

# **Australia Pacific LNG Project**

## **Volume 3: Gas Pipeline**

### **Chapter 16: Waste**

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## 16. Waste

### 16.1 Introduction

Australia Pacific LNG proposes to develop a world scale long term coal seam gas (CSG) to liquefied natural gas (LNG) project in south central Queensland. The proposed Australia Pacific LNG Project (the Project) is expected to be over a 30-year period and will include:

- Developing the Walloons gas fields in the Surat Basin in southern central Queensland with up to 10,000 coal seam gas wells
- Constructing and operating an approximately 450km long main gas transmission pipeline (gas pipeline) to connect the Walloons gas fields with the LNG facility
- Constructing and operating an LNG facility on Curtis Island near Gladstone to produce and export approximately 18Mtpa of LNG.

#### 16.1.1 Purpose

This environmental impact statement (EIS) chapter discusses the waste assessment from the gas pipeline, while other project elements are discussed in Volume 2 Chapter 16 and Volume 4 Chapter 16.

Throughout the project life, including site preparation, construction, operation, decommissioning and rehabilitation, the Project will produce a variety of waste streams and products. Australia Pacific LNG has a strong commitment to sustainability and has developed a set of sustainability principles that will be used to guide the management of waste (refer to Volume 1 Chapter 3). Of Australia Pacific LNG's 12 sustainability principles, the key relevant principles for waste management are:

- Minimising adverse environmental impacts and enhancing environmental benefits associated with Australia Pacific LNG's activities, products or services; conserving, protecting, and enhancing where the opportunity exists, the biodiversity values and water resources in its operational areas
- Using resources efficiently, reducing the intensity of materials used and implementing programs for the reduction and re-use of waste
- Identifying, assessing, managing, monitoring and reviewing risks to its workforce, Australia Pacific LNG's property, the environment and the communities affected by its activities
- Working cooperatively with communities, governments and other stakeholders to achieve positive social and environmental outcomes, seeking partnership approaches where appropriate.

In applying the sustainability principles, Australia Pacific LNG will develop and implement waste management guidelines. The plans will incorporate the waste management hierarchy to avoid, reduce, recycle and dispose of wastes.

#### 16.1.2 Scope of work

This chapter identifies the likely waste streams generated through the construction, operation, decommissioning and rehabilitation of the gas pipeline. It assesses the potential impacts on the

surrounding environment from the generated wastes and proposes management strategies to minimise the impact.

Further information regarding the following waste streams generation and management are discussed in other EIS chapters:

- Acid sulfate soils – Volume 3 Chapter 5
- Air emissions – Volume 3 Chapter 13
- Hydrotest water – Volume 3 Chapter 11

### 16.1.3 Legislative and policy framework

Queensland's waste management regulatory requirements are provided in the *Environmental Protection Act 1994* (EP Act), the Environmental Protection Regulation 2008, the Environmental Protection (Waste Management) Policy 2000, and the Environmental Protection (Waste Management) Regulation 2000.

#### ***Environmental Protection Act 1994***

The objective of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).

The EP Act defines waste as anything that is:

- Left over, or an unwanted by-product, from an industrial, commercial, domestic or other activity
- Surplus to the industrial, commercial, domestic or other activity generating the waste.

#### ***Environmental Protection Regulation 2008***

The Environmental Protection Regulation 2008 defines 'general waste' as waste other than regulated waste. Regulated waste is defined as waste that is:

- A commercial or industrial waste, whether or not it has been immobilised or treated
- Of a type, or contains a constituent of a type, mentioned in Schedule 7 of the Environmental Protection Regulation 2008.

#### ***Environmental Protection (Waste Management) Policy 2000***

The aim of the Environmental Protection (Waste Management) Policy 2000 is to achieve the objective of the EP Act in relation to waste management through:

- Identifying the environmental values to be enhanced or protected
- Providing a framework to:
  - Ensure waste management is consistent with ecologically sustainable development
  - Minimise the impact of waste on the environment
  - Minimise the quantity of waste generated
  - Promote efficient use of resources and maximum use of waste
  - Continuously improve waste management activities

- 
- Providing for the preparation of waste management programs and industry waste reduction programs.

The policy outlines the waste management hierarchy as an optimal waste management tool, which moves from most preferred to least preferred:

- Waste avoidance
- Waste re-use
- Waste recycling
- Energy recovery
- Waste disposal.

One of the principles highlighted in the policy applicable to the management of wastes associated with the Project is the 'polluter-pays principle'. This principle states 'all costs associated with the management of waste should, if practicable, be borne by the persons who generated the waste'.

The waste management hierarchy and the 'polluter pays principle' have important ramifications for the design of a waste management program. The waste hierarchy is specifically designed to reduce the amount of waste a project produces; while the polluter pays principle encourages 'cleaner/greener' design by the proponent, by ensuring they are held accountable for any wastes the Project may produce.

The environmental values which have the potential to be impacted by waste are:

- Life, health and wellbeing of people
- Diversity of ecological processes and associated ecosystems
- Land use capability, having regard to economic considerations
- Management of finite resources.

The management of waste must protect these values during the construction, operation, decommissioning and rehabilitation of the gas pipeline.

### ***Environmental Protection (Waste Management) Regulation 2000***

The object of Environmental Protection (Waste Management) Regulation 2000 is to protect the environment by:

- Minimising the impact of waste on the environment including, in particular, the impact of waste so far as it directly affects human health
- Establishing an integrated framework for minimising and managing waste under the principles of ecologically sustainable development.

The regulation also provides the reporting and tracking requirements for regulated waste.

### ***Australia Pacific LNG corporate standards***

Origin will develop and operate the gas pipeline on behalf of Australia Pacific LNG. As a result, waste management for the gas pipeline will also be in accordance with Origin's Health, Safety and Environment Management System Standard 19: Product stewardship, conservation and waste management.

This standard aims to minimise the consumption of resources and materials as far as reasonably practicable. Wastes are to be eliminated, reduced, recycled and/or re-used as far as reasonably practicable, or disposed of appropriately.

The following performance requirements will be implemented:

- Development and implementation of programs to ensure wastes are eliminated, reduced, re-used, recycled, treated and/or appropriately disposed of as a last resort
- Development and implementation of systems to identify, quantify, and monitor wastes generated. Records will be kept to ensure wastes can be tracked from source to disposal, and waste receiving facilities are pre qualified and if necessary audited to ensure conformance to appropriate waste standards.

## 16.2 Methodology

Wastes were identified for the construction, operation, decommissioning and rehabilitation of the gas pipeline. These were categorised into general waste, recyclable and regulated waste and management options were identified using the principles of the waste management hierarchy and cleaner production initiatives. Quantities of wastes were identified using data compiled from existing Origin operations, and other similar pipeline projects.

A matrix was developed which further investigated the likely impacts associated with each identified waste. This matrix is provided in Section 16.5.10. Management options for these were then identified, employing principles such as the waste management hierarchy which focuses firstly on avoiding and minimising, secondly on re-using and recycling, and finally on appropriate disposal.

## 16.3 Waste generation

### 16.3.1 Construction waste

Waste will be generated through the construction of the gas pipeline and associated infrastructure including scraper stations and mainline valves. The major waste streams generated during the construction phase are:

- Green waste
- Steel
- Waste oils, grease and fuels
- General waste (packaging, ropes and rope spacers)
- General industrial waste
- Used chemicals
- Horizontal directional drilling fluid and cuttings
- Green waste
- Temporary accommodation facilities waste including general and putrescible
- Air emissions
- Sewage and greywater.

A quantity of waste steel (including scrap metal and welding rods) will be generated from the construction of the gas pipeline during pipe stringing and welding. All of the steel will be segregated and stored within designated sections of the laydown areas prior to transport to a recycling facility.

Construction of the gas pipeline will generate general industrial waste. This will be recycled where possible and the remaining waste transported to a licensed landfill.

Waste oils, grease and fuels will be generated from the large number of machinery and equipment required for trenching, drilling, boring, welding and so on. These will be appropriately stored and banded to prevent spills and overflows prior to transport off site by a licensed contractor to a recycling facility or licensed disposal facility.

As a result of transporting the pipes to the gas pipeline right of way, approximately 10m<sup>3</sup>/day of ropes, rope spacer and packaging waste will be produced. These will be transported to a suitable recycling facility where possible, with the remaining waste to be transported to a suitable licensed landfill.

The temporary accommodation facilities will generate putrescibles, general waste, sewage and greywater. Section 16.3.4 details the storage and treatment of sewage and greywater. The other wastes from the temporary accommodation facilities will be segregated and appropriately stored, before being transported off-site to a suitable recycling facility or landfill. Section 16.5.5 discusses the availability of local landfills.

Air emissions are discussed in Volume 3 Chapter 13. Those generated during gas pipeline construction will predominantly be dust from:

- Access to the pipeline corridor by motor vehicles, particularly trucks and machinery
- Clearing and grading the right of way
- Vehicle movements associated with stringing the pipeline, welding, non-destructive testing and joint coating
- Trenching
- Rock blasting
- Sourcing and placement of bedding and padding
- Pipe trench backfilling
- Clean-up and rehabilitation.

Virtually all soils to be disturbed with the intertidal and supratidal areas of The Narrows are expected to be acid sulfate soils which could potentially cause acidic runoff. Volume 3 Chapter 5 discusses acid sulfate soils in more detail.

Following construction of a section of gas pipeline, hydrostatically pressure testing (hydrotesting) will be conducted. The resulting hydrotest water will be tested for discharge criteria prior to release. Volume 3 Chapter 11 discusses hydrotest water disposal in more detail.

An inventory of waste generated during construction, potential impacts from each of the identified wastes and management strategies to minimise impacts to the environment is provided in Section 16.5.10.



### 16.3.2 Operational waste

Minimal wastes will be generated during the operation of the gas pipeline and associated infrastructure. The major waste streams generated during the operational phase are:

- Packaging and waste oils and greases
- Sludge
- Contaminated soil.

Waste oils and greases will be generated during inspection and maintenance activities on the pipeline and from the aboveground facilities (i.e. mainline valves, scraper stations). These wastes will be stored and banded in accordance with AS1940, before being transported off-site to a suitable recycling facility or licensed landfill.

Scheduled inspection and maintenance activities for the pipeline include pigging, which may result in the generation of sludge. This is classified as regulated waste and will require transport by a licensed contractor to a licensed regulated waste landfill.

An inventory of all waste generated during gas pipeline operations is provided in Section 16.5.10.

### 16.3.3 Decommissioning and rehabilitation waste

Minimal wastes will be produced during the decommissioning and rehabilitation of the gas pipeline provided that it is decommissioned in place. The Project is in the early phases of development and has yet to complete a detailed assessment of the type and quantity of waste generated during this phase for the gas pipeline. However, it can be expected that all aboveground facilities and equipment will be dismantled and removed.

Where feasible, the following material and equipment will be re-used:

- Mainline valves
- Scraper stations.

The material and equipment likely to be suitable for recycling includes:

- Steel
- Electrical equipment and cabling
- Control systems equipment
- Fencing.

The material and equipment likely to be unsuitable for either re-use or recycling and may require disposal includes:

- Plastic and glass fibre reinforced plastic tanks
- Sludge from pipelines and equipment.

Further assessment of the wastes will be undertaken when required, in accordance with Origins' standards and procedures, and statutory requirements.

### 16.3.4 Sewage and effluent

Sewage will be generated during the construction phase of the gas pipeline. Package sewage treatment facilities will be located at each of the temporary accommodation facilities to treat the generated sewage. The treatment facilities will be designed to treat the waste to Class C recycled wastewater quality to permit disposal to land. Table 16.1 details the contaminant levels required for disposal. The volume of sewage to be produced is estimated 150L per person per day.

A typical sewerage treatment plant will include:

- A balance tank for flow equalisation
- A primary tank for settlement, digestion storage of solid matter
- An aeration compartment for biological degradation of organic matter
- A clarifier for further removal of residual suspended solids
- A final effluent tank for disinfection and storage of treated water.

Absorption beds and/or irrigation fields will be used for treated wastewater disposal and will be located and designed to avoid:

- Sensitive areas
- Soil erosion
- Surface ponding
- Impact on the quality of ground water.

Signs will be erected around absorption beds and/or irrigation fields to restrict access. The resultant sludge will be transported off-site by a regulated waste contractor to a regulated waste facility. The treatment facilities will be designed to include alternative storage and disposal options during times of system failure and in conditions preventing discharge to land (i.e. during rain events).

**Table 16.1 Class C wastewater quality**

Quality characteristics	Units	Limit
Biological Oxygen Demand (BOD)	mg/L	20 (maximum)
pH	Scale	6.0 – 8.5
Electrical conductivity	µs/cm	<1,600
Total dissolved solids	mg/L	<1,000
Total suspended solids	mg/L	30 (maximum)
<i>Escherichia coli</i> ( <i>E. coli</i> )	Colony forming units/100mL	<1,000 (maximum)
Total Nitrogen	mg/L	35 (maximum)
Total Phosphorous	mg/L	10 (maximum)
Dissolved Oxygen	mg/L	2 (maximum)

Sewage from small accommodation facilities such as advance accommodation facilities will be disposed of onsite in an appropriate manner.

## 16.4 Potential impacts

Environmental impacts from waste will only occur as a result of poor management. The potential impacts include the following:

- Land and water (surface water and groundwater) contamination from inappropriate storage, handling and disposal of solid and liquid wastes
- Land and water (surface water and groundwater) contamination from spills during handling and transportation
- Land and water contamination (surface water and groundwater) from spills/overflows from extreme rainfall events
- Increased populations of vermin from inappropriate storage and handling of waste
- Social amenity degradation due to poor housekeeping
- Inefficient use of resources
- Adverse effects to flora and fauna.

A detailed inventory of waste generated during the construction and operational phases, potential impacts from each of the identified waste streams and management strategies to minimise impacts to the environment is provided in Section 16.5.10.

Wastes are not expected to pose a significant risk to the environment or public health with the implementation of effective waste management and control measures.

## 16.5 Mitigation and management

The main objective of waste management is to minimise impacts to the environmental values as outlined in Section 16.1.3 and to implement the sustainability principles. Several strategies will be used for the Project, principally the implementation of the waste management hierarchy and cleaner production principles. These are discussed in Sections 16.5.3 and 16.5.4 respectively.

The waste management and minimisation actions proposed for the gas pipeline are detailed in this section, in the environmental management plan in Volume 3 Chapter 24, and in Section Table 16.4. This table also details the key initiatives that have been incorporated for each waste stream to ensure it is managed sustainably.

### 16.5.1 Waste management guidelines

Detailed waste management guidelines will be developed for the construction, operation, decommissioning and rehabilitation phases of the Project. They will aim to minimise the consumption of resources, reduce the quantity of waste produced, maximise waste re-use and recycling opportunities, minimise the risk to the employees, environment and communities from generated wastes and effectively implement the principles of the waste management hierarchy.

The plans will include the following details:

- Waste streams and quantities
- Management strategies to be employed for each waste stream
- Roles and responsibilities

- Monitoring waste streams and management activities
- Spill incident and response
- Auditing against the waste management guidelines
- Reporting requirements.

The high level waste management strategies detailed in this chapter will provide the framework for, and be progressed into, functional waste management guidelines. Waste management guidelines will be dynamic documents that will be amended specifically for each phase of the gas pipeline, and updated subsequent to waste management audits to ensure continual improvement.

### **16.5.2 Summary of key environmental design features**

The following is a summary of the key environmental design features incorporated during planning for construction and operation of the gas pipeline.

#### ***Liquid waste minimisation***

A variety of technologies and practices will be implemented to control and minimise liquid wastes. Where practicable, these measures will include:

- The segregation of wastewater streams and their treatment
- The re-use of treated wastewater for onsite irrigation
- The use of secondary containment structures for storage of hazardous liquid wastes
- Design the facilities to Australian Standards for the storage and handling of dangerous goods such as fuels and chemicals
- Repeat use of hydrotest water to minimise volume to be disposed.

#### ***Solid waste minimisation***

A variety of technologies and practices will be implemented to control, minimise, and re-use solid wastes. Where practicable, these measures will include:

- Maximise recycling and re-use opportunities
- The re-use of cleared site vegetation (including mulching) to aid site rehabilitation and erosion and sediment control following site earthworks
- Develop contracts conditions with suppliers to minimise waste volumes transported to the site.

#### ***Air emissions minimisation***

A variety of technologies and practices will be implemented to minimise and control air emissions during construction of the gas pipeline and associated facilities. Where practicable, these measures will include:

- Vehicles and machinery used in construction will be fitted with appropriate emission control equipment and maintained in a proper and efficient manner in accordance with the manufacturer's specifications
- Dust mitigation measures will be implemented including:
  - Minimising disturbance footprint

- Minimising duration of disturbance
- Use of dust suppression methods including watering.

### 16.5.3 Waste management hierarchy

The waste management hierarchy will be the primary tool used for sustainable waste management.

#### **Waste avoidance**

Waste avoidance will be achieved through the consideration of alternative products, implementation of alternative technology and procurement processes which includes the provision of contracts with companies encouraging sustainable waste management practices. The use of off-site fabrication will play an important part in waste avoidance for the gas pipeline. Given the remote location, a number of modular components will be sourced and brought onto site. This will substantially reduce the quantities of some waste streams associated with the construction phase, including scrap steel.

#### **Waste re-use**

The re-use of waste will be achieved through identifying re-use opportunities onsite and subsequently identifying market demands for waste items. To maximise re-use opportunities wastes will be segregated. Waste items that will be generated by the Project and may be re-used include horizontal directional drilling cuttings, soils, cleared vegetation and scrap metal. Future investigations regarding waste re-use will continue. The marketability of wastes will also be regularly reviewed to ensure potential new and emerging opportunities for waste re-use are maximised.

#### **Waste recycling**

Waste recycling will be a large component of the waste management strategy used onsite. A large percentage of the waste generated through the Project can be recycled, including waste oils, steel, ropes and rope spacers, paper and cardboard, and timber.

Regulated waste that can be recycled will be transported off-site by a licensed contractor to an appropriate recycling facility. Table 16.2 provides an outline of the recyclable product, potential end use and a qualitative assessment of the marketability of the product.

**Table 16.2 Recyclables and market potential**

Recyclable product	Potential end use	Marketability
Scrap ferrous metal	Scrap metal will be managed via a third party licensed recycling contractor. The product will be removed from the site, shredded and either re-smelted or used in the smelting process. Any grade of steel can be recycled to top quality new metal.	High marketability with continual high demand from local and global market available.
Scrap non-ferrous metal	Scrap metal will be managed via a third party licensed recycling contractor. The product will be removed from the site, shredded and crushed into bales for resale. It is then smelted to produce a molten product and forged. There is very little property differences between recycled and virgin non ferrous metal.	High marketability with continual high demand from the local and global market.
Paper, cardboard,	These recyclable wastes will be managed via a third	Medium marketability as

Recyclable product	Potential end use	Marketability
glass, some plastics, tins and cans	party licensed recycling contractor. The products will be removed from site and taken to a material recovery facility to sort to specifications, baled, shredded, crushed, or otherwise prepared for resale.	demand from Australian and global markets for these products is unstable and will fluctuate.
Waste oils	Waste oils will be managed via a third party licensed recycling contractor. The oils will be taken from the site, filtered and demineralised, propane de-asphalted and distilled to produce re-refined base oil suitable for use as a lubricant, hydraulic or transformer oil.	High marketability with Queensland markets available to recycle this waste.
Decommissioning equipment	A decommissioning plan will be developed that will maximise recycling opportunities. Waste concrete, ferrous metals and non-ferrous metals will be managed as above. Plant and equipment will be sold.	Medium to high marketability due to high value recyclable materials generated.

### **Waste disposal**

Disposal of wastes will only be used where there is no other option available. General waste will be transported to a local landfill for disposal in accordance with regulatory requirements. Regulated waste will be transported off-site by a licensed contractor to an appropriate regulated waste facility. Refer to Section 16.5.5 for details on waste disposal facilities.

#### **16.5.4 Cleaner production**

Cleaner production is a continual improvement process designed to maximise resource usage and operational efficiency in order to minimise waste disposal. Cleaner production techniques applicable to the Project are:

- Improved operation and maintenance practices to reduce the quantity of resources used and to minimise the amount of waste generated
- Selection and use of the most appropriate technology to reduce the quantity of resources used and to minimise the amount of waste generated
- Segregation of waste to facilitate re-use
- Closed-loop recycling.

#### **16.5.5 Waste disposal facilities**

Australia Pacific LNG does not propose to construct any new landfills as part of the Project. There are several landfills within the development area that may be used for the disposal of general waste including Trap Gully, Miles, Wandoan and Benaraby.

Table 16.3 details the local landfills and the accepted waste types. Australia Pacific LNG will work with local councils to determine the current landfill capacities and accepted waste types and will work with councils to assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the Project can be accommodated if required.

**Table 16.3 Local landfills and accepted wastes**

Landfill	Location	Capacity	Accepted wastes
Trap Gully	Dawson Highway 16km east of Biloela	Some capacity	General waste, commercial waste, large loads, some regulated waste (asbestos) and tyres
Miles	Leichardt Highway Miles	Limited capacity	General waste, construction and demolition waste, commercial and industrial waste, scrap steel, green waste, timber and recyclables
Wandoan	Tip Road Wandoan	Near capacity	General waste, construction and demolition waste, commercial and industrial waste, scrap steel, green waste, timber and recyclables
Benaraby Regional Landfill	Bruce Highway Benaraby	Capacity (expected life of 150 years)*	General commercial waste, recyclable waste, green waste, construction and demolition waste, sewage sludges and other regulated wastes

Source: Western Downs Regional Council (n.d.)

\*(Pers. comms. Scott Prior, Coordinator Waste Services, December 2009).

### 16.5.6 Waste treatment, handling and storage

#### ***Waste treatment***

The treatment of sewage and acid sulfate soils will be the only waste treatment to occur onsite. Section 16.3.4 describes the sewage treatment.

A detailed acid sulfate soil investigation will be undertaken in accordance with Queensland Acid Sulfate Soil Technical – Soil Management Guidelines, 2002. An acid sulfate soil management plan will then be developed and implemented in accordance with the State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate Soils. It is anticipated the soil will be treated with lime and re-used during backfilling.

#### ***Waste handling and storage***

Designated temporary waste management areas will be constructed strategically along the gas pipeline corridor and at the temporary accommodation facilities for sorting wastes into the various waste streams and waste storage prior to transport off-site. The temporary waste management areas will be bunded or have a suitable containment system in place for the type of waste to be stored. The areas will have appropriate drainage and sump systems in place to assist with the drainage and removal of any waste materials or products released into the containment system. The containment systems will ensure wastes are contained and do not cause environmental harm including surface water and groundwater contamination.

General wastes will be separated and stored within designated labelled bins in the temporary waste management area as follows:

- Aluminium cans, glass, recyclable plastics
- Paper and cardboard
- General waste and putrescible waste.

There will be a dedicated section in the temporary waste management areas for hazardous wastes. They will be stored within sealed containers within a bunded area which will create a secondary bunding system. The following measures will be implemented to prevent environmental harm:

- Bunds will be designed in accordance with AS1940: The Storage and Handling of Flammable and Combustible Liquids
- Bunds containing liquid will be pumped out as required and disposed of appropriately
- Where practicable, all loading and unloading will take place within the containment area
- Containers storing hazardous waste will be securely closed
- All containers will be labelled for clear interpretation of the contents
- Hazardous wastes will not be mixed with non hazardous wastes
- Spills containment material and spill kits will be provided.

Material safety data sheets (MSDS) provide information on specific materials and products including storage and handling requirements. The relevant MSDS for waste products will be kept onsite and made assessable to all personnel working with waste or working within the location of the designated waste storage area.

#### **16.5.7 Spill containment and remediation**

Australia Pacific LNG will implement standard procedures for the storage, handling, disposal and spill response for hazardous waste. Hazardous materials will be stored in appropriate bunding in accordance with AS1940: The Storage and Handling of Flammable and Combustible Liquids and other relevant dangerous goods standards. Spill containment material and spill kits will be strategically located along the gas pipeline and training in spill response will be conducted for all employees.

#### **16.5.8 Regulated waste tracking**

A site register will be developed and maintained for all wastes generated onsite. It will include the following details:

- Source of waste
- Type of waste
- Quantity of waste
- Storage location
- Any storage particulars
- Dates of collection
- Date of disposal/recycling
- Name and details of transporter and facility used to dispose the waste.

The tracking of regulated wastes is a legal requirement under the Environmental Protection (Waste Management) Regulation 2000. Details including waste type, quantity, waste transporter and disposal location must be recorded and provided to Department of Environment and Resource Management. The treatment, storage and transport of regulated waste require an environmental authority under the



EP Act. Where a contractor carries out these activities, the contractor will be required to hold the appropriate approvals.

### 16.5.9 Waste auditing and monitoring

Waste streams, quantities and management practices will be audited during the construction and operational phases of the Project as part of the waste management guidelines. The objectives of auditing the waste management activities onsite include:

- Assessment of the actual wastes compared to predicted waste streams and quantities
- Monitor potential impacts from wastes
- Review the waste transportation records
- Recommend future actions to improve waste management practices
- Monitor the implementation of the principles of waste management hierarchy.

Weekly inspections will be conducted during the construction phase on the designated temporary waste management areas to ensure that the waste material is appropriately separated, stored and labelled. All unidentified wastes will be assessed to determine the appropriate management measures to use when handling, storing, transporting and disposing of the waste. This process may involve the investigation of a sample of the waste material which will be sent to an accredited laboratory for analysis, and a risk assessment of the risks associated with the handling and disposal of the waste.

### 16.5.10 Waste reporting

The National Environmental Protection Council (NEPC) has endorsed a National Environment Protection Measure (NEPM) in the form of the National Pollutant Inventory (NPI). It is a database designed to provide stakeholders and government agencies information on the type and quantity of substances emitted to land, water and air. The objectives of the NPI are to:

- Provide information to industry and government to assist with environmental planning and management
- Provide the community up to date information about substance emissions and transfers from industrial facilities
- Promote waste minimisation, cleaner production, and energy and resource efficiency.

Reporting on emissions will be an annual requirement for the Project.

The NEPC has also endorsed The National Environment Protection (Movement of Controlled Waste between States and Territories) Measure. The objective of this NEPM is to *'provide a national framework for developing and integrating state and territory systems for the management of the movement of controlled wastes between states and territories originating from commercial, trade, industrial or business activities'*.

There will be no wastes transported to other states or territories as part of the Project. Therefore this measure is not relevant. Table 16.4 summarises the waste inventory, quantity, impacts and management strategies.

**Table 16.4 Waste inventory, quantity, impacts and management**

Phase	Waste	Source	Characteristics/ nature	Estimated quantity	Potential impact	Management	Destination	EIS section
Construction	Soils	Earthworks	Inert material	No excess soil	Erosion and sedimentation  Surface water quality degradation due to runoff from stockpiles.	Soils will be stripped and stockpiled in accordance with the EM Plan and re-used onsite during rehabilitation following construction.  Stockpiles will be located within cleared areas and away from drainage lines.  Key initiatives – waste re-use	Re-used onsite.	Volume 3 Chapter 3 – Project description  Volume 3 Chapter 5 – Geology, topography, geomorphology, soils and land contamination  Volume 3 Chapter 24 – Environmental management plan
Construction	Green waste	Clearing of vegetation for construction of pipeline and facilities	Organic material	No excess vegetation	Release of waste causing contamination of land and surface water.  Fire risk	Temporary stockpiles will be located within cleared areas away from drainage lines.  Vegetation material will be mulched where practicable and used during rehabilitation.  Trees with hollows will be left onsite for fauna habitat.  Weeds to be managed in a manner consistent with the appropriate weed classification and recognised Queensland weed management strategy.  Key initiatives – waste avoidance, waste re-use.	Re-used onsite during rehabilitation  Weeds to be managed in a manner consistent with the appropriate weed classification and recognised weed management strategy	Volume 3 Chapter 3 – Project description  Volume 3 Chapter 8 – Terrestrial ecology  Volume 3 Chapter 24 – Environmental management plan
Construction	General industrial waste	Pipe stinging, bending and welding	General and recyclable waste  30% Recyclable	10m <sup>3</sup> /day	Release of waste causing contamination of land and surface water.  Visual amenity impacts due to poor housekeeping	All construction waste will be segregated to maximise re-use and recycling opportunities.  Wastes will be stored within designated sections in the temporary waste management areas.  Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.  Procurement of pre-fabricated materials will be encouraged to reduce the quantity of waste.  Key initiatives – waste avoidance, waste re-use, waste segregation, recycling and cleaner production.	Recyclables - transported by a licensed contractor to a recycling facility  Non recyclable – transported by a licensed contractor to a local licensed landfill.	Volume 3 Chapter 3 - Project description  Volume 3 Chapter 24 – Environmental management plan
Construction	General waste (packaging, ropes, fibre/nylon rope spacers)	Pipe delivery	General and recyclable waste  30% recyclable	10m <sup>3</sup> /day	Release of waste causing contamination of land and surface water.  Visual amenity impacts due to poor housekeeping	All construction waste will be segregated to maximise re-use and recycling opportunities.  Wastes will be stored within designated sections in the temporary waste management areas.  Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.	Recyclables - transported by a licensed contractor to a recycling facility  Non recyclable – transported by a licensed contractor to a local licensed landfill.	Volume 3 Chapter 3 – Project description  Volume 3 Chapter 24 – Environmental management plan

Phase	Waste	Source	Characteristics/ nature	Estimated quantity	Potential impact	Management	Destination	EIS section
						<p>Procurement of pre-fabricated materials will be encouraged to reduce the quantity of waste.</p> <p>Key initiatives – waste avoidance, waste segregation, waste re-use, recycle and cleaner production.</p>		
Construction	Steel (including scrap metal, welding rods)	Pipe off-cuts, stringing, bending and welding	Recyclable	<p>Pipe off-cuts – approximately 9 tonnes/week</p> <p>Other waste steel – 1 tonne/week</p>	<p>Littering of land and surface water.</p> <p>Visual amenity impacts due to poor housekeeping.</p>	<p>All steel will be segregated and stored within designated areas in temporary waste management areas.</p> <p>Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.</p> <p>Procurement of pre-fabricated materials will be encouraged to reduce the quantity of waste.</p> <p>Key initiatives – waste avoidance, waste segregation, waste re-use, recycle and cleaner production.</p>	Transported by a licensed contractor to a recycling facility.	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Waste oils, grease and fuels	Construction machinery including side-boom tractors, HDD rigs, trenchers and so forth	Regulated waste	350L/week	<p>Spills and overflows causing contamination of land, surface water and groundwater</p> <p>Releases causing degradation of biodiversity i.e. native flora and fauna</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>Bins and/or drums will be designated for the storage of used oils, grease and fuels.</p> <p>Bins and/or drums will be sealed, labelled and stored within appropriately banded areas in accordance with AS1940.</p> <p>Spill kits will be strategically located along the gas pipeline.</p> <p>Contracts with companies will be established to encourage opportunities for recycling waste oils.</p> <p>Key initiatives – waste segregation, waste re-use, recycle and cleaner production.</p>	<p>Transported by a licensed contractor to a recycling facility where possible</p> <p>Remaining waste to be transported to a licensed regulated waste landfill</p>	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Contaminated absorbent material	Clean up of spills, maintenance of machinery	Regulated waste	5m <sup>3</sup> total	<p>Release of contaminated material to the environment causing contamination of land, surface water and groundwater.</p> <p>Releases causing degradation of biodiversity i.e. native flora and fauna</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>Bins and/or drums will be designated for the storage of contaminated material.</p> <p>Bins and/or drums will be sealed, labelled and stored within appropriately banded areas in accordance with AS1940.</p> <p>Spill kits will be strategically located along the gas pipeline.</p> <p>Contracts with companies will be established to encourage opportunities for recycling waste oils.</p> <p>Key initiatives – waste segregation, waste re-use, recycle and cleaner production.</p>	<p>Transported by a licensed contractor to a recycling facility where possible</p> <p>Remaining waste to be transported to a licensed regulated waste landfill</p>	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Used chemicals (spent x-ray film, developer chemicals,	Pipeline testing and coating	Regulated waste	100L/week	<p>Spills and overflows causing contamination of land, surface water and groundwater</p> <p>Release of contaminated material to the environment causing</p>	<p>Bins and/or drums will be designated for the storage of used chemicals.</p> <p>Bins and/or drums will be sealed, labelled and stored within appropriately banded areas in accordance with AS1940.</p>	<p>Transported by a licensed contractor to a recycling facility where possible</p> <p>Remaining waste to be transported to a licensed</p>	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>

Phase	Waste	Source	Characteristics/ nature	Estimated quantity	Potential impact	Management	Destination	EIS section
	used tins from solvents, rust proofing agents or primer)				contamination of land and surface water  Release causing degradation of biodiversity i.e. native flora and fauna  Visual amenity impacts due to poor housekeeping	Liquid wastes will be stored separately to solid wastes to minimise contamination and maximise recycling opportunities.  Spill kits will be strategically located along the gas pipeline.  Contracts with companies will be established to encourage opportunities for recycling waste chemicals.  Key initiatives – waste segregation, waste re-use, recycle and cleaner production.	regulated waste landfill	
Construction	Horizontal directional drilling (HDD) cuttings	Horizontal directional drilling	Inert material	Cuttings – 900m <sup>3</sup> Bentonite – 255m <sup>3</sup>	Release of waste causing contamination of land, surface water and groundwater.  Release causing degradation of biodiversity i.e. native flora and fauna.  Visual amenity impacts due to poor housekeeping	Cuttings will be stored within containment pits at the drill entry and exit points.  Drilling mud will be used in the construction of the pipeline, to wash the drill cuttings to the surface and to seal and line the drilled hole to facilitate insertion of the pipe. Once construction completed, the drilling mud will be used to fill the annular space between the drill hole and pipe.  Key initiatives – waste re-use.	Muds will be used to fill the annular space  Excess muds will be disposed of either onsite or a facility, following analysis	Volume 3 Chapter 3 – Project description  Volume 3 Chapter 24 – Environmental management plan
Construction	Putrescible and general waste	Temporary accommodation facility	General waste and recyclable waste	14m <sup>3</sup> /week/accommodation facility	Release of waste causing contamination of land and surface water  Release causing degradation of biodiversity i.e. native flora and fauna  Visual amenity impacts due to poor housekeeping  Increase in vermin	There will be designated areas throughout the temporary accommodation facilities for general waste storage. These will be sealed to prevent land and water contamination and access for vermin.  A licensed waste management contractor will be contracted to supply bins, transport waste and dispose of non-recyclable waste at local licensed landfills.  Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.  Procurement of pre-fabricated materials will be maximised to reduce the quantity of waste.  Key initiatives – waste segregation, waste avoidance, waste re-use, recycle and cleaner production.	Transported by a licensed contractor to a recycling facility  Transported by a licensed contractor to a suitable licensed landfill	Volume 3 Chapter 3 – Project description  Volume 3 Chapter 24 – Environmental management plan
Construction	Paper and cardboard	General packaging, temporary accommodation facility waste, cardboard boxes, newspapers	Recyclable	0.5m <sup>3</sup> /day	Littering of land and surface water  Visual amenity impacts due to poor housekeeping  Fire hazard	All paper and cardboard waste will be segregated and stored within the temporary waste management areas.  Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.  Contracts with companies will be established to encourage opportunities for paper and cardboard recycling.  Key initiatives – waste avoidance, waste segregation, waste re-use, recycle and cleaner production.	Transported by a licensed contractor to a recycling facility.	Volume 3 Chapter 3 – Project description  Volume 3 Chapter 24 – Environmental management plan

Phase	Waste	Source	Characteristics/ nature	Estimated quantity	Potential impact	Management	Destination	EIS section
Construction	Sewage and greywater	Greywater and sewage from bathrooms, toilets, showers, sinks and kitchens	Regulated waste	150L/person/day	<p>Spills and overflows causing contamination of land, surface water and groundwater</p> <p>Release causing degradation of biodiversity i.e. native flora and fauna</p> <p>Visual amenity impacts due to poor housekeeping</p> <p>Increase in vermin</p>	<p>Package sewage treatment facilities will be located at each of the accommodation facilities. The treatment facilities will be designed treat the waste to Class C recycled wastewater quality. Absorption beds and/or irrigation fields will be used for treated wastewater disposal and will be located and designed to avoid:</p> <ul style="list-style-type: none"> <li>• sensitive areas</li> <li>• soil erosion</li> <li>• surface ponding</li> <li>• impacts to ground water quality.</li> </ul> <p>Signs will be erected around absorption beds and/or irrigation fields to restrict access.</p> <p>The treatment facilities will be designed to include alternative storage and disposal options during times of system failure and in conditions that prevent discharge to land (i.e. during rain events).</p> <p>Spill kits will be strategically located along the gas pipeline.</p> <p>Key initiatives – appropriate sewage treatment and effluent recycling.</p>	<p>Irrigation beds/absorption beds.</p> <p>Sludge will be transported by a licensed contractor to a suitable licensed regulated landfill.</p>	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Foam pigs	Commissioning of the pipeline	General waste	256m <sup>3</sup> total	<p>Release of waste causing contamination of land and surface water</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>Wastes will be segregated and stored within designated sections in the temporary waste management areas.</p> <p>Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.</p> <p>Key initiatives – waste avoidance and cleaner production.</p>	<p>Transported by a licensed contractor to a suitable licensed landfill</p>	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Timber	Timber from packaging	Organic material	20m <sup>3</sup> /week	<p>Littering of land and surface water</p> <p>Fire hazard</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>All timber waste will be segregated and stored within the temporary waste management areas.</p> <p>Timber will be re-used onsite and/or mulched onsite for rehabilitation purposes, where possible.</p> <p>Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.</p> <p>Contracts with companies will be established to encourage opportunities for timber recycling.</p> <p>Key initiatives – waste segregation, waste re-use and recycle.</p>	<p>Reused onsite or transported by a licensed contractor to a recycling facility</p>	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>

Phase	Waste	Source	Characteristics/ nature	Estimated quantity	Potential impact	Management	Destination	EIS section
Construction	Acid sulfate soils	Construction of crossing of The Narrows	Regulated waste	Unknown	<p>Release of acid runoff causing contamination of land and surface water.</p> <p>Release causing degradation of biodiversity i.e. native flora and fauna</p>	<p>A detailed ASS investigation will be undertaken in accordance with Queensland Acid Sulfate Soil Technical – Soil Management Guidelines, 2002.</p> <p>An acid sulfate soil management plan will be developed and implemented in accordance with the State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate Soils.</p>	Acid sulfate soils will be appropriately treated using lime and re-used during backfilling	<p>Volume 3 Chapter 5 – Geology, topography, geomorphology, soils and land contamination</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Hydrotest water	Pipeline testing	Water with potential contaminants of silts, cleaning chemicals, traces of biocides and oxygen scavengers	Approximately 100ML	<p>Release of hydrotest water causing surface water and groundwater contamination</p> <p>Release of hydrotest water causing erosion and degradation of biodiversity i.e. native flora and fauna</p>	<p>Contamination will be minimised through:</p> <ul style="list-style-type: none"> <li>designing with an appropriate factor of safety on storage capacity of all hydrotest dams</li> <li>selecting biocide and oxygen scavenger (if necessary) which can be neutralised, are biodegradable, or do not bio-accumulate in the soil</li> <li>monitoring of hydrotest water and receiving water quality</li> <li>discharging hydrotest water in compliance with all regulatory and landholder requirements</li> <li>selecting chemical additives that are least harmful to the environment.</li> </ul> <p>Erosion caused by hydrotesting activities will be minimised through:</p> <ul style="list-style-type: none"> <li>constructing erosion control measures at discharge locations</li> <li>locating suction pumps to avoid significant vegetation and minimise disturbance to vegetation</li> <li>locating suction pumps above the watercourse bed to minimise erosion.</li> </ul>	Discharge to land and watercourses	<p>Volume 3 Chapter 11 – Water resources</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Construction	Air emissions	Emissions generated are likely to consist of engine exhausts from vehicles and diesel generators, dust generated by earthworks and vehicle movements on sealed and unsealed roads	The composition of engine exhaust emissions is expected to be primarily NO <sub>x</sub> and carbon monoxide (CO) with small quantities of hydrocarbons	As per emissions provided in Chapter 13 (Air)	<p>Release of air emissions results in</p> <ul style="list-style-type: none"> <li>decrease in human, terrestrial flora and fauna health</li> <li>community dust nuisance</li> <li>decrease in agricultural production.</li> </ul>	<p>Vehicles and machinery used in the construction of the gas pipeline will be fitted with appropriate emission control equipment and maintained in a proper and efficient manner in accordance with the manufacturer's specifications.</p> <p>Dust mitigation measures will be implemented including:</p> <ul style="list-style-type: none"> <li>minimising disturbance footprint</li> <li>minimising duration of disturbance</li> <li>use of dust suppression methods including watering.</li> </ul>	Air shed	<p>Volume 3 Chapter 13 – Air quality</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>

Phase	Waste	Source	Characteristics/ nature	Estimated quantity	Potential impact	Management	Destination	EIS section
Operation	Filters	Delivery and metering stations	General waste	0.5m <sup>3</sup> /year	<p>Release of waste causing contamination of land and surface water.</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>Bins and/or drums will be designated for the storage of used filters.</p> <p>Contracts with companies will be established to encourage opportunities for recycling used filters.</p> <p>Key initiatives – waste re-use, recycle and cleaner production.</p>	Transported by a licensed contractor to a recycling facility where possible. Remaining waste to be transported to a licensed regulated waste landfill.	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Operation	Packaging and waste oils and greases	Pipeline maintenance	Regulated waste	40m <sup>3</sup> /month	<p>Spills and overflows causing contamination of land, surface water and groundwater.</p> <p>Releases causing degradation of biodiversity i.e. native flora and fauna.</p> <p>Visual amenity impacts due to poor housekeeping.</p>	<p>Bins and/or drums will be designated for the storage of oily rags.</p> <p>Bins will be sealed, labelled and stored within appropriately bunded areas in accordance with AS1940.</p> <p>Wastes will be stored separately to maximise recycling opportunities.</p> <p>Spill kits will be strategically located along the gas pipeline.</p> <p>Contracts with companies will be established to encourage opportunities for recycling oily rags.</p> <p>Key initiatives – waste segregation, waste re-use, recycle and cleaner production.</p>	Transported by a licensed contractor to a recycling facility where possible. Remaining waste to be transported to licensed regulated waste landfill.	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Operation	Sludge (pigging)	Pipeline maintenance	Regulated waste	10m <sup>3</sup> /year	<p>Release of waste causing contamination of land and surface water.</p> <p>Releases causing degradation of biodiversity i.e. native flora and fauna.</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>Bins and/or drums will be designated for the storage of sludge.</p> <p>Bins will be sealed, labelled and stored within appropriately bunded areas in accordance with AS1940.</p> <p>Spill kits will be strategically located along the gas pipeline.</p> <p>Key initiatives – appropriate waste storage, disposal and cleaner production.</p>	Transported by a licensed contractor to a suitable licensed landfill	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>
Operation	Contaminated soil	Oil spills from operational activities	Regulated waste	Negligible	<p>Release of waste causing contamination of land and surface water.</p> <p>Releases causing degradation of biodiversity i.e. native flora and fauna.</p> <p>Visual amenity impacts due to poor housekeeping</p>	<p>A bunded area will be designated for the storage of contaminated soil.</p> <p>Contracts with companies will be established to encourage opportunities for remediating contaminated soil.</p> <p>Spill kits will be strategically located along the gas pipeline.</p> <p>Key initiatives – waste re-use and cleaner production.</p>	Transported by a licensed contractor to a suitable facility for remediation.	<p>Volume 3 Chapter 3 – Project description</p> <p>Volume 3 Chapter 24 – Environmental management plan</p>

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## 16.6 Conclusions

### 16.6.1 Assessment outcomes

A summary of the sustainability principles, potential impacts and mitigation measures in relation to waste management is presented in Table 16.5. This table includes the residual risk levels for waste management.

A risk assessment has been undertaken to identify the potential risks, causes and consequences from the generation and management of waste.

Mitigation measures to reduce the risk have been nominated and the residual risk has been calculated. The risk assessment methodology is discussed in Volume 1 Chapter 4.



**Table 16.5 Summary of environmental values, sustainability principles, potential impacts and mitigation measures**

Environmental values	Sustainability principles	Potential impacts	Possible causes	Mitigation and management measures	Residual risk level
Life, health and wellbeing of people	Minimising adverse environmental impacts and enhancing environmental benefits associated with Australia Pacific LNG's activities, products or services; conserving, protecting, and enhancing where the opportunity exists, the biodiversity values and water resources in its operational areas	Release of waste causing contamination of land, surface water and groundwater	Inappropriate waste handling and/or storage	Wastes will be appropriately segregated and sealed within designated temporary waste management areas.	Low
Diversity of ecological processes and associated ecosystems	Pacific LNG's activities, products or services; conserving, protecting, and enhancing where the opportunity exists, the biodiversity values and water resources in its operational areas	Release of waste causing degradation of biodiversity i.e. Native flora and fauna	Poor housekeeping	Waste will be transported by a licensed contractor to a recycling facility or suitable licensed landfill. Bins and/or drums for regulated wastes will be sealed, labelled and stored within appropriately bounded areas in accordance with AS1940 and located within temporary waste management areas.	
Land use capability, having regard to economic considerations	Identifying, assessing, managing, monitoring and reviewing risks to its workforce, Australia Pacific LNG's property, the environment and the communities affected by its activities	Visual amenity impacts due to poor housekeeping Ignition sources for fires Increase in vermin populations		Liquid wastes will be stored separately to solid wastes to maximise recycling opportunities. Spill kits will be strategically located along the gas pipeline corridor during both the construction and operational phases as required. Package sewage treatment facilities will be appropriately designed and include alternative storage and disposal options during times of system failure and in conditions that prevent discharge to land (that is during rain events). Hydrotest water will be appropriately managed to minimise land and water contamination and erosion. Weeds to be managed in a manner consistent with the appropriate weed classification and recognised Queensland weed management strategy. Vegetation material (including mulching) will be used onsite during rehabilitation where appropriate.	



Environmental values	Sustainability principles	Potential impacts	Possible causes	Mitigation and management measures	Residual risk level
				<p>Stockpiles will be located within cleared areas and away from drainage lines.</p> <p>Vehicles and machinery will be fitted with appropriate emission control equipment and maintained in a proper and efficient manner in accordance with the manufacturer's specifications.</p> <p>Dust mitigation measures will be implemented.</p> <p>Acid sulfate soils will be managed in accordance with State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate Soils.</p>	
Management of finite resources	Using resources efficiently, reducing the intensity of materials used and implementing programs for the reduction and re-use of waste  Working cooperatively with communities, governments and other stakeholders to achieve positive social and environmental outcomes, seeking partnership approaches where appropriate.	Inefficient use of resources  Generation of excessive quantities of waste  Insufficient landfill airspace	Unsuccessful implementation of the waste management hierarchy and cleaner production techniques.	<p>Contracts with companies (for the supply of materials) will be established encouraging sustainable waste management practices.</p> <p>Procurement of pre-fabricated materials will be encouraged to reduce the quantity of waste.</p> <p>Segregation of wastes to maximise re-use and recycling opportunities.</p> <p>Australia Pacific LNG will work with local councils to determine the current landfill capacities and accepted waste type and will work with council to assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the Project can be accommodated if required.</p> <p>Waste to be transported by a licensed contractor to a recycling facility or suitable licensed landfill.</p> <p>Liquid wastes will be stored separately to solid wastes to maximise recycling opportunities.</p>	Low

### 16.6.2 Commitments

Australia Pacific LNG will:

- Develop and implement a detailed waste management guidelines for the gas pipeline utilising the principles of the waste management hierarchy
- Consult with local councils to determine current landfill capacities and accepted waste types, and should insufficient capacity be identified, Australia Pacific LNG will provide councils with information to assist in planning the expansion and upgrade of their landfills to ensure waste generated from the Project can be accommodated
- Establish contracts with companies encouraging sustainable waste management practices
- Encourage local businesses to establish recycling facilities within the region to maximise the opportunities for re-use and recycling
- Regular review of the waste management guidelines including the marketability of wastes and the results of waste audits to improve waste management for the gas pipeline.

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## References

Banana Shire n.d., *Council Services Directory*, viewed 15 January 2010,  
<<http://www.banana.qld.gov.au/>>

Western Downs Regional Council n.d., *Waste Management Facilities*, viewed 12 October 2009,  
<[www.wdrc.qld.gov.au](http://www.wdrc.qld.gov.au)>