Clear the minimum area required within the 30 m construction ROW. Survey and peg areas to be cleared prior to clearing being undertaken.</li> <li>Undertaken progressive reinstatement to minimise areas of disturbed soils.</li> <li>Develop and implement a Blast Management Plan that will include measures to minimise dust and particulate matter.</li> <li>Develop and implement a Traffic Management Plan that outlines approved traffic routes and controls.</li> </ul>	<ul style="list-style-type: none"> <li>Visually monitor the active construction area, access roads and other disturbed areas for dust lift off.</li> <li>Weekly inspections to ensure clearing is within approved area.</li> </ul>	<ul style="list-style-type: none"> <li>All dust and air quality complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> <li>All monitoring of air quality is undertaken in accordance with regulatory requirements and complies with approval parameters.</li> </ul>
<b>Emissions</b>			
<ul style="list-style-type: none"> <li>Minimise impacts on the community and construction personnel due to poor air quality.</li> <li>Minimise impacts to air quality.</li> <li>Efficiently use resources to minimise unnecessary emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Operate machinery, equipment and vehicles as per manufacturer's instructions and in an efficient manner to minimise exhaust and greenhouse gas (GHG) emissions.</li> <li>Maintain machinery, equipment and vehicles so that they operate efficiently.</li> <li>Minimise land clearing within construction footprint and restrict clearing to approved footprint to reduce land clearing GHG emissions.</li> <li>Investigate opportunities for GHG emissions reduction, including selecting fuel efficient plant and equipment, and sourcing construction supplies locally to reduce transport emissions.</li> </ul>	<ul style="list-style-type: none"> <li>GHG emissions monitoring and reporting in accordance with the National Greenhouse and Energy Reporting framework.</li> </ul>	<ul style="list-style-type: none"> <li>All air quality complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> <li>All monitoring of air quality is undertaken in accordance with regulatory requirements and complies with approval parameters.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Workers and community</b> <ul style="list-style-type: none"> <li>Minimise impacts on the community and construction work personnel due to poor air quality resulting from particulate matter, dust, odour and gases.</li> </ul>	<ul style="list-style-type: none"> <li>Induct and train staff in clearing techniques, dust suppression, machinery use and relevant management actions.</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> <li>Communicate with potentially affected residents to inform them of construction activities, potential air quality impacts (e.g. dust), duration of activity, and contact details for complaints or information.</li> </ul>	<ul style="list-style-type: none"> <li>Records of staff training and inductions.</li> <li>Records of complaints and resolution / follow up actions.</li> </ul>	<ul style="list-style-type: none"> <li>All community complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>

## Air management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Operate and maintain the pipeline such that air quality impacts are minimised.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and maintain facilities to ensure equipment operates as per design, incorporating controls that minimise impacts of emissions (i.e. elevated emissions stacks at compressor stations).</li> <li>All monitoring of air quality is undertaken in accordance with regulatory requirements and complies with approval parameters.</li> <li>Monitor and record equipment operating parameters to track operational activities and identify options for improved efficiencies.</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> <li>Test emissions as stipulated by regulatory requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of air quality where requested by regulatory authority.</li> <li>GHG emissions monitoring and reporting.</li> <li>Records of complaints and resolution / follow up actions.</li> </ul>	<ul style="list-style-type: none"> <li>No reasonable dust complaints received.</li> <li>Any complaints received are followed up and outcomes reported to complainant.</li> <li>No identified change in air quality at sensitive receptors, compared to pre-construction air quality monitoring results (if monitoring is undertaken).</li> </ul>

### 13.11 NOISE AND VIBRATION

#### 13.11.1 ENVIRONMENTAL VALUES AND RISKS

The noise and vibration values that occur within the Project footprint, and potential noise and vibration impacts and risks associated with project activities are described in Chapter 11 of this EIS. A Noise Assessment Report was undertaken for the EIS, and is provided in Appendix T. A brief summary of noise and vibration, as relevant to the Project, is provided below.

Limited anthropogenic noise sources currently exist along the pipeline alignment and minimal ecological noise, other than birds and insects at dawn and dusk, is present. For the majority of the Project footprint, road traffic and residential noise emissions from the sensitive receiver areas represent the nearest existing noise emission sources i.e. there is no industrial or other development that contributes to background noise.

Roads nearby to the Project footprint include the Stuart Highway, Barkly Highway, Diamantina Developmental Road and other local unpaved roads. While these local highways are considered to be the nearest noise emission sources potentially affecting sensitive receptors of the Project, they are still relatively remote from the nearest affected sensitive receptors to the pipeline route.

At the eastern end of the pipeline and proposed Mount Isa Compressor Station (MICS) facility, the Mount Isa community is influenced by operations of the Mount Isa Mine. Noise emissions from the mine include excavation activities, operation of heavy machinery and processing equipment, and vehicular traffic. Besides the mine, other key noise sources closest to the project sensitive receptors are the Diamantina and Leichardt Power Stations located on Powerhouse Road (east of Diamantina Development Road). Baseline monitoring data (from site M7 – see below) indicate that these power stations significantly influence the noise character of the nearby sensitive receiver areas.

A review of the proposed alignment for the construction activities indicates minimal potential for vibration impacts at the nearest sensitive receptors. In order to assess the potential impacts, predicted vibration levels at standard separation distances was reviewed against the relevant vibration criteria. The predicted vibration levels from pipeline construction activities (excluding blasting – see below) indicate compliance with the continuous preferred and maximum vibration criteria for locations at a separation distance of 80 - 90 m and 50-60 m, respectively. Predicted sensitive receivers are all well above 100 m in separation from the proposed construction alignment.

Blasting will occur at certain sections of the pipeline only and based on a review of the locations, a house south of Mount Isa and Outstation 975 are the nearest residential receptors (1 km and 4 km respectively from the proposed activities). Vibration and airblast overpressure levels were modelled for various distances from blasting in the Noise Assessment Report (Appendix T). The predicted results indicate compliance with the blasting criteria by a significant margin at the nearest residential receptors.

The environmental risk assessment identified the following potential impacts with a pre-mitigation risk rating as moderate or above:

#### Planning

- noise and vibration impacts not adequately assessed leading to lost opportunities for impact avoidance.

#### Construction

- intense or sudden noise or vibration due to blasting, and subsequent impacts on nearby residents and fauna.

#### Operations

- community disturbance or complaints due to high volume noise potentially occurring at any time, due to gas flaring and venting at the PCCS facility
- community disturbance or complaints due to continuous (24/7) elevated low frequency noise from facilities operations, due to operation and maintenance of MICS facility
- community disturbance or complaints due to high volume noise potentially occurring at any time, due to gas flaring and venting at the MICS facility

***A Noise Management Plan has been developed to provide detailed mitigation measures for implementation by the Construction Contractor and Jemena, during construction and operations respectively (refer to Appendix U). A framework for managing potential air impacts through each project phase is provided in the sections below.***

### 13.11.2 MANAGEMENT MEASURES

#### Noise and vibration management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Adequately prepare for the construction and operation phase.</li> </ul>	<ul style="list-style-type: none"> <li>Complete noise and vibration assessment to identify opportunities for mitigation through design.</li> <li>Engage a suitably qualified person to undertake modelling based on accurate Project details.</li> <li>Model a number of scenarios to identify worst-case scenarios, which will inform the risk assessment and mitigation measures.</li> <li>If Project details change, revise the modelling and re-assess risks as required.</li> <li>Develop a Noise Management Plan.</li> <li>Develop a Blast Management Plan.</li> <li>Develop a Traffic Management Plan.</li> <li>Plan noise generating activities to minimise impacts to sensitive receivers.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Risk assessment and management plans are informed by Project specific modelling.</li> </ul>

#### Noise and vibration management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>Traffic and machinery</b> <ul style="list-style-type: none"> <li>Minimise impacts of noise and vibration on the community and sensitive receptors.</li> </ul>	<ul style="list-style-type: none"> <li>Implement the Noise Management Plan.</li> <li>Implement the Traffic Management Plan, which will clearly outline traffic routes and controls.</li> <li>Vehicle movements are scheduled to avoid night time driving in populated areas where possible.</li> </ul>	<ul style="list-style-type: none"> <li>Where requested by the administering authority, noise will be monitored in accordance with current noise monitoring</li> </ul>	<ul style="list-style-type: none"> <li>All noise and vibration complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> <li>Noise monitoring data does not</li> </ul>



Objective	Management actions	Monitoring	Performance indicators
	<ul style="list-style-type: none"> <li>Select traffic routes away from sensitive receptors where available.</li> <li>Maintain machinery, equipment and vehicles in accordance with manufacturer's requirements and industry standard.</li> <li>Machinery and equipment operating procedures to include noise controls.</li> <li>Provide avenues for complaints or feedback, to allow investigation and optimisation of specific.</li> </ul>	guidelines or procedures.	exceed acceptable limits at sensitive receptors. .
<b>Blasting</b>			
<ul style="list-style-type: none"> <li>Manage blasting to minimise impacts of noise and vibration on the community and sensitive receptors.</li> <li>Minimise impacts of noise and vibration on biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Implement the Blast Management Plan, which will outline controls for blasting (e.g. drill patterns, safety, debris controls), timing of blasting (e.g. daytime only near sensitive receptors).</li> <li>Communicate with potential sensitive receptors (e.g. nearby residents) prior to blasting to inform them of blasting activities, the duration of blasting, controls in place, and a contact for complaints or information.</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> </ul>	<ul style="list-style-type: none"> <li>Noise will be monitored during blasting activities with proximity to sensitive receivers to enable proactive implementation of noise abatement procedures.</li> </ul>	<ul style="list-style-type: none"> <li>All noise and vibration complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> <li>No damage to sensitive receptors.</li> <li>Noise monitoring data does not exceed acceptable limits at sensitive receptors.</li> </ul>
<b>Fauna</b>			
<ul style="list-style-type: none"> <li>Minimise impacts of noise and vibration on biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Utilising sphere of influence from modelling data, identify any significant potentially affected fauna areas.</li> <li>If sensitive fauna identified, engage ecologist to consider best options to mitigate construction activities (see Biodiversity – Section 13.5).</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring to be determined by engaged ecologist if modelling suggests potentially affected fauna areas.</li> </ul>	<ul style="list-style-type: none"> <li>Noise and vibration mitigation measures are implemented.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Workers and community</b> <ul style="list-style-type: none"> <li>Minimise impacts of noise and vibration on the community and sensitive receptors.</li> </ul>	<ul style="list-style-type: none"> <li>Induct and train staff into noise reduction techniques (e.g. designated transport routes, operating hours).</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> <li>Communicate with potentially affected residents to inform them of construction activities and contact details for complaints.</li> </ul>	<ul style="list-style-type: none"> <li>Records of staff training and inductions.</li> <li>Records of complaints and resolution / follow up actions.</li> </ul>	<ul style="list-style-type: none"> <li>All noise and vibration complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> </ul>

## Noise management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Operate and maintain the pipeline such that risks and annoyances to community and surrounding environment are minimised.</li> </ul>	<ul style="list-style-type: none"> <li>Maintain and operate pipeline and facilities in accordance with industry standards.</li> <li>Inspect and maintain facilities to ensure equipment operates as per design, incorporating controls that minimise noise impacts</li> <li>When gas venting, ensure design has suitable flow and nozzle diameter, or additional silencer, to reduce the noise impact to an acceptable limit.</li> <li>Restrict maintenance and testing venting exercise to daytime periods where possible.</li> <li>Provide a designated contact for receipt and follow-up of complaints.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of noise emissions where requested by regulatory authority.</li> </ul>	<ul style="list-style-type: none"> <li>All noise and vibration complaints responded to within 48 hours and corrective actions closed out within agreed timeframes.</li> <li>Noise monitoring data does not exceed acceptable limits at sensitive receptors.</li> </ul>

## 13.12 WASTE

### 13.12.1 ENVIRONMENTAL VALUES AND RISKS

A specific waste risk assessment was not undertaken for the EIS. Environmental values and risks relevant to waste were identified through the risk assessments undertaken for biodiversity, water and human health and safety. A summary of waste streams generated by the Project, and their management, is provided below.

Waste includes general landfill waste, organic wastes (e.g. green waste), bulk wastes, recyclables, and listed or regulated wastes.

In the Northern Territory, listed wastes are defined in Schedule 2 of the *Waste Management and Pollution Control (Administration) Regulations*. The handling, transport, and disposal of these wastes are licenced through the NT EPA.

In Qld, listed wastes are termed 'regulated wastes' and defined under the *Environmental Protection Regulation 2008*. The transport, storage, recycling and disposal of regulated wastes are an Environmentally Relevant Activity, and are licenced through the Qld DEHP.

The Project will generate wastes during the construction and operation phases. Due to the remote location of the construction and operational footprints, there are limited facilities for waste management. Existing facilities near the Project are located at:

- Tennant Creek Landfill - Fazaldeen Road
- Mount Isa City Council Landfill - Jessop Drive

No landfill will be developed within the construction footprint; all waste that is required to be disposed of at a landfill, recycling centre or licenced facility will be transported off-site to a licenced facility.

The Tennant Creek Landfill operates under an Environment Protection Licence (EPL 109) granted by the NT EPA. The EPL allows for the operation of a landfill and also stipulates the authorised activities associated with certain listed wastes. Tennant Creek Landfill can store and recycle tyres, waste mineral oil and batteries. Only tyres can be treated or disposed of at the landfill.

The Mount Isa City Council Landfill accepts general landfill waste as well as batteries, E-waste and metal. No liquid wastes are accepted at the landfill.

The NT EPA provides a list of companies that are licenced to handle listed wastes. Any listed wastes that are generated by Jemena will be collected by a listed waste handler, who will dispose of it accordingly at a licenced facility.

#### Waste streams

An estimate of expected waste and quantities is provided in Table 13-5 for construction and Table 13-6 for operational phases of the Project respectively. The wastes are categorised according to waste streams, as defined by the *Cth DoE* (2013).

Table 13-5. Construction waste

Waste type	Characteristic	Quantity	Management
<b>Commercial and industrial</b>			
General industrial waste from pipe-laying	General and recyclable material Estimated 30% recyclable	3 m <sup>3</sup> / day	Recyclables to be transported to approved facility Non recyclables transports to approved landfill
General waste from pipe delivery (packaging, ropes, plastic)	General and recyclable material Estimated 40% recyclable	3 m <sup>3</sup> / day	Recyclables to be transported to approved facility Non recyclables transports to approved landfill
Steel from pipe-laying (scrap metal, welding rods)	Recyclable	~0.5 T / week	Transport to approved recycling facility
Timber from packaging	Organic material, untreated	5 m <sup>3</sup> / week	Reused on-site or transport to a recycling facility
<b>Construction and demolition</b>			
Soil and rock from excavations	Inert material	To be determined during detailed design	To be minimised through cut and fill balance on-site
<b>Domestic</b>			
Putrescible and general waste from workers accommodation camps	General waste and recyclable waste	5 m <sup>3</sup> / week / camp	Recyclables to be transported to approved facility Non recyclables transports to approved landfill
Glass from workers accommodation camps	Recyclable	1 m <sup>3</sup> / week / camp	Transport to approved recycling facility
Plastic from workers accommodation camps	Recyclable	3 m <sup>3</sup> / week / camp	Transport to approved recycling facility
Aluminium from workers accommodation camps	Recyclable	1 m <sup>3</sup> / week / camp	Transport to approved recycling facility
Paper and cardboard from general packaging	Recyclable	2 m <sup>3</sup> / day	Transport to approved recycling facility
Grey water from workers accommodation camps	Treatable waste	200 L / person / day	Treated and irrigated on-site
<b>Listed/hazardous wastes</b>			
Waste oils, grease and fuels from construction machinery	Listed/regulated waste	100 L / week	Transport to approved recycling facility and / or regulated waste facility
Contaminated absorbent material from maintenance of machinery	Listed/regulated waste	2 m <sup>3</sup> total	Transport to approved recycling facility and / or regulated waste facility
Contaminated soil from spills during construction	Listed/regulated waste	Negligible	Transport to licenced facility for remediation

Waste type	Characteristic	Quantity	Management
Contaminated material from spill response and clean-up (if accident spill occurs)	Listed/regulated waste	Negligible	Transport to licenced facility for disposal
Used chemicals from pipeline testing (x-ray film chemicals, solvents, rust proofing agent)	Listed/regulated waste	20 L / week	Transport to approved recycling facility and / or regulated waste facility
Tyres from machinery and vehicles	Bulk waste	As required	Transport to Tennant Creek Landfill or other
Batteries from equipment on-site and workers accommodation camps	Acid and heavy metals - listed/regulated waste	Up to 20 batteries per camp site	Transport to approved recycling facility and / or regulated waste facility
Hydro-flush water (pre-fill) used to clean pipe prior to hydrostatic testing	Sediments, metals, silt	Maximum of 1 ML per test section	Filtered at the end of the test section and released to land.
Hydrostatic test water from pipeline testing	Water with potential contaminants of silt, metals, cleaning chemicals, traces of biocides and oxygen scavengers	~ 20 ML	Release to storage and treatment dams, discharged to land following testing.
Sewage and grey water	Listed/regulated waste	1 L / person / day	Sludge transport to a licenced regulated disposal facility

**Table 13-6. Operational waste**

Waste type	Characteristic	Quantity	Management
<b>Commercial and industrial</b>			
Steel from pipeline maintenance (scrap metal, welding rods)	Recyclable	Negligible	Transport to approved recycling facility
<b>Listed/hazardous waste</b>			
Contaminated soil from accidental spills during operation	Listed/regulated waste	Negligible	Transport to licenced facility for remediation
Contaminated material from spill response and clean-up (if accident spill occurs)	Listed/regulated waste	Negligible	Transport to licenced facility for disposal
Sludge from pigging operations	Listed/regulated waste	Negligible	Sludge transport to a licences regulated disposal facility
Used chemicals from pipeline maintenance (x-ray film chemicals, solvents, rust proofing agent)	Listed/regulated waste	Negligible	Transport to approved recycling facility and / or regulated waste facility
Produced water from compressor station	Listed/regulated waste	200 L/hr	Filtered on-site and pumped to an on-site evaporation pond for on-site evaporation
<b>Domestic</b>			
General waste (putrescible and general waste) from start of line and end of line facilities	General waste and recyclable waste	Minimal	Recyclables to be transported to approved facility Non recyclables transported to approved landfill

Risks to the environment, workers or the community resulting from waste are summarised below.

#### Construction

- pollution and contamination of soil and water with general waste and listed wastes
- human health and safety impacts from consumption of contaminated water, interaction with hazardous substances, and exposure to harmful pathogens or diseases
- introduction or attraction of vermin or other pests due to the generation and inappropriate management of waste, resulting in displacement of native fauna and exposure of humans to disease
- direct mortality of native fauna or livestock due to interaction with waste material (e.g. sharp scrap metal) or consumption of wastes (e.g. plastics, listed wastes)
- reduction of visual amenity
- nuisance related impacts from odour.

## Operations

- pollution and contamination of soil and water with general waste and listed wastes
- human health and safety impacts from consumption of contaminated water, interaction with hazardous substances, and exposure to harmful pathogens or diseases
- introduction or attraction of vermin or other pests due to the generation and inappropriate management of waste, resulting in displacement of native fauna and exposure of humans to disease
- direct mortality of native fauna or livestock due to interaction with waste material (e.g. sharp scrap metal) or consumption of wastes (e.g. plastics, listed wastes)
- reduction of visual amenity
- nuisance related impacts from odour.

### 13.12.2 MANAGEMENT MEASURES

Project wastes will be managed in accordance with waste management hierarchy, which states that waste should be managed in accordance with the following order:

- avoidance
- reduce
- re-use
- re-recycling and recovery of energy
- disposal.

Waste management measures are outlined for each phase of the Project in the following tables.

## Waste management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>• Identify waste streams, including hazardous and non-hazardous materials.</li> <li>• Identify methods for storage, handling and containment of chemicals and hazardous substances.</li> <li>• Identify strategies for management, storage, transport and disposal of waste taking into account the waste management hierarchy.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement a Waste Management Procedure.</li> <li>• Plan waste storage areas away from sensitive receivers.</li> <li>• Plan waste disposal locations and licenced handlers to collect listed wastes.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>



## Waste management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>General</b> <ul style="list-style-type: none"> <li>• Avoid contamination of soil and water.</li> <li>• Minimise potential health impacts on the work personnel and public as a result of waste management.</li> <li>• Minimise impacts on terrestrial and aquatic ecosystems, and pastoral activities.</li> <li>• Avoid visual or amenity impacts.</li> <li>• Minimise the generation of waste and maximise reusing or recycling opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>• All waste will be managed in accordance with the Waste Management Procedure, which will include methods to handle waste in accordance with the waste management hierarchy.</li> <li>• A site waste register will be maintained.</li> <li>• No waste will be buried or burned within the construction footprint. The construction ROW will be kept waste free at all times.</li> <li>• All project areas will be well maintained and cleared of any litter. Housekeeping is to be a focus of inspections, toolboxes and training.</li> </ul>	<ul style="list-style-type: none"> <li>• Weekly environmental inspections to assess general housekeeping, waste separation and storage areas.</li> <li>• Check waste disposal containers and storage areas on a weekly basis for housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</li> <li>• Monitor waste containers and storage areas regularly to ensure they do not reach full capacity prior to collection from a waste disposal contractor.</li> <li>• Check for litter and improperly disposed waste.</li> <li>• Review waste minimisation opportunities on a regular basis.</li> <li>• Monthly environmental audit to assess housekeeping and waste treatment.</li> </ul>	<ul style="list-style-type: none"> <li>• All waste separated into waste streams and stored and managed in accordance with Safety Data Sheets and the Waste Management Procedure.</li> <li>• All waste is disposed of at approved facilities and recorded on the waste register.</li> <li>• All rubbish is removed from the construction ROW daily.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Waste streams</b>			
<ul style="list-style-type: none"> <li>Separate and adequately store waste streams, including hazardous and non-hazardous materials.</li> </ul>	<ul style="list-style-type: none"> <li>Waste generated along the pipeline alignment will be transported back to camps for storage, separation and disposal at the end of each day.</li> <li>Waste streams will be separated into recyclables, general wastes, organic and inert wastes, and listed wastes. Labelled bins or collection areas will be provided for each stream adequate for the volume produced at peak production. Contractors will be engaged to regularly remove waste from site.</li> <li>Where possible recyclable wastes such as steel, timber pallets and drums will be reused during construction.</li> <li>Waste storage areas will be designed such that there is no sediment or rainfall runoff, or dust generation. The waste storage areas to be established are to be located at least 100 m from watercourses and generally distanced away from any storm water or other drainage line.</li> <li>Waste, including waste fluids, must be transported off-site for lawful re-use, remediation, recycling or disposal unless the waste is specifically authorised by conditions of the environmental authority to be disposed of or used on-site.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly environmental inspections to assess waste separation and storage areas for housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</li> <li>Monitor waste containers and storage areas regularly to ensure they do not reach full capacity prior to collection from a waste disposal contractor.</li> <li>Check for litter and improperly disposed waste.</li> <li>Monthly environmental audit to assess housekeeping and waste treatment.</li> </ul>	<ul style="list-style-type: none"> <li>All waste separated into waste streams and stored and managed in accordance with Safety Data Sheets and the Waste Management Procedure.</li> <li>All waste is disposed of at approved facilities and recorded on the waste register.</li> </ul>
<b>Hazardous and listed waste</b>			
<ul style="list-style-type: none"> <li>Avoid contamination of soil and water.</li> <li>Minimise potential health impacts on the work personnel and public as a result of waste</li> </ul>	<ul style="list-style-type: none"> <li>A Dangerous Goods and Hazardous Substances Management Procedure will be developed and staff trained in Spill Response should a spill of listed or hazardous liquid wastes occur.</li> <li>Management of contaminated materials/soil or potentially contaminated materials/soil will be in accordance with the Contaminated Land Management Procedure.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly environmental inspections to assess general housekeeping, waste separation and storage areas.</li> <li>Check waste disposal containers and storage areas</li> </ul>	<ul style="list-style-type: none"> <li>All hazardous waste is stored in accordance with Safety Data Sheets, Australian standards, and the Waste Management Procedure.</li> <li>All waste is collected by a</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<p>management.</p> <ul style="list-style-type: none"> <li>Minimise impacts on terrestrial and aquatic ecosystems, and pastoral activities.</li> </ul>	<ul style="list-style-type: none"> <li>Liquid and hazardous wastes are to be handled and stored in appropriate containers in banded areas (or equivalent purpose-built ventilated and self banded container) until transported offsite.</li> <li>Listed wastes will be stored for collection by a licenced waste handler and transporter, who will take all listed wastes to an appropriately licenced facility.</li> <li>Where listed/regulated wastes are removed from site a record must be kept of: <ul style="list-style-type: none"> <li>The date of waste transport</li> <li>Quantity of waste</li> <li>Type of waste removed and transported</li> <li>Route selected for transport of waste</li> <li>Quantity of waste delivered</li> <li>Any incidents that may have occurred on route</li> </ul> </li> <li>All trucks transporting wastes offsite are to be appropriately licensed to carry materials to licensed waste facilities.</li> </ul>	<p>on a weekly basis for housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</p> <ul style="list-style-type: none"> <li>Monitor waste containers and storage areas regularly to ensure they do not reach full capacity prior to collection from a waste disposal contractor.</li> <li>Check for litter and improperly disposed waste.</li> <li>Review waste minimisation opportunities on a regular basis.</li> <li>Monthly environmental audit to assess housekeeping and waste treatment.</li> </ul>	<p>licenced waste contractor and disposed of at approved facilities and recorded on the waste register.</p> <ul style="list-style-type: none"> <li>No contamination due to construction activities after reinstatement is complete.</li> </ul>
<b>Inert waste</b>			
<ul style="list-style-type: none"> <li>Avoid visual or amenity impacts.</li> <li>Minimise the generation of waste and maximise reusing or recycling.</li> </ul>	<ul style="list-style-type: none"> <li>Green waste must be used on site for rehabilitation and/or sediment and erosion control purposes.</li> <li>Soil and rock will be reused onsite during backfill and bulk reinstatement.</li> <li>Construction materials will be reused where possible.</li> <li>Scrap metal will be separated into ferrous and non-ferrous bins for collection by a scrap metal contractor for recycling.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly environmental inspections to assess general housekeeping, waste separation and storage areas.</li> <li>Check waste disposal containers and storage areas on a weekly basis for</li> </ul>	<ul style="list-style-type: none"> <li>All waste separated into waste streams and stored as per Waste Management Procedure.</li> <li>All waste is disposed of at approved facilities and recorded on the waste register.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
		<p>housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</p> <ul style="list-style-type: none"> <li>Monitor storage areas regularly to ensure they do not reach full capacity prior to collection from a waste disposal contractor.</li> <li>Monthly environmental audit to assess housekeeping and waste treatment.</li> </ul>	
<b>Wastewater</b>			
<ul style="list-style-type: none"> <li>Avoid contamination of soil and water.</li> <li>Adequately capture and treat wastewater to minimise potential health impacts on workforce or public.</li> <li>Adequately capture and treat wastewater to minimise impacts on terrestrial and aquatic ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>Sewage from construction camps will be treated to Class C standard for recycled water (Class B where EP is greater than 150) and will be disposed of via land application (surface irrigation) within a dedicated effluent disposal area. Irrigation fields will be signed and fenced, and vegetated to encourage absorption of effluent and uptake of nutrients.</li> <li>Biosolids (sludge) remaining following treatment of sewage will be stored and transported to a licensed facility by a licensed listed waste handler.</li> <li>Hydrostatic test water will be stored in low consequence dams and reused through multiple test sections to minimise water resource demands. Hydrostatic test water will be discharged to land following water quality analysis and treatment as required in the Water Management Plan and environmental approvals.</li> <li>Pre-fill water will be discharged to land at the end of each test section after filtration as outlined in the Water Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>Sampling of construction camp wastewater and monitoring of irrigation area as per Water Management Plan (Construction) (Appendix O).</li> </ul>	<ul style="list-style-type: none"> <li>No contamination due to construction activities after reinstatement is complete.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Waste minimisation</b>			
<ul style="list-style-type: none"> <li>Minimise the generation of waste and maximise reusing or recycling prior to disposal.</li> </ul>	<ul style="list-style-type: none"> <li>Materials are to be purchased in bulk where possible to minimise packaging.</li> </ul>	<ul style="list-style-type: none"> <li>Review waste minimisation opportunities on a regular basis.</li> </ul>	<ul style="list-style-type: none"> <li>Waste is reused or recycled where possible.</li> </ul>

## Waste management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<b>General</b>			
<ul style="list-style-type: none"> <li>Identify waste streams, including hazardous and non-hazardous materials.</li> <li>Identify methods for storage, handling and containment of chemicals and hazardous substances.</li> </ul>	<ul style="list-style-type: none"> <li>Waste will be stored at either compressor station.</li> <li>Waste will be transported to a licenced facility for disposal as required to maintain capacity in storage areas at site.</li> <li>A site waste register will be maintained.</li> <li>During maintenance activities all waste will be collected and transported to a licenced facility. The easement and facilities will be maintained free of waste.</li> </ul>	<ul style="list-style-type: none"> <li>Check waste disposal containers and storage areas on a weekly basis for housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</li> <li>Monitor waste containers and storage areas regularly to ensure they do not reach full capacity prior to collection</li> </ul>	<ul style="list-style-type: none"> <li>All waste separated into waste streams and stored and managed in accordance with Safety Data Sheets and the Waste Management Procedure.</li> <li>All waste is disposed of at approved facilities.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
		<p>from a waste disposal contractor.</p> <ul style="list-style-type: none"> <li>• Check for litter and improperly disposed waste.</li> <li>• After maintenance the easement or facility is to be inspected and assessed as clean prior to closing out job.</li> <li>• Review waste minimisation opportunities on a regular basis.</li> </ul>	
<b>Waste streams</b>			
<ul style="list-style-type: none"> <li>• Separate and adequately store waste streams, including hazardous and non-hazardous materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Waste streams will be separated into recyclables, general wastes, organic and inert wastes, and listed wastes. Labelled bins or collection areas will be provided for each stream adequate for the volume produced at peak production. Contractors will be engaged to regularly remove waste from site.</li> <li>• Waste storage areas will be designed such that there is no sediment or rainfall runoff, or dust generation.</li> </ul>	<ul style="list-style-type: none"> <li>• Check waste disposal containers and storage areas on a weekly basis for housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</li> <li>• Monitor waste containers and storage areas regularly to ensure they do not reach full capacity prior to collection from a waste disposal contractor.</li> <li>• Check for litter and improperly disposed waste.</li> </ul>	<ul style="list-style-type: none"> <li>• All waste separated into waste streams and stored and managed in accordance with Safety Data Sheets and the Waste Management Procedure.</li> <li>• All waste is disposed of at approved facilities.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
		<ul style="list-style-type: none"> <li>After maintenance the easement or facility is to be inspected and assessed as clean prior to closing out job.</li> <li>Review waste minimisation opportunities on a regular basis.</li> </ul>	
<b>Hazardous and listed waste</b>			
<ul style="list-style-type: none"> <li>Separate and adequately store hazardous and listed wastes for disposal off-site.</li> <li>Avoid contamination of soil and water.</li> <li>Minimise potential health impacts on the work personnel and public as a result of waste management.</li> <li>Minimise impacts on terrestrial and aquatic ecosystems, and pastoral activities.</li> </ul>	<ul style="list-style-type: none"> <li>Liquid and hazardous wastes are to be handled and stored in appropriate containers in banded areas (or equivalent purpose-built ventilated and self banded container) until transported offsite.</li> <li>An evaporation pond will be established at PCCS to capture produced water for disposal via evaporation. The pond will be sufficiently sized, engineered and designed to accommodate projected produced water volumes, with necessary freeboard for rainfall events. The pond will be lined and a leak detection system installed.</li> <li>Listed/regulated wastes will be stored for collection by a licenced waste handler and transporter, who will take all listed wastes to an appropriately licenced facility.</li> <li>Where listed/regulated wastes are removed from site a record must be kept of: <ul style="list-style-type: none"> <li>The date of waste transport</li> <li>Quantity of waste</li> <li>Type of waste removed and transported</li> <li>Route selected for transport of waste</li> <li>Quantity of waste delivered</li> <li>Any incidents that may have occurred on route</li> <li>All trucks transporting wastes offsite are to be appropriately licensed to carry materials to licensed waste facilities.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Check waste disposal containers and storage areas on a weekly basis for housekeeping, to ensure that waste segregation is occurring, the storage areas have sufficient capacity and there are no leaks.</li> <li>Monitor waste containers and storage areas regularly to ensure they do not reach full capacity prior to collection from a waste disposal contractor.</li> <li>Check for litter and improperly disposed waste.</li> <li>After maintenance the easement or facility is to be inspected and assessed as clean prior to closing out job.</li> </ul>	<ul style="list-style-type: none"> <li>All waste separated into waste streams and stored and managed in accordance with Safety Data Sheets and the Waste Management Procedure.</li> <li>All waste is collected by a licenced waste contractor and disposed of at approved facilities and recorded on the waste register.</li> </ul>



### 13.13 REINSTATEMENT AND REHABILITATION

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#### 13.13.1 ENVIRONMENTAL VALUES AND RISKS

Reinstatement will be the responsibility of the Construction Contractor, and will include backfilling and compaction of the trench, re-spreading topsoil, re-contouring to match the surrounding landscape, and re-spreading of cleared vegetation. This will also include the installation of any permanent drainage, erosion or sediment controls, such as flow diversion bunds at intervals along the reinstated ROW. Reinstatement will be required for the construction ROW, temporary access tracks, temporary construction camps, and temporary water storage dams. The only construction infrastructure that will not be reinstated is that requested to remain by the landholder.

Jemena will survey the reinstated construction footprint and, once satisfied that the reinstatement meets all their criteria, will assume responsibility for the ongoing rehabilitation. This will include monitoring for erosion and sediment controls, revegetation progress, and weeds.

The following risks have been considered in this EMP, and have been informed by the risk assessments undertaken for biodiversity and water:

#### Planning

- pre-disturbance rehabilitation and weed surveys do not provide adequate information to inform rehabilitation monitoring

#### Construction

- spread of existing weed species, or introduction of new weed species, throughout the construction footprint due to poor weed hygiene during construction
- erosion of disturbed soils and sediment entering local watercourses and reducing water quality
- poor reinstatement hindering rehabilitation.

#### Operations

- spread of existing weed species throughout reinstated footprint
- erosion of reinstated soils and sediment entering local waterways due to failure of rehabilitation
- permanent reduction in habitat quality due to failure of rehabilitation
- alteration to local land use due to failure of rehabilitation.



### 13.13.2 MANAGEMENT MEASURES

#### Reinstatement and rehabilitation management – Planning phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Ensure all base-line information has been collected with applicable surveys undertaken in order to identify pre-construction vegetation, landforms, weeds and waterways to inform the development of rehabilitation criteria.</li> <li>Ensure all natural habitat components and cultural heritage features within construction footprint have been identified, mapped and avoided where necessary.</li> <li>Plan construction to facilitate reinstatement and rehabilitation.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-construction environmental assessments, including photographs and GPS references, should be undertaken as required - for use as pre-construction baseline information or to identify analogue sites for comparison, post rehabilitation.</li> <li>Prior to construction, develop a Rehabilitation Plan that: <ul style="list-style-type: none"> <li>Meets landholder and stakeholder requirements (determined through consultation)</li> <li>Details pre-construction land condition and establishes rehabilitation criteria, or reference sites in non-disturbed areas</li> <li>Addresses the requirements of environmental approvals, legislation and industry standards</li> <li>Provides rehabilitation criteria</li> </ul> </li> <li>Ensure reinstatement follows standard procedures outlined in the <i>Code of Environmental Practice: Onshore Pipelines</i> (APIA 2013).</li> <li>Undertake pre-construction soil landscape surveys and mapping to identify soil types, problematic soils and erosion hazard areas.</li> <li>Develop ESCP that identify specific requirements for soil management, major watercourse crossings, reinstatement requirements and final landform requirements, including level of cover to be achieved over disturbed soil.</li> <li>Each watercourse crossing profile is to be surveyed for levels prior to disturbance and these levels are to be used as a guide for reinstatement following construction.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-construction land condition monitoring analogue sites are established.</li> <li>Pre-construction soil and watercourse crossing assessments to inform Progressive ESCP.</li> </ul>	<ul style="list-style-type: none"> <li>Data is available on pre-construction land condition, including aerial photographs and analogue sites for comparison of on-going rehabilitation monitoring.</li> <li>Stakeholder engagement has identified specific landholder or stakeholder requirements relevant to rehabilitation which are incorporated into land owner line list.</li> </ul>

## Reinstatement and rehabilitation management – Construction phase

Objective	Management actions	Monitoring	Performance indicators
<b>General</b> <ul style="list-style-type: none"> <li>Progressively reinstate disturbed areas that are no longer required for on-going construction activities.</li> <li>All areas significantly disturbed during construction are to be reinstated to an acceptable level.</li> </ul>	<ul style="list-style-type: none"> <li>During clearing activities vegetation shall be cleared separately and stockpiled adjacent to the cleared area to facilitate re-spreading. Vegetation clearing should avoid damage to adjacent live vegetation.</li> <li>Prior to grading, soil management procedures (width and depth of topsoil stripping) are to be determined, and communicated to clearing operators.</li> <li>Topsoil is to be removed and stockpiled separately from subsoils along the side of the construction ROW, access tracks and temporary infrastructure.</li> <li>Construction ROW and all temporary facilities, tracks and work areas will be progressively reinstated the construction phase. The entire construction footprint is to be reinstated, unless permanent access is required or landholders request that certain infrastructure remains.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-disturbance inspection of ROW, watercourse crossings and temporary infrastructure locations to establish levels and condition that reinstated landform is to conform with.</li> <li>Post-reinstatement inspection of ROW, watercourse crossings and temporary infrastructure to confirm that reinstatement is as per procedure prior to marking area as no-go zone and restricting access.</li> <li>Levels taken prior to disturbance and after reinstatement to ensure landform is correct.</li> <li>Final reinstatement inspection prior to handover to Jemena.</li> </ul>	<ul style="list-style-type: none"> <li>No non-compliances with landholder line list requirements.</li> <li>All watercourse bed and banks are stabilised, returned to original contours with no evidence of scouring.</li> <li>The temporary construction footprint is returned to original contours and stable landform.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Construction ROW</b>	<ul style="list-style-type: none"> <li>Undertake clearing, grading and earthwork activities in accordance with specific procedures in order to ensure completed work areas can be progressively reinstated.</li> <li>Progressively reinstate the ROW.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-disturbance inspection of ROW to establish levels and condition that reinstated landform is to conform with.</li> <li>Post-reinstatement inspection of ROW to confirm that reinstatement is as per procedure prior to marking area as no-go zone and restricting access.</li> <li>Environmental audits will check reinstated areas.</li> <li>Weekly inspections of disturbed and reinstated areas.</li> <li>Final reinstatement inspection prior to handover to Jemena.</li> </ul>	<ul style="list-style-type: none"> <li>The temporary construction ROW is returned to original contours and stable landform.</li> </ul>
<b>Watercourse crossings</b>	<ul style="list-style-type: none"> <li>Minimise the duration of disturbance by progressively reinstating watercourse crossings as soon as practicable following construction of crossing, including access through water courses when no longer required.</li> <li>Major watercourse crossing profiles will be surveyed for levels prior to disturbance and these levels will be used as a guide for reinstatement following construction.</li> <li>Bed and banks of watercourses will be reinstated to pre-disturbance conditions.</li> <li>Active revegetation of watercourse banks will be considered to minimise</li> </ul>	<ul style="list-style-type: none"> <li>Pre-disturbance inspections of watercourse crossings to establish levels and condition that reinstated landform is to conform with.</li> <li>Post-reinstatement inspections of watercourse crossings to confirm that reinstatement is</li> </ul>	<ul style="list-style-type: none"> <li>All watercourse bed and banks are stabilised, returned to original contours, and with no evidence of scouring.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
	vegetation fragmentation and assist in rapid stabilisation.	<p>as per procedure prior to marking area as no-go zone and restricting access.</p> <ul style="list-style-type: none"> <li>Environmental audits will check reinstated areas.</li> <li>Weekly inspections of disturbed and reinstated areas.</li> <li>Levels taken prior to disturbance and after reinstatement to ensure bed and bank profile is correct.</li> </ul>	
<b>Erosion and sediment controls</b>			
<ul style="list-style-type: none"> <li>ESCP are developed and implemented for Project.</li> <li>Drainage, erosion and sediment is managed to minimise erosion of construction footprint.</li> <li>All temporary controls are removed following stabilisation.</li> <li>Reinstatement achieves a stable landform.</li> </ul>	<ul style="list-style-type: none"> <li>Temporary drainage, erosion and sediment controls will be installed and maintained in accordance with ESCP to assist in diversion, stabilisation and management of anticipated surface water flows during site re-establishment; these will be removed once there is sufficient ground cover for the area to be stable (to be detailed in ESCP).</li> <li>Permanent drainage controls are installed in accordance with the ESCP. As a minimum, diversion bunds will be installed at intervals along the ROW and at approaches to watercourses to avoid water flowing down the ROW, into watercourses and resulting in erosion, and sedimentation of watercourses.</li> <li>Permanent erosion controls will focus on ground cover in the form of natural revegetation.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring of controls to ensure they are functioning.</li> <li>Erosion monitoring as per ESCP.</li> </ul>	<ul style="list-style-type: none"> <li>The temporary construction footprint is returned to original contours and stable landform.</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<b>Weeds</b>			
<ul style="list-style-type: none"> <li>Reinstated footprint is revegetated, with existing weeds covering an area equal to or less than that of pre-disturbance data or analogue sites.</li> <li>No new weeds within reinstated construction footprint.</li> <li>Reinstatement and rehabilitation activities do not result in a proliferation of existing weeds or introduction of new weeds.</li> </ul>	<ul style="list-style-type: none"> <li>Implement Weed Management Plan, specifically weed management zones, weed hygiene and restrictions on moving weed contaminated vegetation and topsoil along the ROW.</li> <li>Operators and staff working on reinstatement will be trained in weed hygiene and weed inspections, and will adhere to weed management zones and required controls.</li> <li>Rehabilitation monitoring and maintenance includes weed control where required.</li> </ul>	<ul style="list-style-type: none"> <li>Weed monitoring as per Weed Management Plan (Construction)</li> </ul>	<ul style="list-style-type: none"> <li>No outbreaks of new weed species to reinstated areas.</li> <li>Existing weed species do not cover an area equal to or greater than that of pre-disturbance or analogue sites.</li> </ul>
<b>Temporary infrastructure</b>			
<ul style="list-style-type: none"> <li>All temporary infrastructure is removed when it is no longer required.</li> <li>Temporary infrastructure areas are reinstated to match surrounding landform and pre-</li> </ul>	<ul style="list-style-type: none"> <li>All temporary construction infrastructure (access tracks, construction camps and water storage dams) will be decommissioned and reinstated unless otherwise requested by the Landholder.</li> <li>All temporary infrastructure will be reinstated as follows: infrastructure removed, topsoil respread over the surface, recontoured to match the surrounding landscape, ripped along the contour, and cleared vegetation will be respread as ground cover to aid in revegetation.</li> <li>Dams will be dewatered where required; any dams that require dewatering will first be sampled and analysed for potential pollutants, prior to dewatering to land.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-disturbance inspection of temporary infrastructure locations to establish levels and condition that reinstated landform is to conform with</li> <li>Post-reinstatement inspection of ROW, watercourse crossings and temporary infrastructure to confirm that</li> </ul>	<ul style="list-style-type: none"> <li>The temporary construction footprint is returned to original contours and stable landform</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
disturbance conditions.	<p>via erosion and sediment controls as per ESCP.</p> <ul style="list-style-type: none"> <li>Dams will then be backfilled, returning soils in the order that they were removed.</li> <li>Temporary construction camps will be constructed, used, and decommissioned progressively as construction moves along the ROW. As each camp is no longer required all infrastructure will be removed (and moved to the next camp location for reuse where required). Where possible, habitat trees will be retained at construction camps (i.e. not cleared initially) to aid in rehabilitation and stabilising the landform.</li> <li>Onsite wastewater management systems will be decommissioned in accordance with NT DoH's <i>Decommissioning or Reuse of On-site Wastewater Systems Factsheet</i> (DoH 2011).</li> <li>Temporary access roads will be reinstated once construction is complete unless required by landholder. Permanent diversion bunds and drainage may be installed along the access track to shed water and avoid erosion down the track; to be detailed in ESCP.</li> </ul>	<p>reinstatement is as per procedure prior to marking area as no-go zone and restricting access</p> <ul style="list-style-type: none"> <li>Environmental audits will check reinstated areas</li> <li>Weekly inspections of disturbed and reinstated areas</li> <li>Levels taken prior to disturbance and after reinstatement to ensure landform is correct</li> <li>Final reinstatement inspection prior to handover to Jemena</li> </ul>	
<b>Permanent infrastructure</b>			
<ul style="list-style-type: none"> <li>Ensure public participation and consultation regarding reinstatement and land reinstatement has been undertaken with relevant stakeholders</li> <li>All significantly disturbed areas caused by construction activities are to be reinstated to an acceptable level</li> </ul>	<ul style="list-style-type: none"> <li>The construction ROW will not be actively revegetated but will rely on the natural seed stock in topsoil and cleared vegetation. Measures will be implemented to manage trees from growing over the pipeline (refer following section).</li> <li>Permanent access points will be required for maintenance activities and to access the MLVs and CPs. Any permanent access will be managed via landholder agreements and Jemena will be responsible for ongoing monitoring and maintenance of these areas (refer following section)</li> <li>Pre-construction land use will be reinstated as much as possible, including repairing pastoral fences and gates, and minimising risks to livestock by removing all waste and potential contaminants.</li> </ul>	<ul style="list-style-type: none"> <li>Records of landholder agreements</li> <li>Records of ongoing monitoring and maintenance of permanent infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>No complaints in regards to management of permanent infrastructure</li> <li>Land use reinstated where possible</li> </ul>

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Ongoing monitoring and management is undertaken until final acceptance criteria are achieved.</li> </ul>			

### Reinstatement and rehabilitation management – Operational phase

Objective	Management actions	Monitoring	Performance indicators
<ul style="list-style-type: none"> <li>Reinstated landforms are stable, non-polluting, safe and able to sustain pre-disturbance land use or other agreed upon land-use.</li> <li>Rehabilitation monitoring and maintenance is undertaken to maximise rehabilitation outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Rehabilitation Plan that will include: <ul style="list-style-type: none"> <li>Rehabilitation goals</li> <li>Agreed condition that reinstated land will return to (consultation with landholders and stakeholders)</li> <li>Final rehabilitation criteria</li> <li>Procedures that will achieve rehabilitation requirements</li> <li>Clearly stipulate requirements for monitoring and maintenance</li> <li>Ongoing monitoring of works by a suitably qualified person until acceptance criteria is met.</li> <li>Line of sight will be maintained along the ROW.</li> <li>Maintenance to remove trees growing over the pipeline, within the following zones (as per APIA code of <i>Environmental Practice: Onshore Pipelines</i> (2013): <ul style="list-style-type: none"> <li>Clearance zone – all trees cleared within a 3m wide zone above centreline of pipe</li> <li>Zone A - strip of land no closer than 1.5m from centreline of pipe – perennials and annuals only</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Rehabilitation monitoring will target: <ul style="list-style-type: none"> <li>Revegetation success monitoring; comparison between rehabilitation monitoring sites and pre-disturbance or analogue sites</li> <li>Soil erosion monitoring</li> <li>Weed monitoring</li> <li>Integrity of watercourses monitoring</li> </ul> </li> <li>The methods of</li> </ul>	<ul style="list-style-type: none"> <li>Reinstated landform is stable</li> <li>No non-compliances with landholder line list requirements</li> <li>All watercourse bed and banks are stabilised, returned to original contours with no evidence of scouring</li> <li>The temporary construction footprint is returned to original contours and stable landform</li> <li>No outbreaks of new weed species to reinstated areas</li> <li>Where applicable, land is returned to landholders and stakeholders to their satisfaction and pre-disturbance land use is</li> </ul>



Objective	Management actions	Monitoring	Performance indicators
	<ul style="list-style-type: none"> <li>Zone B - strip of land no closer than 3m from centreline of pipe and suitable for small woody shrubs</li> <li>Zone C - strip of land no closer than 5m from centreline of pipe and suitable for woody shrubs and small trees</li> <li>In addition to the ROW vegetation maintenance, rehabilitation maintenance will be undertaken for the following activities: <ul style="list-style-type: none"> <li>Erosion and sediment control maintenance, as per ESCP</li> <li>Weed control as per regulatory requirements</li> <li>Maintenance of fences, gates, signage and above ground infrastructure</li> <li>Maintenance of watercourses as required to maintain hydrology and avoid erosion of the beds and banks at the site of disturbance</li> </ul> </li> <li>Active revegetation (e.g. broad seeding) if required in specific areas where revegetation is insufficient to provide ground cover and stable landform</li> </ul>	rehabilitation monitoring will be further detailed in a Rehabilitation Monitoring Plan	reinstated (as detailed in Landholder Access Agreements and the Rehabilitation Management Plan)



### 13.14 DECOMMISSIONING

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The life of the pipeline is expected to be > 30 years. In the event that the pipeline is no longer required, it will be decommissioned in accordance with legislation, Australian Standards and industry best practice as applicable at the time of decommissioning.

Current decommissioning standards are outlined in AS 2885. The most likely option to be implemented is one of the following, as either entails the least amount of ground disturbance and environmental impact:

- suspension – this will involve depressurising the pipeline, capping, and filling with an inert gas such as nitrogen or water with corrosion inhibiting chemicals. The cathodic protection would be maintained to prevent the pipe corroding.
- abandonment – this will involve disconnecting it from all sources of hydrocarbons, processing plants, meter stations and control lines, and purging the pipe of natural gas with a non-flammable liquid. The pipe may then be filled with water and left to corrode in-situ, filled with cementitious mud, or removed (generally only in built up areas).

A Decommissioning Management Plan will be developed that will address specific decommissioning requirements relevant to environmental management. A Rehabilitation Plan will also be developed at this time that will outline the permanent rehabilitation requirements. This will be developed in consultation with landholders, stakeholders and regulatory authorities at the time of decommissioning. All above ground facilities and equipment will be removed and the sites will be returned to pre-use state (i.e. open grassed grazing land).

Any requirements for specific environmental management measures or ongoing monitoring will be included in the decommissioning and rehabilitation plans. Plans will be submitted to the relevant regulatory authorities for approval prior to commencing decommissioning.

