

Santos

Environmental Impact Report

Pipeline Licence No.2 Moomba to Port Bonython Liquids Line

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Prepared by:

Epic Energy and RPS Ecos

Prepared for:

Santos Ltd

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1 Introduction

1.1 Background

The Moomba to Port Bonython Liquids Pipeline was constructed by Santos in 1982 over a period of 18 months and commissioned in 1982/3. The pipeline is owned by a joint venture headed by Santos Limited and is operated by Epic Energy on their behalf. The pipeline transports liquid hydrocarbon from the Cooper Basin to a processing and export facility at Port Bonython. Epic Energy maintains and operates the Moomba to Port Bonython Liquids Pipeline under contract to Santos in accordance with Pipeline Licence No.2.

1.2 Regulatory Framework

The South Australian *Petroleum Act 2000* (the Act) requires that all regulated activities carried out under the Act must be covered by an approved Statement of Environmental Objectives (SEO). As a consequence this Environmental Impact Report (EIR) and a draft SEO have been prepared to meet this regulatory requirement in relation to the operation of the Moomba to Port Bonython liquids pipeline.

These documents have been prepared as per the following sections of the Act and the Petroleum Regulations 2000 (the Regulations:

- EIR - Section 97 of the Act and Regulation 10 of the Regulations; and
- SEO - Section 99 and 100 of the Act and Regulations 12 and 13.

This document fulfils the requirements of an EIR as outlined in the Act and Regulations.

1.3 About this Document

This EIR has been prepared to satisfy the requirements of the Act with regard to the operation of the Moomba to Port Bonython liquids pipeline and associated facilities (as detailed under Pipeline Licence No.2). The document:

- Provides a description of the pipeline and facilities (Section 2);
- Describes the specific features of the environment that can reasonably be expected to be affected by pipeline operational activities (Section 3);
- Identifies potential environmental impacts and consequences (Section 4);
- Proposes measures to mitigate potential environmental impacts and consequences (Section 4); and
- Summarises stakeholder consultation (Section 5);

A SEO has been developed in conjunction with this EIR and outlines the environmental objectives that Epic Energy is required to achieve and the criteria upon which the objectives are to be assessed. The SEO has been developed on the basis of information provided in this EIR.

1.4 About Epic Energy

Epic Energy operates and maintains the Liquids Line on behalf of Santos.

1.5 Epic Energy Environmental Management System

Epic Energy has developed and implemented a detailed Environmental Management System (EMS) which applies to all of Epic Energy's activities.

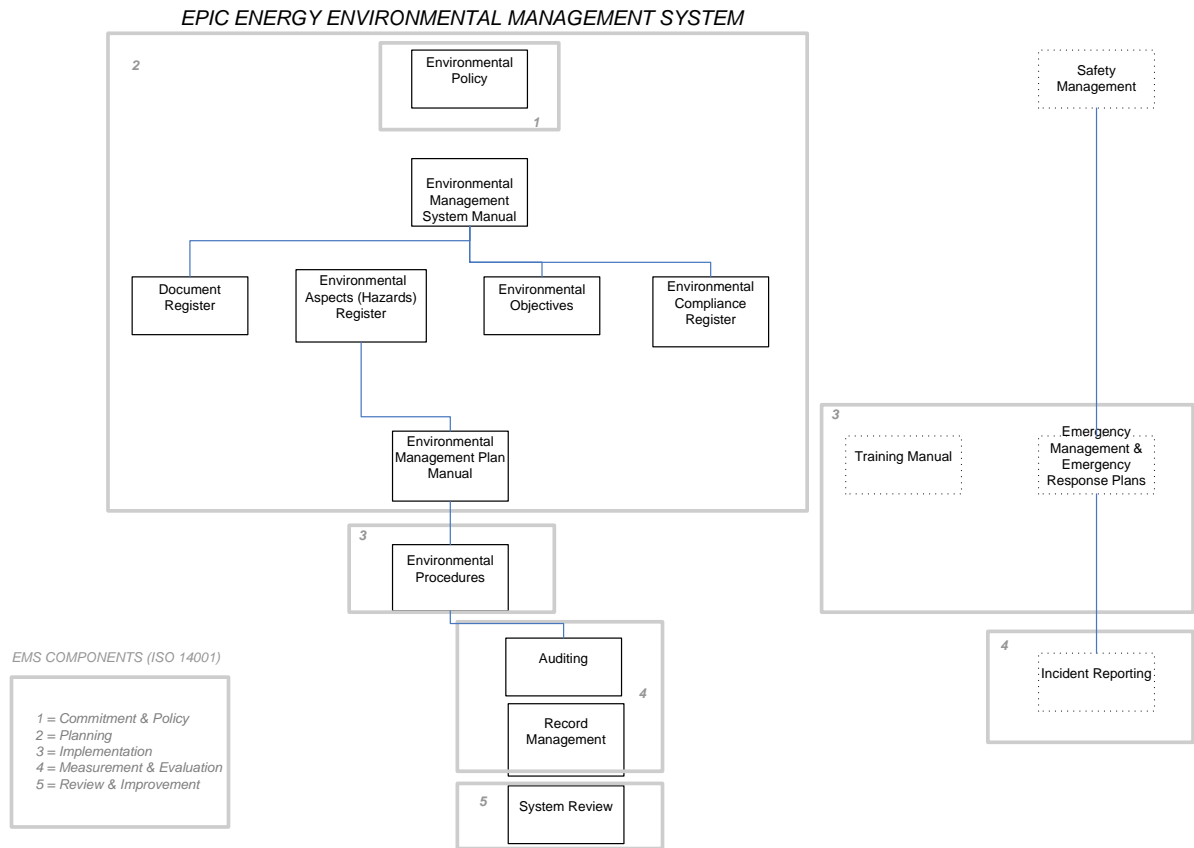
The Epic Energy EMS is a key tool in managing the environmental responsibilities, issues and risk associated with the operational activities. The EMS integrates the management of environmental issues from top management to individual site operations, to reinforce it as a line management responsibility.

The Epic Energy EMS covers all activities undertaken by Epic Energy including:

- Pipeline construction (including route selection, design, land access and construction activities),
- Pipeline operations, and
- Operation of ancillary facilities.

The EMS is comprised of an Overview Manual and a number of supporting documents (refer to Figure 1). The following section details the key components of the Environmental Management System that are relevant to operation of the Moomba to Port Bonython liquids pipeline.

Figure 1: Overview of Epic Energy EMS



1.5.1 Environmental Commitment

Epic Energy is committed to responsible environmental management of the Moomba to Port Bonython liquids pipeline. All planning, maintenance and operational activities will be conducted in accordance with Epic Energy's Environmental Policy (Appendix A). Epic Energy is committed to achieving the environmental objectives outlined in the corresponding SEO.

1.5.2 Environmental Management Plans

Epic Energy's EMP Operations details the generic environmental control measures that apply for the operation of the pipeline and ancillary facilities. These measures are largely based on the Australian Pipeline Industry Association (APIA) Code of Environmental Practice. Where additional or site specific control measures are required to manage a particular issue, environmental procedures are prepared. Epic Energy ensures that the SEO objectives for operations are met through the implementation of the defined control measures.

1.5.3 EMS Hold Signs

Epic Energy is in the process of implementing a system of EMS Hold Signs on all of its pipelines. The purpose of this system is to install visible signs along the ROW at locations where management measures in addition to those listed in the EMP Operations are required e.g. for weed infested areas, areas of particular conservation significance etc. For each location, the sign will cross reference to the relevant Environmental Procedure, which contains details of the specific issue associated with the location and the control measures that need to be implemented.

1.5.4 Job Hazard Analysis

A Job Hazard Analysis (JHA) is a simple tool that is used to help personnel identify, analyse and manage the hazards that exist in the work they undertake. It formalises the process of hazard identification and management that most people follow when working.

The JHA requires personnel to examine the task they are about to undertake and:

- break the job into separate, defined steps;
- for each step identify the potential hazards that could occur with that job step; and
- for each potential hazard list the method to be followed to prevent the hazard causing an injury, loss, damage or environmental incident.

Under the Epic Energy EMS, a Job Hazard Analysis must be completed prior to the commencement of any task that has the potential to cause a significant adverse environmental or cultural impact (e.g. ground disturbance, vegetation clearing, handling hazardous materials and identified high risk activities).

1.5.5 Environmental Monitoring Stations

Environmental Monitoring Stations (EM Stations) are installed on an as required basis along the pipeline route, to provide photographic monitoring of a specific issue e.g. monitoring the rehabilitation of an excavation site.

2 Project Description

2.1 Regulated Activities

The regulated activity (as defined under the *Petroleum Act 2000*) undertaken under Pipeline Licence 2 by Epic Energy is the operation of a transmission pipeline (identified as the Moomba to Port Bonython Liquids Pipeline) for carrying petroleum or another regulated substance. A description of the infrastructure, location and activities undertaken under the licence is provided in the following chapter.

2.2 Moomba to Adelaide Pipeline Alignment

The Moomba to Port Bonython Liquids Pipeline was commissioned in 1982/3 to transport liquid hydrocarbon from the Cooper Basin in far northeast South Australia to a processing and export facility at Port Bonython, near Whyalla (refer to Figure 2). The 659km pipeline route runs parallel to the Moomba to Adelaide Pipeline (MAP) on the eastern side of the Flinders Ranges for the first 330km. The MAP and the Liquids Pipeline are nominally located 32.9m apart. The route then leaves the MAP and proceeds in a south-westerly direction across the Flinders Ranges past Hawker to Neuroodla, where the line turns south to Port Bonython via Port Augusta, before proceeding south and terminating at Port Bonython.

2.3 Environmental Regions

The Moomba to Port Bonython pipeline extends for over 659km. In order to manage the environmental issues associated with the pipeline, the route has been broken down into environmental regions. The environmental regions are largely based on the previously documented bioregions and land systems of South Australia and are used to describe the sections of the pipeline with similar receiving environments and/or land uses. The use of the regions allows for specific controls, where required, be identified and implemented to address the environmental issues specific to the region.

The regions associated with the pipeline route are summarised in

Table 2-1 and described in Section 3 of this document. It is important to note that while a specific start and end point has been provided for each region, these are indicative only. In practice, the landforms of the area generally change over a number of kilometres.

Table 2-1: Locations of Environmental Regions

Region	Approximate Kilometre Point (KP)	Facilities	Section 3 Reference
Channel Country	KP 0.0 – 27	Pumping Station 1 (part of Santos Facilities)	Section 3.2
Dunefields	KP 27 – 162	Pumping Station 2 (disused)	Section 3.3
Stony Plains	KP 162 – 215 KP 234 – 314		Section 3.4
Flinders Lofty Block	KP 215 – 234 KP 314 - 505	Pumping Station 3 (disused)	Section 3.5
Western Pastoral/Gawler	KP 505 - 659	Pumping Station 4 (disused)	Section 3.6

Figure 2: Location of Moomba to Port Bonython Liquids Pipeline



MOOMBA TO PORT BONYTHON LIQUIDS PIPELINE

2.4 Design and Engineering

2.4.1 Pipeline and Facilities

The Moomba to Port Bonython Liquids Pipeline is 659km long and 355.6mm in diameter, constructed of welded steel wrapped in a protective coating and is buried to depths in excess of 800 mm. The pipeline was designed for the express purpose of liquid hydrocarbon and operates at a Maximum Operating Pressure of 10.3MPa.

All pipeline design and construction is undertaken in accordance with the following industry accepted Australian codes and standards:

- AS2885.1 Pipelines – Gas and Liquid Petroleum – Design and Construction
- AS2885.2 Pipelines – Gas and Liquid Petroleum – Welding
- AS2885.5 Pipelines – Gas and Liquid Petroleum – Field Pressure Testing

The purpose of the AS2885 series of Standards is to ensure the protection of the general public, pipeline operating personnel and the environment and to ensure safe operation of pipelines that carry petroleum fluids at high pressures.

The AS2885 series of Standards achieve their purpose by defining important principles for design, construction and operation of petroleum pipelines. The principles are expressed in practical rules and guidelines for use by competent persons and organizations. The five fundamental principles on which the AS2885 series of Standards are based are as follows:

- (a) A pipeline shall be designed and constructed to have sufficient strength and ductility to withstand all identifiable forces to which it may be subjected during construction testing and operation.
- (b) Before a pipeline is placed into operation it shall be inspected and tested to prove its integrity.
- (c) Important matters relating to safety, engineering design, materials, testing and inspection shall be reviewed and approved to a responsible entity, referred to as the operating authority. The responsible entity shall, in each case, be defined.
- (d) Operations and maintenance shall provide for continued monitoring and safe operation of the pipeline.
- (e) Where changes occur in or to a pipeline, which alter the design assumptions or affect the original integrity, appropriate steps shall be taken to assess the changes to ensure continued safe operation of the pipeline.

The design parameters for the Moomba to Port Bonython Liquids Pipeline are provided in Table 2-2

Table 2-2: Pipeline design parameters

Parameter	
Date Constructed	1982
Date Commissioned	1982/3
Length, km	659
Diameter (OD), mm	355.6
Wall Thickness, mm:	
- Normal	7.14
- Special Crossings (eg: rivers, roads, railways)	8.74
- MLV's	8.74
Fluid	Liquid Hydrocarbon
Pipe Grade	API 5LX-52
MAOP, kPa	10.3
Material	Electric Resistance Welded Steel
Coating	Double wrapped Polyethylene Tape
Main Line Valves	25
Actuators	17
Pump Stations	4
Meter Stations	2 – Inlet & Outlet

2.4.2 Facilities and Infrastructure

A brief description of the pipeline facilities and associated infrastructure is provided in Table 2-3.

Table 2-3: Pipeline facilities and infrastructure

Facility	Description.
Pumping Stations	There are 4 pumping stations located on the Liquids Line, approximately 150 kms apart (PS1-4). Pump station 1 forms part of the Moomba facility and is not operated by Epic Energy. The remaining pump stations are no longer in use. The facilities have been isolated and shut off. The facilities are secured and visited regularly and inspected. A underground waste oil storage tank is located at Pump Station 3 and this is still utilised by Epic Energy personnel.
Liquid Mainline Valves (LMLV)	Mainline valves are located approximately every 25-30km. Mainline valves are installed to shut down a section of the pipeline when any rapid drop in system pressure is detected or to isolate a section of the pipeline for maintenance. Every third valve from Moomba to LMLV 13 and from LMLV 13 to Port Bonython is remotely operated, the remainder are manually operated.
Metering Stations	Metering stations are located at Moomba and Port Bonython. The purpose of the stations is to monitor liquids flow, temperature and pressure, monitoring overall liquids mass flow and provide input to the Epic Energy pipeline leak detection system.
Scraper Stations	Scraper stations are located at the main line valves at Moomba, LMLV 7, LMLV 13, LMLV 19 and Port Bonython. Scraper stations are required to allow for cleaning devices (pigs) to be inserted into (and removed from) the pipeline to clean the line and/or detect damage or pipe corrosion along the pipeline.
Cathodic Protection	A cathodic protection system is incorporated into the pipeline design to protect the pipeline from corrosion. This involves the use of buried anode beds, which are connected to the pipeline via cabling. In addition, cathodic protection test posts are located approximately every 1.5km. The test posts are required to allow for monitoring of the effectiveness of the corrosion protection system.
Pipeline Markers	Pipeline marker signs are located along the pipeline easement, at intervals, so that a person can clearly see a marker sign in either direction. The maker signs are placed closer at bends, on either side of road and watercourse crossings and at fence-lines.

2.5 Operation

2.5.1 Pipeline Operations

The pipeline is controlled remotely from the Epic Energy Control Centre in Melbourne using a SCADA (Supervisory Control and Data Acquisition) system. The SCADA system performs the following:

- Leak detection/location and pipeline monitoring;
- Remote control functions such as emergency shutdowns;
- Alarm and event recording; and
- Provision of pipeline status information.

The pipeline maintenance operations are based from a depot at Dry Creek, with the majority of maintenance depots shared with the operation of the Moomba to Adelaide Gas Pipeline, which is owned and operated by Epic Energy.

Field operations undertake regular route inspections, maintain ongoing liaison with landholders as required and respond to maintenance requirements such as erosion control and weed control, as necessary.

The key activities which may have an impact on landowners, occupiers and the environment include:

- Maintenance of the pipeline easement (e.g. weed control, rehabilitation of erosion and excavation sites);
- Maintenance of the pipeline and facilities (e.g. excavation of the pipeline for maintenance, hydrotesting, assessment of internal pipeline integrity and welding);
- Access to the pipeline easement;
- Inspection of the pipeline, easement and facilities;
- Emissions from the pipeline; and
- Potential accidents or emergency situations.

In addition, specific issues that require control include the use and storage of chemicals and the management of wastes.

2.5.2 Emergency Management

Epic Energy has developed and implemented a comprehensive Emergency Management System which applies across all of Epic's operations. The focus of the Emergency Response System is to ensure that resources are in place to provide a quick response to any incident, ensure the safety of employees and the public, minimise any adverse impacts and minimise any loss of supply to our customers.

The Emergency Management System covers emergencies that may occur as a result of:

- Natural events such as cyclones, earthquakes or floods;
- Equipment failure;
- Pipeline damage caused by third party activities e.g. excavation;
- Vehicle accidents;
- Failure of pipeline control or monitoring systems; and
- Malicious damage.

Epic has implemented a comprehensive team structure to respond to any emergency events. The teams include:

- Crisis Management Team
- Emergency Management Team
 - Control Centre Emergency Response Team
 - Emergency Support Team
 - Field Response Team.

The documented system is structured in two volumes as follows:

- Volume 1 Emergency Management Overview - provides an introduction to the overall system and details the specific notification processes that must be followed for any major incident.
- Volume 2 State Response and Recovery Plans – is structured in three parts.
 - Part 1 – Describes the Emergency Management Team, its function and interaction between the individual Emergency Teams,
 - Part 2 – Covers the detailed Emergency Procedures that Field Staff will implement in the event of an Emergency. This includes specific procedures for the Liquids Line and associated facilities,
 - Part 3 – Describes the management of equipment for emergency response including equipment lists, the location and how the equipment is to be maintained.

Epic Energy undertakes regular reviews and trails of the Emergency Management System to ensure that all staff are trained in the requirements and that the system is effective in managing all potential emergency situations.

3 Description of the Environment

3.1 Introduction

The purpose of this section of the document is to describe the environment in which the pipeline operates.

The content of this section of the document has been prepared based on a desktop assessment of the entire pipeline route based on publicly available information and previous environmental and cultural heritage investigations completed on behalf of Epic Energy. In addition, site specific information has been sourced from an Environmental Risk Assessment completed by Epic Energy, the Epic Energy Aspects Register, the Epic Energy Land Management System (LMS) and a range of Epic Energy personnel. A complete list of reference sources is included in Section 7.

As the pipeline extends for over 659km and crosses a range of different landforms and land uses, the pipeline has been divided into regions. This section of the document is presented in terms of the relevant environmental regions. It is important to note that the location specific information presented in this section is not exhaustive, and is included to provide an example of the specific issues that may exist in each region.

The pipeline and facilities were installed approximately 20 years ago. Consequently the easement has, for the most part, revegetated to a state similar to adjoining land. Only the ROW access track (from KP 350 north) and major facilities remain visible and relatively free of vegetation. Aside from these impacts the remainder of the ROW is virtually indistinguishable from the surrounding land uses.

3.2 Channel Country Region

The Moomba to Port Bonython pipeline passes through the Channel Country region between KP 0 and KP 26.7.

3.2.1 Climate

This region has a hot dry desert climate with short cool to cold winters. Rainfall is low and extremely unreliable, with a mean annual rainfall of 125-150 mm and evaporation is high throughout the year with a mean annual evaporation of 3800 mm (Laut *et al* 1977).

Temperatures in this area range from average maximums of 36-39°C in summer and 18-24°C in winter to an average minimum of 5°C in winter (Allan 1990).

3.2.2 Soils and Terrain

This region is dominated by a system of parallel dunes and an extensive system of interconnected claypans. The area is subject to periodic flooding from the Cooper Creek system.

The sandhills are dominated by siliceous red sands while the soils between the dunes are grey and brown clays. The dune soils are prone to wind erosion especially where the soil structure has been disturbed or altered (e.g. addition of clay for road caps). The claypans between the dunes are comprised grey clays with strong shrink/swell potential and are subject to wide cracking when drying (Laut *et al* 1977, Wright *et al* 1990).

3.2.3 Flora and Fauna

Flora

The vegetation in this region is generally comprised of the following associations:

- a mixed cover of chenopod shrubland and grassland on the inter-dunes predominated by Golden Goosefoot (*Chenopodium auricomum*), Saltbush (*Atriplex nummularia*), Coolibah (*Eucalyptus coolabah*), Lignum (*Muehlenbeckia florulenta*), Curly Wiregrass (*Aristida contorta*), and *Eragrostis* species.
- a tall shrubland with a grass and forb understorey and hummock grasslands on the dunes predominated by Marpoo / Sandhill Wattle (*Acacia ligulata*), Whitewood (*Atalaya hemiglauca*), *Hakea* species, Sandhill Canegrass (*Zygochloa paradoxa*) and Spinifex (*Triodia basedowii*).
- fringing woodland on the floodplain predominated by Coolibah (*Eucalyptus coolabah*), Broughton Willow (*Acacia salicina*), Lignum (*Muehlenbeckia florulenta*), Bean Tree (*Lysiphyllum gilvum*), with *Acacia* species, chenopods and flood plain ephemerals (Laut *et al* 1977).

Fauna

The Channel Country, Simpson Strzelecki Dunefields and Stony Plains regions provide a rich diversity of habitats for a wide range of arid zone fauna. Distribution is largely affected by the location of water resources. Studies of the region (Kemper 1990, Reid *et al* 1990, Tyler *et al*, 1990) indicate that 56 mammal species, 225 bird species and 120 amphibian and reptile species are present.

The Coongie Lakes and Cooper Creek Systems in the north of this region are recognised as areas of exceptional ecological value and as such their wetlands have been recognised under the international Ramsar Convention. These wetlands provide a habitat for large numbers of migratory and nomadic birds and support a great variety of aquatic fauna including desert rainbow fish, shrimp, the Cooper tortoise and a diverse frog population. The region also provides a habitat for a number of rare, endangered or vulnerable species (as listed under the *SA National Parks and Wildlife Act 1972*) of birds (flock pigeons, grass owls, grey grasswrens and the freckled duck), mammal (ampurta) and reptiles (bronze-back legless lizard) (Santos 1997).

3.2.4 Water Resources

Sections of this region lie within the Lake Eyre Drainage basin. Drainage systems within the area are ephemeral and streams are characterised by extreme variations in discharge and flow duration.

Shallow aquifers are located throughout this region and are generally recharged during floods. These aquifers are utilised by pastoralists as stock water.

The Great Artesian Basin also underlies this region and is utilised for domestic and stock water supplies by local inhabitants (Epic Energy 2000).

3.2.5 Land Use

The main land use of this zone is extensive cattle grazing, with some conservation (Innamincka Regional Reserve and Coongie Lakes National Park to the north) and tourism (the Strzelecki Track and Simpson Desert to the west) also occurring in the region.

Merty Merty Station (KP18-52) is chemical free, and no chemicals are to be used on the lease without the prior approval of the Lessee.

Petroleum production and oil and gas exploration also occur in the region.

3.3 Dunefields Region

The Moomba to Port Bonython passes through the Simpson Strzelecki Dunefields region between KP 26.7 and KP 162.

3.3.1 Climate

This region has a hot dry desert climate with short cool to cold winters. Rainfall is low and extremely unreliable, with a mean annual rainfall of 125-150 mm and evaporation is high throughout the year with a mean annual evaporation of 3200-3800 mm (Laut *et al* 1977).

Temperatures in this area range from average maximums of 36-39°C in summer and 18-24°C in winter to an average minimum of 5°C in winter (Allen 1990).

3.3.2 Soils and Terrain

This region consists of an extensive undulating dunefield with numerous small claypans and encompasses the Strzelecki Desert. It also includes Lake Frome and other regional saltlakes with gypsum dunes.

The sandhills are dominated by siliceous red sands while the soils between the dunes are grey and brown cracking clays and red calcareous earths. These soils are prone to wind erosion or water erosion where water has been concentrated by alterations to the soil structure (e.g. addition of clay for road caps). However the dunes have the capacity to store water following rains and consequently are often stabilised by vegetation. The plains between the dunes are comprised grey clays with strong shrink/swell potential and are subject to wide cracking when drying (Laut *et al* 1977, Wright *et al* 1990).

3.3.3 Flora and Fauna

Flora

The vegetation in this region is generally comprised of low shrublands on the dunes predominated by Marpoo (*Acacia ligulata*), Needlewood (*Hakea leucoptera*), Whitewood (*Atalaya hemiglauca*), with Spinifex (*Triodia* species), Canegrass (*Zygochloa paradoxa*), *Eremophila* and *Senna* species.

The inter-dune depressions are also vegetated with low open shrubland, with *Acacia* and *Hakea* species, Nitrebush (*Nitraria billardi*), chenopods, forbs and grasses (Laut *et al* 1977).

Fauna

The Channel Country, Simpson Strzelecki Dunefields and Stony Plains regions provide a rich diversity of habitats for a wide range of arid zone fauna. Distribution is largely affected by the location of water resources. Studies of the region (Kemper 1990, Reid *et al*/1990, Tyler *et al*, 1990) indicate that 56 mammal species, 225 bird species and 120 amphibian and reptile species are present.

Fauna species potentially found in this region, listed as endangered, vulnerable or rare under the *SA National Parks and Wildlife Act 1972* include:

Name	Classification
Ampurta (<i>Dasyercus cristicauda hillieri</i>)	Rare
Fawn Hopping-mouse (<i>Notomys cervinus</i>)	Endangered
Kowari (<i>Dasyercus byrnei</i>)	Vulnerable
Dusky Hopping-mouse (<i>Notomys fuscus</i>)	Vulnerable
Plains Rat (<i>Pseudomys australis</i>)	Vulnerable
Bronze-back Legless Lizard (<i>Ophidiocephalus taeniatus</i>)	Vulnerable
Desert Glossy Skink (<i>Notoscincus ornatus</i>)	Rare
Desert Death Adder (<i>Acanthophis pyrrhus</i>)	Rare
Common Bandy Bandy (<i>Vermicella annulata</i>)	Rare

3.3.4 Water Resources

Sections of this region lie within the Lake Eyre Drainage basin. Drainage systems within the area are ephemeral and streams are characterised by extreme variations in discharge and flow duration.

Shallow aquifers are located throughout this region and are generally recharged during floods. These aquifers are utilised by pastoralists as stock water.

The Great Artesian Basin also underlies this region and is utilised for domestic and stock water supplies by local inhabitants (Epic Energy 2000).

3.3.5 Land Use

The main land use of this zone is extensive cattle grazing. Petroleum production and oil and gas exploration also occur in the region. The region also encompasses the Strzelecki Regional Reserve, Lake Frome Regional Reserve and the Lake Callabonna Fossil Reserve.

Lindon Station (KP 52-158) and Murnpeowie Station (KP158-183) have "Organic Beef" status. As a result, no chemicals are to be used on the lease without the prior permission of the lessee.

3.4 Stony Plains Region

The Moomba to Port Bonython passes through the Stony Plains region between KP 162 and KP 215 and again between KP 234 and KP 314.1.

3.4.1 Climate

This region has warm to hot summers and cool to cold winters. Rainfall is low and extremely unreliable, with a mean annual rainfall of 150 mm and evaporation is high throughout the year with a mean annual evaporation of 3100 - 3600 mm (Laut *et al* 1977).

3.4.2 Soils and Terrain

This northern part of this region is characterised by gently sloping gibber plain with drainage lines, while the southern part of this region is characterised by wide flood plains and some occasional dunes (Laut *et al* 1977).

The stony tablelands of this region are dominated by a complex arrangement of Gilgai depressions and flats where desert loam, crusty red duplex soils or red clay soils dominate with a stone (gibber) cover. The desert loams form a surface seal that often prevents the infiltration of water. The red clays crack widely until they begin to swell following the infiltration of run-off water.

The gibbers provide an effective stabilising cover on the tablelands, however when gibbers are disturbed the underlying soils are subject to water and wind erosion with gullying common. The dunes are also prone to drift as a result of wind erosion (Laut *et al* 1977, Wright *et al* 1990).

3.4.3 Flora and Fauna

Flora

The vegetation in this region is generally comprised of the following associations:

- chenopod shrubland on plains predominated by Low bluebush (*Maireana astrotricha*), Cottonbush (*Maireana aphylla*), Mealy Saltbush (*Rhagodia parabolica*), *Sclerolaena* species and grasses.
- tall open shrubland or low woodland with a mixed shrub understorey on flood plains and in drainage lines. Dominant species found in this association include Low bluebush (*Maireana astrotricha*), Cottonbush (*Maireana aphylla*), Mealy Saltbush (*Rhagodia parabolica*), Bullock Bush (*Alectryon oleifolius*), Mulga (*Acacia aneura*), *Eremophila* species, *Dodonaea* species, Coolibah (*Eucalyptus coolabah*) and Broughton Willow (*Acacia salicina*).
- shrubland comprised of *Senna*, *Eremophila* and *Acacia* species on dunes (Laut *et al* 1977).

Fauna

The Channel Country, Simpson Strzelecki Dunefields and Stony Plains regions provide a rich diversity of habitats for a wide range of arid zone fauna. Distribution is largely affected by the location of water resources. Studies of the region (Kemper 1990, Reid *et al* 1990, Tyler *et al*,

1990) indicate that 56 mammal species, 225 bird species and 120 amphibian and reptile species are present.

Conservation

Part of the pipeline easement (KP 284 to KP 300) in this region lies within the Gammon Ranges National Park. This park provides an important habitat for a wide variety of endemic arid zone plants and animals including the vulnerable Yellow-footed Rock Wallaby.

3.4.4 Water Resources

Sections of this region lie within the Lake Eyre Drainage basin. Drainage systems within the area are ephemeral and streams are characterised by extreme variations in discharge and flow duration.

Shallow aquifers are located throughout this region and are generally recharged during floods. These aquifers are utilised by pastoralists as stock water.

The Great Artesian Basin also underlies this region and is utilised for domestic and stock water supplies by local inhabitants (Epic Energy 2000).

3.4.5 Land Use

The main land use of this zone is livestock grazing (sheep and cattle). The region also encompasses the Gammon Ranges National Park.

Murnpeowie Station (KP158-183) has "Organic Beef" status. As a result, no chemicals are to be used on the lease without the prior permission of the leasee.

3.5 Flinders Region

The Moomba to Port Bonython pipeline passes through the Flinders region between KP 215.0 and KP 234.0 and again between KP 314.1 and KP 505.

3.5.1 Climate

The Flinders region experiences mild to hot summers and cool to cold winters. Rainfall is low and unreliable throughout the year but the higher falls generally occurring in winter. The mean annual rainfall is 150-350 mm and evaporation is high throughout the year with a mean annual evaporation of 2400 - 3500 mm (Laut *et al* 1977).

3.5.2 Soils and Terrain

This region encompasses the central Flinders Ranges including the Wilpena Pound and other significant geological features. It also passes through part of the Lake Frome Basin on the eastern side of the ranges.

The region is characterised by a series of high quartzite hogback ridges with shallow loamy soils and intervening plains and lowlands with red duplex soils. All of the soils in this region are well drained however the soils on the plains are prone to gullyng, while the soils on the hills and ridges are prone to sheet erosion (Laut *et al* 1977).

3.5.3 Flora and Fauna

Flora

The vegetation in this region is generally comprised of the following associations:

- Low woodland on the hogback ridges dominated by Native pine (*Callitris glaucophylla*), Black oak (*Casuarina pauper*) and Red mallee (*Eucalyptus socialis* – *E. brachycalyx*). The understorey of this association is sparse but scattered with shrubs such as hopbush (*Dodonaea viscosa*), wattles (*Acacia rivalis*) and porcupine grass (*Triodia* species). Yacca (*Xanthorrhoea semiplana*) can also be found on the summits.
- Tall shrubland on the lower ridges and hills in the south dominated by Red Mallee (*Eucalyptus socialis*), peppermint box (*E. odorata*), mallee box (*E. porosa*), native cherry (*Exocarpos species*) and scatterings of false sandalwood (*Myoporum platycarpum*). In the lower storey wattles (*Acacia* species), hopbush (*Dodonaea* species) and needlebush (*Hakea leucoptera*) are dominant with grasses, forbs and chenopod shrubs. The lower ridges and hills in the north are dominated by native pine and black oak with a tall shrubland or chenopod shrubland understorey.
- Chenopod shrubland on the plains and some ridges predominated by Saltbush (*Atriplex vesicaria*), *Maireana* species, Nitrebush (*Nitraria billardierei*) and grasses.
- Low open fringing woodland on the plains dominated by Black Oak (*Casuarina pauper*), Mulga (*Acacia aneura*), *Eremophila* species, *Dodonaea* species, Teatree (*Melaleuca glomerata*), Bullock Bush (*Alectryon oleifolius*), and mallees (*Eucalyptus socialis* and *E. oleosa*) with Red Gum (*Eucalyptus camaldulensis*) peppercorn trees, grasses and ephemeral forbs on the flood plains or in drainage lines.

Some areas in the south-western section of this region have been cleared in historical attempts at agriculture. Many of these cleared areas were left to regrow and have been recolonised by an early successional species such as the elegant wattle (*Acacia victoriae*) and some chenopods. Some cereal cropping still occurs in the south-western corner of this region around Quorn and to the north-east of Port Augusta.

Fauna

The native vegetation in this region provides an important habitat for a wide variety of animals. A number of species, now restricted by loss or modification of habitat as a result of agricultural practices, can be found in and around the conservation parks of the region.

Fauna found in the region include 120 bird, 5 mammal and 8 reptile species classified as rare or threatened under the *SA National Parks and Wildlife Act 1972* (Graham *et al* 2001). Fauna species likely to be found in this region, listed as endangered, vulnerable or rare under the *SA National Parks and Wildlife Act 1972* include:

Name	Classification
Yellow-footed Rock Wallaby (<i>Petrogale xanthopus</i>)	Vulnerable
Lace Goanna (<i>Varanus varanus</i>)	Rare

Krefft's Tiger snake (*Notechis ater ater*), classified as vulnerable under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*, is also known to occur in this region (PASA 1981).

Conservation

The pipeline passes near two conservation zones in the Flinders Ranges, the Flinders Ranges National Park (including Wilpena Pound) and The Dutchman's Stern Conservation Park, located to the north-east and the east of pipeline respectively. Both of these parks provide habitat for colonies of the vulnerable Yellow-footed Rock Wallaby.

3.5.4 Water Resources

Drainage systems within this region are predominantly intermittent and ephemeral depending upon seasonal conditions. Creeks and drainage lines are characterised by extreme variations in discharge and flow duration.

Shallow aquifers are present in the region and are utilised primarily for stock watering (Laut *et al* 1977).

3.5.5 Land Use

The main land use of this zone is livestock grazing (sheep and cattle). In the south-western section of this region, around the township of Quorn, native vegetation has been cleared and is used for cereal cropland.

Conservation and tourism enterprises, centred on the Flinders Ranges National Park and The Dutchmans Stern Conservation Park also occur in this region.

3.6 Western Pastoral / Gawler Region

The Moomba to Port Bonython pipelines passes through the Western Pastoral/Gawler region between KP 505 and KP 659.

This region can be divided into 2 sub-regions:

- Torrens (KP 505 to KP 565)
- Gawler Uplands (KP 565 to KP 659).

3.6.1 Climate

The Torrens sub-region is characterised by a mild to hot summer and cool to cold winter. Rainfall is low and unreliable, with a mean annual rainfall of 150-225 mm. Evaporation is high throughout the year with a mean annual evaporation of 2200-3500 mm (Laut *et al* 1977).

The Gawler Uplands sub-region is characterised by a mild to hot summer and cool to cold winter. Rainfall is low and unreliable, with a mean annual rainfall of 225-250 mm. Evaporation is high throughout the year with a mean annual evaporation of 2200-2400 mm (Laut *et al* 1977).

3.6.2 Soils and Terrain

The Torrens sub-region is characterised by a sandy alluvial plain with numerous lakes, including Lake Torrens, and parallel dunes. The soils are predominantly well drained red calcareous earths and sands.

The Gawler Uplands sub-region is characterised by granite hills with gentle footslopes and a plateau with steep escarpments and long footslopes mantled by Aeolian sand and undulating plains with low sand dunes. Samphire or mangrove flats are also present along the coastal margins. The soils in this region are characterised by well drained red duplex soils and calcareous loams with reddish sands in the dunes (Laut *et al* 1977). The dunes are prone to wind erosion when disturbed and the soils on the slopes are prone to sheet erosion and gullyng.

3.6.3 Flora and Fauna

Flora

The vegetation in this region is generally comprised of the following associations:

- Chenopod shrubland on the plateaux and plains dominated by *Atriplex vesicaria*, *Maireana sedifolia*, *M. pyramidata* and *Nitraria billardierei*.
- Low open woodland on dunes dominated by sandhill mulga (*Acacia ramulosa*), Black Oak (*Casuarina cristata*) and native pine (*Callitris glaucophylla*).
- Low open shrubland on the plateaux, footslopes and plains dominated by Black Oak (*Casuarina pauper*) Myall (*Acacia papyrocarpa*), False Sandlewood (*Myoporum platycarpum*) and occasional stands of Red Mallee (*Eucalyptus socialis*).
- Mangrove woodlands or low Samphire on the coastal tidal flats comprised of Mangrove (*Avicennia marina*) and Samphire (*Halosarcia and Sarcocornia species*).

Fauna

Studies of the Gawler Uplands sub-region have indicated that approximately 10 species of native mammal, 50 reptile and amphibian species and over 165 species of bird are expected to occur in the area (Santos 1981).

Fauna species likely to be found in this region, listed as endangered, vulnerable or rare under the *SA National Parks and Wildlife Act 1972* include:

Name	Classification
Thick-billed Grasswren (<i>Amytornis textilis myall</i>)	Rare
Redthroat (<i>Pyrrholaemus brunneus</i>)	Rare
Rock Parrot (<i>Neophema petrophila</i>)	Rare
Blue-winged Parrot (<i>Neophema chrysostoma</i>)	Vulnerable

3.6.4 Water Resources

Drainage systems within this region are predominantly ephemeral depending upon seasonal conditions. Creeks and drainage lines are characterised by intermittent extreme variations in discharge and flow duration.

Some shallow aquifers are present in the region but the majority of the water is too salty to be utilised for either stock or human consumption (Laut *et al* 1977).

3.6.5 Land Use

The main land use of this zone is pastoral livestock grazing (sheep).

Other land uses include recreational (along the shores of the upper Spencer Gulf between Whyalla and Port Augusta), industrial (Port Bonython Oil Refinery and industrial estate) and military (Cultana Army Training Reserve).

The region also encompasses the Lake Torrens National Park and the Whyalla Conservation Park which are located to the north-west and the west of pipeline respectively.

3.7 Cultural Heritage

The pipeline easements traverse a number of Native Title claimant and cultural heritage areas. It also passes by a number of European heritage sites.

In recent years a number of cultural heritage surveys have been undertaken at various locations on the easement as a component of infrastructure upgrades. A summary of the findings for the regions in which they have been undertaken is provided below.

Channel Country

No heritage places of value have been noted in archaeological surveys of this region in the vicinity of the pipeline easement however a number of artefact sites have been located (ACS 2000)

Dunefields

The Lake Frome environmental association (KP 145 to KP 164.5) has been assessed as being of moderate to high archaeological sensitivity due to the active dunes exposing and recovering Aboriginal cultural material. Two areas of particularly high sensitivity are located at KP 145 to KP 150.3 and KP 161 to KP 163.6 (ACS 1999).

Stony Plains

The Pootkamaunta environmental association (K P198 to KP 332) has been assessed as being of moderate archaeological sensitivity with archaeological sites occurring on most of the dunes and creek lines. One area of high archaeological sensitivity is the red linear sand dunes located between KP 234 and KP 302 (ACS 1999).

Western Pastoral

A number of Aboriginal archaeological sites have been found in the vicinity of the Port Bonython facility in the sand dunes to the west and north of Weeroona Bay. It is possible that there may be further sites within the coastal dunes of the region.

The historical Lowly Point Lighthouse and cottages (built in the 1880's) are also located near the Port Bonython facility (Santos 1981).

3.8 Land and Groundwater Contamination

As previously stated, the Moomba to Port Bonython Liquids Line has been in operation for over 20 years and as a result, contamination from previous practices has occurred. The most significant contamination associated with the operation of the Moomba to Port Bonython

Liquids Line was land and ground water contamination associated with burn pits at Pump Stations 2 & 3 (pump stations are no longer in use) and Neuroodla.

Previously, liquid hydrocarbon released during maintenance and pigging activities was discharged to the burn pits and disposed of via burning. As a result, contamination of the burn pit and areas in the vicinity of the pit occurred. This practice no longer occurs and any liquid hydrocarbon waste released during maintenance or pigging activities is discharged to containment systems and collected by a waste contractor.

Monitoring and remediation of areas of potential contamination has been completed over a number of years, with soil removed to landfarms that are operated in conjunction with the Moomba to Adelaide Gas Pipeline (also operated by Epic Energy). A discussion of the potential impact of the contamination and monitoring program is provided in Section 4.11.

4 Potential Impacts and Mitigation Measures

This chapter describes the potential impacts to the environment as a result of pipeline operation and an outline of the impact mitigation strategies adopted by Epic Energy. Identification of potential impacts and mitigation strategies are based on environmental issues (e.g. soil, flora, heritage, etc.) rather than operational activity. A more detailed summary of Epic's operational activities and associated potential environmental impacts is included in Appendix B.

4.1 Flora

4.1.1 Potential Impacts

Daily pipeline operation activities have little impact on native vegetation, however irregular or unscheduled maintenance activities have the potential to result in the clearance of trees, shrubs and groundcover within the easement.

The movement of vehicles along the 'right-of-way' (ROW) and welding operations also have the potential to result in fire, however control measures are in place regarding the restriction of potential ignition sources and welding activities, and the likelihood of a fire resulting from these activities is considered remote (as demonstrated from previous experience of operation).

The operation of the Liquids Line also has the potential to impact on flora through the release of liquid hydrocarbons, either through rupture of the pipeline, leaks from valves or other infrastructure or discharges during pigging operations. Additional information regarding potential impacts associated with land contamination is outlined in Section 4.3.2. Activities which may adversely impact on flora include:

- Excavations or 'Dig-ups' – Dig-ups are required to undertake inspection and repair of the pipeline or pipeline coating. It is estimated that up to 30 dig-ups occur per year (over 659km of pipeline), but this is highly dependent on the inspection and maintenance program. This number is dependent on planned activities for the year. Excavations are generally performed for coating refurbishment work, installation of new anode beds, training associated with Emergency Response Exercises and projects requiring new tie in facilities. Vegetation is removed from the immediate area of excavation, which may extend for 5-10m along the ROW and from storage and stockpile areas if required.

- Vegetation Control
- Trees are not permitted to grow on the ROW within 2m of the pipeline centreline. Other vegetation on the ROW is controlled to ensure that the line of sight for pipeline markers is maintained. Vegetation is removed in a targeted program. Vegetation is generally removed just above ground level with roots and ground covers left in place.

The loss of vegetation as a result of these activities is likely to be short-term and restricted to existing easements that have previously been used for pipeline construction activities.

The removal of vegetation as a result of excavation activities is mitigated by revegetation activities undertaken as part of the excavation reinstatement process. Revegetation activities are undertaken following the completion of excavation or disturbance activities; however the degree of success is highly dependent upon seasonal conditions and rainfall events and other external factors such as land use and grazing. Consequently revegetation may take several years.

The majority of the weed species found on the pipeline have become endemic and can be spread by stock, animals and agricultural vehicles. The potential for pipeline operations to spread weed species is discussed in Section 4.4.

Some operational and maintenance activities generate ignition sources and have the potential to result in fires.

4.1.2 Mitigation Measures

General management strategies that are implemented to minimise the impacts on flora are provided below.

Impact mitigation measures include:

- restricting operational activities to the easement access tracks and the easement ROW;
- minimising the time between clearing and rehabilitating the easement when excavations are required;
- trimming vegetation rather than clearing, particularly at watercourses;
- where possible, avoiding the clearing of isolated trees, roadside tree-belts and small isolated clumps of trees;
- where practical, removing vegetation without disturbing the soil to preserve root and seed-stock along the ROW;
- keeping topsoil stockpiled separate from subsoils and respreading after backfilling in the immediate vicinity of its origin;
- respreading of cleared vegetation where it does not impede vehicles, stock or wildlife;
- re-contouring the land surface consistent with the surrounding area to ensure localised habitats/niches are maintained; and
- adherence to the Epic Energy Environmental Management System (refer Section 1.5).

Control measures related to the prevention of soil contamination, and therefore secondary impacts on flora, are detailed in Section 4.3.2.

4.2 Fauna

4.2.1 Potential Impacts

The pipeline facilities cover a rich diversity of habitats in the northern and pastoral regions of the state.

Daily pipeline operation and maintenance activities have little impact on fauna, however irregular or unscheduled maintenance activities, such as excavations, have the potential to result in the loss of foraging and breeding habitat. The impact of such disturbances is likely to be short-term and restricted to existing easements that have previously been used for pipeline construction activities. There is also the potential for entrapment of fauna at excavation sites, although the duration of excavation work is generally limited to 3 days (may be longer for complicated maintenance work). Control measures are outlined in Section 4.2.2.

Other potential impacts to fauna as a result of the operation of the pipeline and associated facilities include:

- fauna mortality, through incidental roadkills or occasional contact with facilities or oil spills
- short-term disturbance associated with noise, vehicle traffic and human activity on the ROW and at facilities (especially relevant times, such as breeding, when fauna are sensitive to disturbance).

The pipeline facilities also traverse pastoral and agricultural land used for the grazing of livestock. The daily operation of the pipeline has little impact upon livestock.

4.2.2 Mitigation Measures

Impact mitigation measures to reduce the potential impact to fauna include:

- restricting operational activities to the easement access tracks and the easement ROW;
- minimising the time between clearing and rehabilitating the easement when excavations are required;
- planning excavations to ensure that the period of time that the trench is open is minimised;
- provision of fauna escape means in open trenches and regular inspection of open trenches for trapped fauna; and
- re-contouring the land surface consistent with the surrounding area to ensure localised habitats/niches are maintained.
- Prompt clean-up and remediation of spills or leaks

4.3 Soils and Terrain

4.3.1 Potential Impacts

Daily pipeline operation and maintenance activities that have the potential to impact on soils include:

- excavation activities undertaken to expose a section of pipe requiring repair or replacement. Excavations usually occur on the ROW or in designated compounds and are a short term, temporary event.
- movement of vehicles along the ROW. Vehicles regularly travel on the formed tracks/roads along the ROW while undertaking inspection and maintenance activities. The majority of the unsealed roads/tracks used are located on private property or the ROW where public access is restricted.
- storage, use, collection and transport of hydrocarbons and chemicals. A variety of hydrocarbons and chemicals are used for maintenance activities (e.g. diesel fuel, lubricants for machinery, degreasing agents, paints, etc.).
- generation of waste hydrocarbons via the collection and removal of product contaminants in the pipeline (via filters or 'pigging' operations) and maintenance activities on machinery and vehicles.
- Breach of the pipeline resulting in release of liquid hydrocarbon (refer to Section 4.10 for additional information).
- Minor leaks of liquid hydrocarbons from valves and infrastructure.

To date, there has been no major leak of hydrocarbons from the pipeline. Control methods are constantly reviewed to minimise the risk of such an occurrence (refer to Section 4.10). Minor leaks from valves and infrastructure have previously occurred, but discharges have been contained no long term impact has resulted. Pigging operations occur on at least an annual basis, and there is the potential for discharge of hydrocarbon upon removal of the pig, however the facilities and work practices are designed ensure that any discharge is fully contained (refer to Appendix B for additional information).

Operation and maintenance of the pipeline may result in the following potential adverse effects to soil and terrain:

- Soil inversion and resulting loss in soil fertility or structure.
- Erosion of disturbed sandy soils and the fine powdery sub-soils, particularly by wind.
- Erosion of banks and channels of watercourses.
- Compaction of duplex soils.
- Contamination of soils by oil or chemicals.

The regions that are more susceptible to soil erosion are:

Region	Potential Impact
Dunefields	Sand dunes - prone to erosion through water and wind processes
	Fine clays – easily dispersed through water and wind processes
	Watercourses – prone to erosion and sedimentation during flood events

Region	Potential Impact
Stony Plains	Watercourses – prone to water erosion and sedimentation following rainfall events
Flinders Lofty Block	Watercourses – prone to water erosion and sedimentation following rainfall events
Western Pastoral / Gawler	Coastal sand dunes - prone to erosion through water and wind processes

There are approximately 22 watercourse crossings along the pipeline route, of which issues related to erosion and/or pipeline exposure have occurred at six locations. Remedial action has been implemented at these locations to minimise the potential for further exposure and minimise the risk to integrity of the pipeline.

The potential for the movement of water (leading to tunnel erosion) along/within the trench of the MAP and associated lateral pipelines has been considered. However due to the nature of the soils (primarily clays and loams), the landforms through which the pipelines pass and the installation of trench breakers during the construction of the pipelines, it is unlikely that sufficient water movement would occur along the trench to cause a problem.

4.3.2 Mitigation Measures

Measures that are adopted by Epic to reduce the risk and impact of soil erosion or contamination include:

- minimising the area cleared during excavations, in particular minimising the disturbance of gibber/duplex soils or highly erodible soils;
- minimising the time period between clearing and restoration;
- promoting rapid restoration by conserving and re-spreading topsoil;
- reinstating surface contours and natural drainage patterns;
- reinstating watercourse banks as soon as practicable and applying bank stabilisation techniques as necessary;
- restricting the use of heavy machinery to the minimum necessary to complete the task;
- restricting vehicle use in wet or boggy conditions;
- monitoring for erosion, evidence of inversion and compaction (see Disturbance Checklist Appendix C);
- regular inspection and maintenance of valves and facilities;
- use of containment measures when completing pigging operations;
- collection and storage of waste hydrocarbon within containment facilities and disposal of waste hydrocarbons by a licensed contractor on a regular basis;
- use of spill control and containment devices when completing maintenance activities;
- implementation of appropriate contingency plans in the event of a spill; and
- adherence to the Epic Energy Environmental Management System (refer Section 1.5).

4.4 Pests and Diseases

4.4.1 Potential Impacts

A variety of weed species are present along the pipeline. The type and distribution of weeds are related to land use and rainfall with some species thriving under grazing or cropping regimes. Generally weed species are fewer in number in the northern zones of the state where stocking rates and rainfall are low, however in the higher rainfall areas of the state

where grazing and agriculture are more intensive and the natural vegetation is highly modified, weeds are common. The density and abundance of weeds on the ROW is comparable to adjoining land and land use.

While most weeds have become endemic and can be spread by stock, animals and agricultural vehicles there are a number of weeds which can be spread by pipeline operations.

The movement of maintenance vehicles and equipment along the easement has the potential to result in the spread of weed species through the transport of plant material on vehicles or soil.

4.4.2 Mitigation Measures

Measures that are adopted by Epic to reduce the risk of pest and/or disease spread include:

- identifying and clearly marking known infestations of weeds along the ROW;
- developing and implementing procedures to define access routes to the ROW to avoid areas of known infestation;
- minimising soil transport along the ROW and the prevention of soil transport out of areas of known weed infestation;
- implementation of a system of vehicle and equipment washdown for vehicles entering and leaving the ROW;
- implementation of targeted weed eradication programs; and
- adherence to the Epic Energy Environmental Management System (refer Section 1.5).

4.5 Water Resources

4.5.1 Potential Impacts

As described in Section 3, the Liquids Pipeline traverses a number of water courses and surface water drainage areas. The majority of the watercourses crossed are ephemeral and are only subject to flow following seasonal or heavy rainfall events. As a consequence these watercourses are naturally prone to erosion and sedimentation following rainfall events.

Pipeline watercourse crossings generally have minimal impact on the dynamics of a watercourse as the pipeline is buried at depth and the banks are battered on the vehicle crossing, reducing the erosivity of the banks and facilitating vehicle movement. The vehicle access crossings have been designed to have minimal impact on the direction and flow of surface water. This has been demonstrated following flow events as vehicle crossings often require repair to replace road base material removed by flood waters. No re-direction of watercourses due to the installation of access tracks has been observed along the ROW.

Daily pipeline operation activities that may have the potential to impact upon surface water resources include the movement of vehicles and the transport of materials along the ROW, temporary excavation activities and potential breaches of the pipeline integrity (refer to Section 4.10 for additional information).

Pipeline operation may result in potential impacts to surface water including:

- Disturbance of surface water drainage patterns along creeks and floodplains
- Reduced water quality associated with sedimentation and/or low level contamination.

As outlined above, it is considered that these impacts are minimal in terms of severity and duration, and can be appropriately managed through the implementation of the mitigation measures outlined below.

Due to the depth of the pipeline it is unlikely that the pipeline operations will impact on ground water unless it is within 2m of the surface. The pipeline does pass through shallow groundwater in the coastal regions but the physical presence of the pipeline has had no observed impact on these areas. The only pipeline operations likely to have a potential impact on groundwater are those involving the use of hydrocarbons or chemicals where there is the potential for an uncontrolled spill.

The potential for pipeline operations to impact on upon subsurface water (aquifers) has been considered. However it is considered that impacts to aquifers would be minimal due to the majority of the aquifers present, within the operational area, being confined to a depth of more than 2m or being unsuitable for use due to poor water quality.

An underground storage tank is located at the maintenance facility at approx KP350. The tank is used for the storage of waste hydrocarbon liquid and is emptied on a regular basis by a licensed waste contractor.

4.5.2 Mitigation Measures

Mitigation of impacts on surface water largely relates to the protection of drainage patterns and preventing contamination. Mitigation methods include:

- ensuring excavation activities (including stockpiles) do not unduly impede surface water flows;
- conducting maintenance activities across drainage lines when dry, where practicable;
- utilising sediment control measures;
- reinstating surface contours as part of the rehabilitation process;
- disposing of hydrotest waters appropriately;
- reducing the level of activity during wet weather;
- ensuring all vehicles are well maintained and that all servicing occurs at designated facilities;
- adopting appropriate chemical and oil storage, handling and disposal;
- regular monitoring of underground storage tanks to ensure that the integrity is maintained;
- ensuring that the use and storage of hazardous substances is undertaken within contained areas and appropriate spill containment measures are implemented;
- implementation of a spill response system to promptly manage any potential spill of hazardous materials; and
- adherence to the Epic Energy Environmental Management System (refer Section 1.5).

Mitigation measures implemented by Epic Energy to prevent breaches of the pipeline integrity are outlined in Section 4.10.

4.6 Land Use

4.6.1 Potential Impacts

Following the construction of the pipeline the land use above the pipeline was able to resume (e.g. cropping, grazing, conservation, etc) with the exception of excavation activities immediately above the pipeline. The operation of the pipeline has only a minor localised impact on land use. Localised impacts can be summarised as follows:

- Occasional short-term reduction in available pastoral grazing or cropping land during excavations.
- Occasional temporary cutting of fences to allow access during excavations.
- Use of access tracks on pastoral properties to access the existing private road maintained by Epic Energy.

The impact of minor spills on 'chemical free' or 'organic' properties has also been considered. While the potential for such incidents is considered low, mitigation measures will be undertaken to avoid a breach of conditions associated with the property status. This would include isolation of the spill area and restoration of the area in close liaison with the relevant landholder.

The impact of soil inversion on soil fertility has also been considered. This would only occur at sites where excavation for pipeline maintenance activities was required. Procedures are in place concerning the stockpiling of soil and fill during excavations and the return of the original soil profile during re-instatement activities and monitoring of restoration of such areas.

Impacts to conservation values are associated with the potential disturbance to flora, fauna or items of cultural heritage. These issues are dealt with sections 4.1, 4.2 and 4.9, respectively. Generally, as the impact will be contained to the existing, previously disturbed easement, it is expected that there will be minimal disturbance to these existing land uses as a result of pipeline operations.

No impacts are expected to conservation areas or tourism.

No impacts are expected to the petroleum industry outside the assets and operations of Epic Energy.

4.6.2 Mitigation Measures

Measures implemented to mitigate impacts on land use include:

- regular maintenance and inspection of valves and facilities;
- minimising the extent of disturbance to native vegetation/pastoral fodder/crops and restricting activities to the immediate easement as far as possible;
- notification of landholders on 'chemical free' or 'organic' properties of any spills and obtaining permission prior to the use of chemicals on site;
- planning activities to minimise the time between clearing of vegetation and rehabilitation;
- reinstating all fences cut during maintenance activities, following rehabilitation of the easement and ensuring temporary arrangements are determined in consultation with the relevant property manager. Any damage to pastoral property infrastructure will be rectified;
- ensuring property gates are left as found and maintaining stock grids on the easement;
- contacting the Department for Environment and Heritage regarding protection of conservation values in any of the National Parks prior to commencing work; and
- adherence to the Epic Energy Environmental Management System (refer Section 1.5).

4.7 Noise

4.7.1 Potential Impacts

Noise emissions associated with the operation of the pipeline include vehicle movement along the easement, the occasional operation of heavy equipment or machinery such as excavators, graders and bulldozers, the operation of compressor stations and mainline valves.

Heavy vehicles and machinery typically have a noise level of 90-95 dB(A) at distances of 10 m from the source.

The only noise associated operation of the pipeline is associated with Mainline valves. Noise is generated during the remote valve operation but these operations only occur on an occasional basis.

There are very few residential areas in the immediate vicinity of the pipeline. These residential areas are unlikely to be affected by noise associated with the operation of the pipeline.

There is no noise associated with normal operation of the pipeline.

4.7.2 Mitigation Measures

Equipment is maintained with standard noise suppression devices fitted e.g. attenuators. It is considered that specific noise mitigation measures are not required.

4.8 Emissions

4.8.1 Potential Impacts

Dust is likely to pose the main threat to existing air quality. However, the impact of dust on air quality, vegetation (dusting), land use (visual impairment, air quality) and public safety (visual impairment, air quality) is likely to be localised, short term and restricted to vehicle movement on unsealed roads, occasional excavation, and road maintenance activities. Dry conditions are likely to increase dust generation.

No significant impacts are expected to occur to agricultural areas, pastoral areas, residences, native vegetation or water bodies.

Minor air emissions of nitrous oxides, sulphur oxides and carbon monoxide are associated with the exhausts of machinery and support vehicles. These are small and limited.

The air quality and Greenhouse gas impacts of these emissions will be insignificant.

4.8.2 Mitigation Measures

Dust emissions will be mitigated by minimising the period between clearing and restoration, and limiting vehicle speeds on the ROW.

Other air emissions will be mitigated by employing adequate pollution control measures on plant and equipment.

Epic Energy is a participant in the Australian Greenhouse Challenge Program, which is a national voluntary program involving partnership between industry and the Commonwealth Government to implement actions to reduce global warming.

4.9 Cultural Heritage

4.9.1 Potential Impacts

Potential impacts to cultural sites are likely to be minimal as all operational activities are located within existing easements. However, potential impacts may occur as a result of excavation activities where they result in the accidental discovery of new materials.

The discovery of new sites or identification of cultural material is most likely to occur during excavation activities and may, in the northern regions of the state, yield sub-surface remains, including human remains.

The regions where accidental discovery of cultural heritage sites is more likely to occur are:

Region	Potential Impact
Dunefields	Sand dunes – active dunes are prone to exposing and recovering Aboriginal cultural material
Stony Plains	Dunes & creeklines – prone to archaeologically sensitive areas
Eyre Yorke Block	Coastal regions including dunes - prone to archaeologically sensitive areas
Western Pastoral / Gawler	Coastal dunes - prone to archaeologically sensitive areas

4.9.2 Mitigation Measures

The principal keys to effective management of cultural heritage issues lie in awareness of heritage as a valid management issue, commitment to the protection of cultural heritage and the adoption of clear, systematic and consistent management procedures.

Specific procedures will be adopted to reduce potential impacts to sites of cultural significance. These include:

- completion of an archaeological survey to identify all significant areas prior to the commencement of significant excavation activities;
- entry of all known sites into Epic Energy's MAP GIS system and inclusion in all planning documents and maps;
- implementation of a comprehensive induction program to ensure that all personnel are aware that significant cultural places are off limits to all project personnel;
- where required, employment of a qualified archaeologist and Aboriginal Monitors on-site during excavation activities to inspect all work areas;
- fencing, flagging and recording of new sites with a GPS and inclusion of sites on the GIS system. Development of further management measures are adopted in consultation with community representatives; and
- adherence to the Epic Energy Environmental Management System (refer Section 1.5).

4.10 Public Safety

The Liquids Pipeline is operated in accordance with Pipeline Licence No. 2 and Australian Standard *AS 2885.3-2001 Pipelines – Gas and Liquid Petroleum – Operation and Maintenance*. This Australian Standard describes the minimum standards for the operation and maintenance of pipelines.

The standard requires Epic Energy, as the operator of the pipeline, to:

- develop operating procedures based on the requirements of the standard;
- ensure that operating personnel are suitably qualified, trained and experienced;
- ensure that changes to the original design of the pipeline are fully assessed to ensure that the integrity of the pipeline is not impaired and that the safety of the public, operating personnel and/or protection of the environment is not diminished;
- ensure the appropriate inspections, assessments and maintenance activities are completed; and
- establish safe systems of work for pipeline repairs.

Previous incidents that have occurred on the pipeline have included:

- Pipeline exposure due to water movement;
- Pipeline exposure due to movement of dune;
- Pipeline exposure due to erosion;
- Minor leaks from valves;
- Threats to pipeline integrity due to activities by third parties (e.g. fencing contractor and quarrying);

although to date, no incident has resulted in any significant or long term impact to the environment or members of the public.

Pipeline Licence No. 2 requires that a Risk Assessment for the Moomba to Port Bonython Liquids Pipeline be completed and submitted to PIRSA for approval. A risk assessment was completed by Epic Energy, in consultation with Santos, in late 2001.

The purpose of the risk assessment was to identify areas where additional control measures may be required to ensure that the risks associated with the operation of the pipeline were reduced to As Low As Reasonably Practicable (ALARP).

The Risk Assessment identified that the greatest threats to the integrity of the Liquids Line were associated with:

- External Corrosion,
- Dam building,
- Power pole hole boring,
- Trenching operations.

Other threats identified, but were considered as low risk included:

- Excavation by Santos,
- General corrosion,
- Erosion, floatation and floating objects at creek crossings KP 351.3 and KP 426.3,
- Quarrying
- Core sampling / bore drilling,
- Casing shielding pipe from adequate corrosion protection.

Of the credible threats identified, the existing protection was determined to be adequate for the majority. While several actions were identified to further assist in reducing all risks associated with the operation of the pipeline, all the assessed threats to the integrity of the pipeline were considered to be As Low As Reasonably Practicable (ALARP).

4.10.1 Potential Impacts

A leak in the pipeline would result in a mixed jet of gas and liquid hydrocarbons being released. The rate of release is dependent on the size of the rupture. The gas would tend to be denser than the surrounding air and therefore not readily disperse. Fire could result if a source of ignition was present.

The quantity of hydrocarbon lost and therefore environmental impact of the leak would be dependent on the time taken to detect, isolate and repair the line. The risk to public safety would be dependent on the location of the rupture and proximity to residents/public areas.

Epic Energy has implemented a comprehensive range of measures to ensure the risk of such incidents are minimised. These are discussed further in the following section.

4.10.2 Mitigation Measures

There are a number of features of the design and operation philosophy that mitigate the risk posed by the pipeline to people who may be living, working or travelling in the immediate area.

Epic Energy has implemented a range of measures to ensure that the risks associated with the operation of the pipeline are reduced to ALARP. Control measures associated with pipeline operations involve the following areas:

- Measures to minimise the risk of third party activities
- Measures to monitor and control the pipeline
- Measures to maintain and protect the integrity of the pipeline
- Measures to readily detect any breach of the pipeline integrity.

Such measures ensure that the risk of a major event occurring is minimised and also to ensure that detailed emergency response plans are in place and can be readily activated.

Measures to minimise the risk of third party interference include:

- implementation of a regular inspection plan to identify any activity near the pipeline which may cause a danger to the buried facilities or pose a threat to third parties;
- implementation of the Property Contact Program with all land owners and occupiers and the provision of pipeline safety information;
- provision of a 24 hour 'Dial Before You Dig' contact number and a pipeline location service;
- implementation of the community awareness program involving presentations to local contractors, emergency providers and utilities in areas along the pipeline route to educate personnel on the nature of the pipeline, contents, correct work procedures for the easement and emergency procedures;
- maintenance of pipeline warning signs along the pipeline route; and
- provision of buried markers above the pipeline in areas of increased risk from excavation e.g. road crossings.

Epic Energy has in place a range of advanced monitoring and control techniques to ensure the safety and security of the pipeline and facilities. These measures include:

- a 24 hour pipeline control centre incorporating state-of-the art monitoring and control systems that continuously receive and analyse pipeline operating reports;

- vibration, fire and gas leak detectors;
- 'intelligent pigging' operations, in which detection equipment travels inside the pipeline checking for abnormalities and corrosion;
- a system of remote controlled valves which allow a pipeline controller to shut off liquids flow and isolate any portion of the pipeline; and
- constant physical surveillance of the pipeline easement via aerial monitoring, vehicle patrols and actual 'walking of the line'.

4.11 Existing Land and Water Contamination

4.11.1 Potential Impacts

As outlined in Section 3.8, Epic Energy has identified areas of groundwater and land contamination as a result of past operations of the Moomba to Port Bonython Liquids Line.

Environmental remediation and monitoring works has been completed at several sites along the pipeline including burn pits located at the previously used Pump Stations 2 & 3 and Neuroodla. This most recent round of monitoring (Parsons Brinckerhoff, 2003) has identified that:

- there is not ongoing source of contamination at any of the burn pits;
- groundwater and land contamination in the vicinity of the burn pit at previous Pump Station 2 is decreasing and the risk to the environment is considered to be acceptably low; and
- no hydrocarbon contamination in soils was identified in soils surrounding the burn pits at previous Pump Station 4 and Neuroodla.

Through the maintenance of the measures outlined below, it is believed that the contamination can be managed to ensure that the contamination does not spread from its existing boundaries and will slowly degrade over time.

The potential for the movement of water and contaminants within the trench of the Liquids Line has been considered. However due to the nature of the soils (primarily clays and loams) and the landforms through which the pipelines pass and the installation of trench breakers during the construction of the pipelines, it is unlikely that sufficient water movement would occur along the trench to create these issues.

4.11.2 Mitigation Measures

Measures that have been put in place to minimise the impact of the existing contamination and prevent any further contamination include:

- Monitoring of the soil contained within the landfarms. This will be managed in association with the operation of the Moomba to Adelaide Gas Pipeline (and associated SEO);
- Implementing additional investigations and monitoring if it becomes apparent that hydrocarbon contamination levels are increasing or spreading outside existing boundaries;
- Regular monitoring of underground storage tanks to ensure that the integrity is maintained;
- Use of containment trays to contain discharges of liquids hydrocarbon during maintenance or pigging activities;
- Ensuring that the use and storage of hazardous substances is undertaken within contained areas and appropriate spill containment measures are implemented;
- Implementation of a spill response system to promptly manage any potential spill of hazardous materials.

5 Consultation

5.1 Consultation Specific to the EIR & SEO

Epic Energy initiated consultation with various stakeholders and interested groups that may have an interest in the operation of the Moomba to Port Bonython pipeline. This consultation was completed in conjunction with consultation conducted for the Moomba to Adelaide Gas pipeline (which is owned and operated by Epic Energy). The following section summarises the consultation undertaken with State and Local Government, landholders and/or occupiers and Aboriginal Organisations.

5.1.1 Stakeholder Mailout

Key stakeholders associated with the operation of the Moomba to Port Bonython pipeline were contacted by Epic Energy and informed that Epic Energy was in the process of developing the EIR and SEO. Stakeholders were invited to identify any issues that they may have had in relation to the operation of the Liquids pipeline (see Appendix D - Stakeholder Feedback form). Note: Stakeholders associated with KP 0-350km were not specifically contacted with regard to the operation of the Liquids pipeline, as feedback had previously been obtained from them with regard to the operation of the Moomba to Adelaide gas pipeline, which runs parallel to the Liquids pipeline in this location. A summary of the stakeholders contacted in association with the operation of the pipelines is provided in Table 5-1.

Table 5-1 Stakeholders Contacted

Group	Stakeholder
Landholders / Occupiers	As listed in Epic Energy's Landholder Management Database
Local Councils	Corporation of City of Whyalla Corporation of City of Port Augusta Flinders Ranges Council
Government Agencies	SA Water Corporation Transport SA Australian Rail Track Corporation Ltd Eastern Eyre Animal and Plant Control Board Grant Animal and Plant Control Board Northern Animal and Plant Control Board Upper North Animal and Plant Control Board
Aboriginal Groups	Nukuna Peoples Council Inc Flinders Ranges Aboriginal Heritage Consultative Group Ngaduri Walpa Juri Lands and Heritage Association North East Aboriginal Corporation Biringa Incorporated Viliwarinha Yura Aboriginal Corporation
Soil Control Boards	Central Flinders Ranges SCB Gawler Ranges SCB Marree SCB Northern Flinders Ranges SCB

A summary of all the feedback received is provided in Appendix E – Stakeholder Response. All of the issues raised have been taken into consideration and addressed in the preparation of the EIR and SEO.

5.1.2 Government Workshop

On 1st November 2002, Epic Energy held a workshop that was attended by representatives from:

- Department of Primary Industry and Resources SA (PIRSA),
- Department for Environment and Heritage (DEH),
- Department of Water Land and Biodiversity Conservation (DWLBC), and
- Planning SA.

The purpose of the workshop was to provide the government representatives with information regarding:

- the operation of both pipelines,
- the key areas that Epic Energy had identified where there may be an environmental impact,
- Epic Energy's Environmental Management System, and
- Epic's proposed environmental objectives for the operation of the pipelines.

The workshop also allowed representatives to identify any additional issues that they considered should be addressed in the preparation of the EIR and SEO.

A copy of the Meeting Record is provided in Appendix F. All of the issues raised have been taken into consideration and addressed in the preparation of the EIR and SEO.

Epic Energy held a second Government consultation workshop on 12th March 2003, which was attended by representatives from:

- Primary Industry and Resources SA (PIRSA),
- Department for Environment and Heritage (DEH), and
- Department of Water Land and Biodiversity Conservation (DWLBC).

The purpose of the workshop was to present the outcomes of the consultation process undertaken by Epic Energy, demonstrate how feedback from stakeholders had been addressed in the EIR and SEO and obtain comments on the final draft of the Environmental Objectives, as applied to both pipelines.

As a result of the workshop, minor changes were made to the Statement of Environmental Objectives for the Moomba to Adelaide Pipeline before it was finalised. These objectives then formed the basis of the SEO for the Moomba to Port Bonython Liquid Line.

5.1.3 PIRSA Website Information

As an outcome of the Government Workshop, additional consultation material was prepared and placed upon PIRSA's website. All government representatives that were unable to attend the workshop were notified that the material was available for review on the website. In addition, all letters sent to stakeholders after the 1 November 2002, included information regarding the website and how to access it.

5.2 Existing Consultation Program

5.2.1 Landholder Contact

There are 48 landowners and occupiers along the Moomba to Port Bonython Liquids Pipeline. A property owner contact scheme is operated by Epic Energy. The Land Management Officer aims to personally visit each owner or occupier along the pipeline system annually. Other contacts made by Field Maintenance Officers and Superintendents during the course of daily business, or other land related issues that arise occasionally are recorded in the Land Management System (LMS).

Land Management is supported by dedicated LMS software that provides a powerful data base and MapInfo facilities. All property details and notes relating to discussions or issues with property owners are recorded in the LMS. Through its MapInfo facility an image of the cadastral boundaries of each property relative to the pipeline route can be displayed for any property. During the year each property owner dwelling has been captured by GPS and will be displayed on the pipeline / cadastral plans.

If personal contact cannot be made during a visit (e.g. unattended premises), the occupier or owner is telephoned or mailed a letter explaining the reason for the visit, the contact officer's business card, an information brochure on pipeline safety and the 'dial before you dig' contact phone number. All property owners receive the Epic Energy pipeline safety brochure, a complimentary biro, as well as a high quality calendar, which is individually mailed out. These items all contain the "**Dial Before You Dig**" contact phone number and strongly reinforce safe working practices near high-pressure gas lines.

A file is maintained for each of the land parcels crossed by the pipeline. Each property is flagged with the Land Titles Office who informs Epic Energy of any changes in ownership or land tenure details, ensuring that Epic Energy records are always up to date for mail outs and personal visits.

5.3 Pipeline Location Service

Epic Energy provides a free service to locate pipelines for which they are responsible. This service is primarily used by other companies carrying out civil works in the vicinity of pipelines administered by Epic Energy.

There were no actual pipe locations carried out for third parties on the Liquids Pipeline in 2001. The majority of the pipeline locations requested were as a result of the "One Call" system, and ranged from new installations crossing the pipeline to new fences as a result of subdivisions, and other general activities on the pipeline easement. All authorised activities within the pipeline easement are supervised by Epic Energy field officers to ensure the safety and integrity of the pipeline.

5.4 Community Awareness

Epic Energy implements a Community Awareness Program, which entails holding awareness meetings with communities along the pipeline route.

Key organization and target groups such as CFS, MFS, police, ambulance, SES, councils, earth moving contractors, irrigation installation contractors and various community members are invited to attend. In addition, Epic is implementing a program of targeted Community Awareness sessions for specific groups where a particular risk or issue has been identified e.g. contractors.

In 2001, a public awareness presentation for the Liquids Line was made in November at the Hawker Hotel. The focus of the presentation was on the specific nature and characteristics of the products carried by the Liquids Line, the route of the pipeline, basic information about the pipeline and its monitoring, control and emergency procedures. Additional contact has been made with some key agencies during the most recent landholder contact program (refer to Section 5.2.1).

6 Conclusion

The Moomba to Port Bonython pipeline is an extensive line that has been in operation for over 20 years, without any significant incident or injury. The impacts from operations to landholders, the environment and stakeholders are short-term and minor in extent. No significant long term adverse impacts are expected. Nevertheless, the following key issues requiring attention during the operation of the pipeline have been identified:

- Avoiding disturbance to 3rd party infrastructure, landholders or landuse;
- Prevention of soil erosion;
- Maintenance of vegetation cover;
- Prevention of weed and disease introduction and spread;
- Prevention of water and land contamination;
- Prevention of disturbance to surface drainage;
- Safeguarding public safety;
- To minimise noise due to operations;
- To minimise the potential for discharges from the pipeline;
- Protection of cultural heritage sites and values.

In managing the potential impacts Epic Energy is committed to working closely with all relevant authorities and landholders and monitoring our activities to ensure that all potential impacts are minimised.

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8 Appendices

Epic Energy Environmental Policy



ENVIRONMENTAL POLICY

**Epic Energy will Operate in an
Environmentally Friendly Manner**

Epic Energy is a large gas transmission company who constructs, owns, and/or operates gas transmission pipelines throughout Australia. Epic is committed to minimising the impact of its activities on the environment in keeping with its belief that companies be increasingly responsible in their management of environmental issues.

To achieve this objective, Epic will:

- Comply with all relevant environmental legislation and the requirements of industry standards as a minimum requirement.
- Integrate care for the environment into the responsibilities and work ethics of all personnel.
- Continue to adopt appropriate new technologies and best practices that reduce the impact of its activities on the environment.
- Minimise land and habitat disturbance by applying environmentally sustainable solutions.
- Promote open communication with landholders and interested parties.
- Avoid disturbance to known or identified sites of cultural, historical, natural or scientific significance.
- Implement work practices to minimise erosion and sedimentation impacts on neighbouring properties and land.
- Develop opportunities for recycling and more efficiently using energy, water and other resources.

Environmental performance will be monitored regularly and the information communicated to all employees and interested parties/members of the community.

Alan Freer
Chief Executive Officer
September 2006

Appendix B

Potential Environmental Impacts from Operational Activities

ACTIVITY DESCRIPTION					PRIMARY IMPACTS & EIR REFERENCE *							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	VEGETATION & FAUNA (Section 4.1, 4.2 & 4.4)	SOIL (Section 4.3 & 4.11)	WATER (Section 4.5)	DRAINAGE (Section 4.5)	LANDHOLDERS / LANDUSE (Section 4.6)	EMISSIONS (Air & Noise) (Section 4.7 & 4.8)	CULTURAL HERITAGE (Section 4.9)	PUBLIC SAFETY (Section 4.10)
Easement Maintenance												
1	Weed Control	Localised spraying weeds completed as required along the easement.	Control targets specific weeds species and may involve control up to 100m either side of the ROW.	Control occurs as required.	Death of target weed species. Weed species of concern is targeted. Minor temporary impact to non-target species may occur within the immediate vicinity.	None	None	None	Negligible	Minor air and noise emissions from vehicles, limited to the immediate vicinity of the activity.	None	None
2	Line-of-Sight	Removal of trees greater than 2m tall and within 2m of the centreline of the pipeline is carried out to ensure line-of-sight is maintained. Trees usually cut at ground level and roots left in place. In some cases, trimming of branches is sufficient. This is necessary to enable pipeline marker signs to be clearly identified along the ROW.	Line of site control occurs over the entire length of ROW, 2m either side of centreline. However the majority of vegetation control occurs between approx KP 260-500 where vegetation habit tends to warrants removal.	Experience shows line-of-sight operations are required every 5+-10 years, depending upon rainfall events.	Permanent removal of trees greater than 2m tall and within 2m of the pipeline centreline. Where possible, trees are trimmed rather than removed. Undergrowth is allowed to revegetate across the ROW. Majority of vegetation control occurs between approx KP 260-500 where vegetation habitat warrants removal. Vegetation removed is abundant in the areas adjacent the easement and therefore fauna habitat loss is minor. Fauna will only be temporarily disturbed while the activity is occurring.	Negligible	Negligible	None	Short term access to land required which may cause minor temporary impact to landholders and land use within the immediate area of the activity.	Minor air and noise emissions from vehicles. Noise also associated with machinery used to clear vegetation (grader, saws). Impacts are minor and temporary and occur for the duration of the activity only.	None	Only an issue if carried out where there is a public access or near public places. Majority of work is undertaken in relatively remote areas.
3	Patrolling / inspections - easement access	Traveling along ROW, on formed tracks (either purpose built for pipeline or private/public roads) or over cleared paddocks. Involves access to private property and use of private tracks.	Entire length of ROW, excluding areas where access is not possible (e.g. sections of ROW between Whyalla and KP 350)	Generally, properties not traversed on the ROW north of approx KP 350 are not accessed during general easement inspections. Easement inspections can be carried out on a daily to monthly basis. This frequency is increased where a particular issue exists on a property that may require maintenance or monitoring.	Patrolling has the potential to spread of weeds/diseases. Epic has implemented a range of control measures to ensure that this risk is minimised (refer Section 4.4) Patrolling has the potential for occasional road kill (stock or native animals), although this rarely occurs.	Soil compaction is not considered an issue as formed tracks are generally used. Access to pipeline only occurs over cleared paddocks when access to a particular pipeline section is required (e.g. for maintenance) and not on a continuous basis.	None	None	Temporary disturbance while Epic personnel traverse properties.	Temporary minor impacts from dust generation, vehicle emissions and noise. These are limited to the immediate area of the activity.	None	Access and patrolling the easement does not impact on public safety. Where Epic vehicles use public roads, they create no greater risk than other vehicles on the roads.
4	Aerial inspection of easement	Aerial inspections	Sections of ROW between Whyalla and KP 350 where vehicle access is difficult	Aerial inspections carried out monthly and take 1/2 day to complete	None	None	None	None	Potential for temporary disturbance of stock. Aircraft travels at a safe distance to prevent significant disturbance.	Temporary and minor noise disturbance from passing aircraft.	None	None
5	Easement Maintenance	ROW access tracks require maintenance, i.e. Grading, re-sheeting, to allow on-going use by vehicles and to prevent major damage to road infrastructure.	Most access tracks are located north of KP 350.	Maintenance occurs on an ongoing basis, depending on track condition, weather condition and track use.	None	Impact from excavation of borrow pits. Refer to Activity # 9 Excavations	Negligible	Access tracks have been in since pipeline construction. Construction of the access tracks may have caused minor disturbance to surface drainage. All easement maintenance work is conducted to ensure that the new drainage patterns are maintained (i.e. no further impact to drainage occurs).	Temporary disturbance while maintenance work is completed. As tracks tend to be located away from residences etc, this is considered minor.	Temporary minor impacts from dust generation, vehicle emissions and noise. These are limited to the immediate area of the activity.	Potential for impact on unknown cultural heritage sites from excavation of borrow pits. Refer to Section 4.9.	Refer to Activity # 3 Patrolling.
Pipeline Operations												
6	Cathodic Protection Surveys	Traveling ROW, stopping to inspect CP points (above-ground post) on foot. May involve repairs - see activity #9 Excavations	Cathodic Protection inspection posts are located approximately every 1.5km along the entire length of ROW, usually on fence lines to reduce impact to land use.	Conducted every two months, over a 3 week period	As per Activity # 3 Patrolling	As per Activity # 3 Patrolling.	Negligible	Negligible	As per Activity # 3 Patrolling	As per Activity #3 Patrolling.	None	As per Activity # 3 Patrolling.
7	Erosion events - washouts - loss of cover	Following major rainfall events creek lines or run-off areas on ROW can experience significant soil erosion resulting in a significant reduction in cover over the pipeline or exposure of the pipeline. Repairs effected immediately following erosion event and include the replacement of similar materials and re-profiling. In some creek lines permanent repairs such as gabions are used to prevent further erosion and/or re-exposure of the pipeline.	Usually affects sections of ROW within the banks of a creek or drainage line i.e. 10-20m length of pipeline.	Erosion events are seasonal and dependent on major rainfall events. Erosion most frequently observed on the ROW between approx KP 260-500 where climate and terrain result in ephemeral drainage lines (refer to section 4.3).	Potential impact to vegetation may occur in association with alteration of drainage patterns. As stated, this risk is minimised through effective detection and repair.	Erosion events result in the loss of topsoil and exposure of subsoil in the impacted area. Epic undertakes field inspections following significant rainfall events to ensure that erosion events are detected and repaired, to ensure that any damage is restricted to the immediate area. Tunnel erosion is considered unlikely. Refer to Section 4.3 for additional information.	Erosion events have the potential to increase sediment load of adjacent watercourses. However, as the majority of erosion events result from heavy rainfall events, the erosion tends to occur as a result of soil type. The additional sediment load from the pipeline is not considered to be significant.	Erosion events have the potential to alter drainage patterns in the area of the event. As stated previously, repairs are effected immediately and drainage patterns restored to minimise this risk.	Negligible	None	Erosion events tend to occur on the easement and therefore unlikely to impact on known cultural heritage sites (these are located off the easement). Erosion events may uncover previously unidentified cultural material. Refer to Section 4.9 for additional information.	Negligible

ACTIVITY DESCRIPTION					PRIMARY IMPACTS & EIR REFERENCE *							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	VEGETATION & FAUNA (Section 4.1, 4.2 & 4.4)	SOIL (Section 4.3 & 4.11)	WATER (Section 4.5)	DRAINAGE (Section 4.5)	LANDHOLDERS / LANDUSE (Section 4.6)	EMISSIONS (Air & Noise) (Section 4.7 & 4.8)	CULTURAL HERITAGE (Section 4.9)	PUBLIC SAFETY (Section 4.10)
8	Pipeline Incident	The main threats to public safety from the operation and maintenance is loss of hydrocarbon liquid and fire as result of pipeline rupture. Epic has completed a risk assessment of the Moomba to Port Bonython Liquids Line and determined that the greatest threats are associated with third party or external interference to the pipeline and pipeline corrosion.	Epic Energy has completed a Risk Assessment to ensure that the risk associated with the operation of the pipeline (e.g. risk of a pipeline incident occurring) are reduced to As Low As Reasonably Practical (ALARP). Epic has not had any significant pipeline incident occur during the operation of the pipeline. Refer to 4.10		The actual impact of a potential pipeline incident would be dependent on the nature and scale of the incident. In addition to the potential to create a public safety risk, incidents have the potential to disturb and destroy vegetation, disturb wildlife, cause soil contamination, disturbance and erosion and result in significant air emissions. In the case of a pipeline rupture, the actual environmental impact would be dependent on the nature of the rupture and the time taken to detect, isolate and repair the line. Detailed monitoring and control systems are in place to rapidly detect and isolate any potential pipeline breaches (refer to Section 4.10). Epic Energy has procedures in place to ensure that once the emergency situation has ceased and access to the area is available, remediation measures would be put in place to restore the area.							
Pipeline Maintenance												
9	Excavations - coating refurbishment - installation of anode beds - emergency response exercises - new tie-ins	Vegetation is cleared. Topsoil is stockpiled. Excavation performed and spoil stockpiled. Pipeline maintenance performed (may include welding, painting, sand blasting). Backfill of trench spoil. Topsoil replaced. Surface re-contoured. Rip compacted areas. Respread of vegetation. Seeding / planting if necessary.	Pipeline excavations typically 4 metres wide by 5 metres long and 2 metres deep, located entirely on the easement. In extreme cases, excavations can be 50m metres long.	Excavations may occur up to 30 times per year at various locations (operations dependent). Typically maximum of 2 weeks. Vegetation rehabilitation is dependent on seasonal conditions.	Excavations generally occur within the easement and therefore areas that have been previously disturbed. Vegetation clearance is limited to the area of excavation and 5-10m beyond for storage and stockpile areas. Cleared vegetation is respread as part of restoration. Area of disturbance is limited to that required for the safe conduct of the activity. Regrowth is ultimately dependent on seasonal conditions. In some cases, seed and fertiliser may be spread to assist regrowth. Fauna impacts are primarily associated with vegetation clearance and subsequent regrowth on the disturbed area. There is potential for fauna entrapment but this is rare, as fences are installed to prevent stock entrapment and ramps are placed in the pit to assist reptile/mammal escape. Refer to Section 4.1 & 4.2 for additional mitigation measures.	Topsoil and subsoil are disturbed by excavation. There is the potential for loss of topsoil and soil inversion. Impacts to soil are minimised through the implementation of management measures. Soils in the Dunefield, Stony Plains, Flinders Lofty & Western Pastoral Regions have soils that are more susceptible to erosion (refer to Section 4.3). Mitigation measures include: Separating topsoil and subsoil upon excavation and backfilling soil in the correct horizons.	No impacts for aquifers greater than 2 metres deep occur. For very near surface groundwater, an area of 4 by 5 by 2m is disturbed (i.e.. volume less than 40 m3). Where required, surface water (creeks and watercourses) may be temporarily dammed and diverted for excavations. No permanently flowing creeks are encountered on the ROW. Primary mitigation is avoiding such areas when wet. Some silt may be generated during temporary diversions however sediment traps are usually installed as part of standard management measures	Surface drainage patterns over the area of the excavation may be disturbed for the duration of excavation. These are restored as part of the restoration process.	Impacts to landuse are limited to the area of disturbance. In some instances fences are cut to allow temporary access. Any impacts to landholders and land use are generally restricted to the duration of the activity.	Minor air and noise emissions from vehicles. Noise also associated with machinery used for clearing and excavation. Impacts are minor and temporary and occur for the duration of the activity only.	No impact to known sites due to the implementation of effective management measures. There is potential for accidental discovery of previously unknown site (potential is higher in some zones). Epic has implemented detailed management measures to address accidental exposure/discovery. Refer to Section 4.9 for additional information.	Only an issue if carried out where there is public access or near public places. Majority of work is undertaken in relatively remote areas.
10	Hydrotest	Hydrotesting involves filling a section of pipe with water under pressure to test the integrity of the pipe. Sometimes an inhibitor is added to the water to prevent organisms colonising the pipe but this usually only happens on very long sections of pipe (e.g. 100km). Depending upon the location of the testing water is usually sourced locally from mains, dams, bores or trucked in. Water is usually discharged from the pipe onto a suitable area of ground away from water bodies. Erosion and sedimentation controls are used where required.	Hydrotesting is usually only occurs on new or repaired sections of pipe which can vary in length from 10m up to 100km.	Testing is carried out on an as -required basis. Recently testing has been undertaken approx once every 2-5 years. Tests normally take between 4 and 24 hours to complete.	Nil or minimal	Impacts to soil are minimal as water is discharged onto a suitable area of ground (stable or stabilised before discharge) and erosion and sediment controls are used where there is the potential or sedimentation to occur. Refer section 4.3.	None - water is discharged onto solid ground away from waterways.	Negligible	Negligible	None	None	None

ACTIVITY DESCRIPTION					PRIMARY IMPACTS & EIR REFERENCE *							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	VEGETATION & FAUNA (Section 4.1, 4.2 & 4.4)	SOIL (Section 4.3 & 4.11)	WATER (Section 4.5)	DRAINAGE (Section 4.5)	LANDHOLDERS / LANDUSE (Section 4.6)	EMISSIONS (Air & Noise) (Section 4.7 & 4.8)	CULTURAL HERITAGE (Section 4.9)	PUBLIC SAFETY (Section 4.10)
11	Pigging	Pipeline 'pig' placed in the pipe via a launch bay. Pig travels along inside pipe before being removed at a pig exit site. Removal of pig from pipeline results in minor venting of gas and collection of some oil sludge and debris. High pressure nitrogen gas is used to push any liquid product from the pig receiver into the pig launcher and further down the line, to eliminate the need to drain liquid hydrocarbon from the line to remove the pig. Where the removal of liquid hydrocarbon is required, it is drained to containment trays and/or waste storage tank. This liquid waste is then removed by a licenced waste contractor.	Confined to existing facilities. 100km sections usually completed at a time.	Cleaning pigging undertaken annually or as required. Major intelligent pigging programs (to monitor pipeline integrity) tend to be conducted approximately every 5 years. The program usually takes 2 weeks to complete.	None	Measures have been put in place to minimise any discharge of liquid hydrocarbon. Pigs are removed within a contained area, therefore contamination from debris and oily sludge is unlikely.	Measures have been put in place to minimise any discharge of liquid hydrocarbon. Pigs are removed within a contained area, therefore contamination from debris and oily sludge is unlikely.	None	None	Very minor releases of gas occurs when the vessel is depressurised for removal of the pig. Facilities are designed to enable venting to a closed drain system.	None	None
12	Welding	Welding usually required when undertaking repairs of pipeline or making modifications to existing infrastructure. Pipeline welding usually occurs following the excavation of the pipeline (refer Activity # 9 Excavations).	Dependant upon length of pipeline under repair	Ongoing as required	The risk of bushfire as a result of welding is minimised through the implementation of strict management measures.	None	Negligible	None	None	Negligible	None	None
13	Painting	Epoxy painting (spray) of welds or repair areas of pipeline or above ground pipeline	Dependant upon length of pipeline under repair	Painting completed as required, activity duration is less than 2 hours.	None	Potential for minor contamination from overspray and cleaning agents	Potential for minor contamination from overspray and cleaning agents	None	None	Minor noise emissions associated with operation of paint compressor	None	None
14	Sand Blasting	High-pressure abrasive surface blasting of pipe work prior to painting. Undertaken for pipeline inspection or for pipeline coating systems	Area of exposed pipe	Sand blasting completed as required, activity duration is less than 2 hours.	None	Minor contamination from excess sand, the majority of which is usually captured within the trench.	Minor contamination from excess sand, the majority of which is usually captured within the trench.	None	None	Dust generation from blasting activity. Minor noise emissions associated with blasting. This is restricted to the duration of the activity.	None	None
15	Replacement of pipeline section	Section of pipeline is isolated, depressurised and liquid hydrocarbon is drained from the affected section. Affected area then excavated, old pipeline removed and replaced (includes welding, blasting, coating).	Generally less than 100m section of pipe excavated	Historically occurs once every 5 years. Activity usually lasts for approximately 2 weeks	Refer to Activity #9 Excavations	Refer to Activity #9 Excavations These maintenance activities are planned. A waste contractor is organised to remove any liquid hydrocarbon remaining in the line once it is isolated. Spill control measures are activated to minimise the potential for any release to the surrounding environment.	Refer to Activity #9 Excavations These maintenance activities are planned. A waste contractor is organised to remove any liquid hydrocarbon remaining in the line once it is isolated. Spill control measures are activated to minimise the potential for any release to the surrounding environment.	Refer to Activity #9 Excavations	Refer to Activity #9 Excavations	When any section of the pipeline or associated vessel is depressurised, minor amounts of hydrocarbon gas are released. This is released in a controlled manner and results in temporary impacts only. Where possible, venting occurs to a closed drainage system.	Refer to Activity #9 Excavations	Refer to Activity #9 Excavations
Facility Operation and Maintenance												
16	Liquid Main Line Valves	Main Line valves are used to isolate sections of pipeline. They are used to control pipeline activities & in the event of an emergency. The liquids line contains both remotely and manually operated valves.	Located either within a compound approximately 4m by 4m. The valve is located within the pipe.	Main line valves are open continually except if isolations are required or in the event of an emergency. Operated every 6 mths for testing or in emergency.	Negligible	Minor leaks from flanges, fittings, cavity drains and/or vent lines. There is also the potential for discharge during routine maintenance on MLV's. Regular inspection and maintenance program is in place to minimise such discharges.	Negligible	None	None	None	None	None
17	Scraper Stations	Scraper stations are required to allow for cleaning devices (pigs) to be inserted into and removed from the pipeline to clean the line and/or detect damage or pipeline corrosion along the pipeline.	Located at the mainline valves at Moomba, LMLV 7, LMLV 13, LMLV 19 and at Port Bonython.	Used for pigging operations (refer to Activity # 11).	Refer to Activity #11 Pigging	Refer to Activity #11 Pigging	Refer to Activity #11 Pigging	None	None	Refer to Activity #11 Pigging	None	None
18	Pump Stations	Pump stations are required to maintain the liquids pressure and flow within the pipeline. Pump stations generally involve a main line valve (refer above), scraper station (refer above), pumps, associated pipework and burn pit. The pump stations at Moomba is operated by Santos. PS 3 has not been operated since 1990 and has been mothballed. PS2 & 4 are no longer used and have been isolated from the pipeline. The burn pits are no longer operational for burning. Containment trays have been placed in the burn pits, where discharge from pigging operation is required. Refer to Activity #11 Pigging	Located at the mainline valves at Moomba, LMLV 7, LMLV 13 and LMLV 19.	No longer in operation	None	Due to the past practice of discharging liquid waste to the burn pits for burning, some contamination exists in the vicinity of the burn pits. Environmental assessments have monitored the level of contamination and concluded that there is no ongoing source of contamination and that environmental risk is acceptably low.	Due to the past practice of discharging liquid waste to the burn pits for burning, some contamination exists in the vicinity of the burn pits. Environmental assessments have monitored the level of contamination and concluded that there is no ongoing source of contamination and that environmental risk is acceptably low.	None	None	None	None	None
19	Weed Control	Spray pack used to spray weeds in and around compounds	Conducted within compounds	Weed control typically occurs twice per year for 1 week duration (additional control as required)	Death of target weed species. Weed species of concern is targeted. Minor temporary impact to non-target species may occur within the immediate vicinity.	Negligible	Negligible	None	None	Refer to Activity # 1 Weed Control.	None	None

ACTIVITY DESCRIPTION					PRIMARY IMPACTS & EIR REFERENCE *							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	VEGETATION & FAUNA (Section 4.1, 4.2 & 4.4)	SOIL (Section 4.3 & 4.11)	WATER (Section 4.5)	DRAINAGE (Section 4.5)	LANDHOLDERS / LANDUSE (Section 4.6)	EMISSIONS (Air & Noise) (Section 4.7 & 4.8)	CULTURAL HERITAGE (Section 4.9)	PUBLIC SAFETY (Section 4.10)
20	Storage and Use of diesel and oils	Oils and lubricants stored for use in maintenance at facilities shared with the Moomba to Adelaide gas pipeline (owned and operated by Epic Energy) Storage of clean oil & diesel fuel for use.	Oil stored = 5,400l at CS1-CS5. Tanks re-filled 3 times a year Diesel stored in 1,200l tanks at CS1-CS5. Tanks re-filled 3 times a year.	Materials stored for use for duration of pipeline operation	Negligible	Potential for contamination associated with failure of oil/fuel storage tanks. Risk is minimised through the implementation of control measures (refer Section 4.3).	Potential for contamination associated with failure of oil/fuel storage tanks. Risk is minimised through the implementation of control measures (refer Section 4.3).	None	None	None	None	None
21	Production of Hazardous Waste	Waste oil from maintenance stored in oily water pit Waste hydrocarbons generated from pigging operations (ex pipeline/product) Contaminated filters & material from maintenance change-overs Contaminated waste and oils removed from site for disposal by a licensed contractor.	15000 l waste oil tank located at LMLV 19.	Materials continually produced, stored and disposed during the operation of the pipeline.	None	Potential for contamination associated with failure of oil/fuel storage tanks. Risk is minimised through the implementation of control measures (refer Section 4.3).	Potential for contamination associated with failure of oil/fuel storage tanks. Risk is minimised through the implementation of control measures (refer Section 4.3 & 4.5).	None	None	None	None	None
22	Waste disposal - sewage - refuse	Sewage collected in septic systems Domestic waste collected on site and removed to licensed facilities	n/a	Materials produced, stored and disposed of for duration of pipeline operation Sewage disposal - continually. Refuse removed by licensed contractor on a weekly basis	None	Potential for contamination associated with overflow of sewage tanks	Potential for contamination associated with overflow of sewage tanks	None	None	None	None	None
23	Hydrocarbon Contamination Remediation	Contaminated soil from operation of the liquids line is treated at soil farms, which are operated in association with the Moomba to Adelaide gas pipeline (owned and operated by Epic Energy). Soil farms utilised by the Liquids Line are operated at CS 2, 3 (PS 2& 3) and Neuroodla to remediate hydrocarbon contaminated soils	Soil farms are approximately 20m x 20m.	Likely to be operated for the duration of the operating life of the pipeline.	None	Regular monitoring has been completed to determine the extent of contamination and effectiveness of rehabilitation measures.	Regular monitoring has been completed to determine the extent of contamination and effectiveness of rehabilitation measures.	None	Contamination is limited to immediate area and does not impact on adjacent land use.	None	None	None

Appendix C

Example of Disturbance Checklist

Example of Disturbance Checklist

Description of Task/Activity	
Location	
Line:	KP:
Description of Location:	
Project Manager/Supervisor:	
Crew/Contractor undertaking work:	
Commencement Date:	Completion Date:

PLANNING		
Environmental Photo Point		
Location of photo point (s):	Photo Record No.	Date
Checklist	Y/N	Comment/Details
Landholder / third contacted and informed or works? Date contact made : _____		Attached record of any agreement or file reference
Has the GIS been consulted to determine if there are any known heritage sites or environmental sensitive areas in the area of impact?		List any known sites/areas
Will the site require examination for cultural heritage material prior to the commencement of work (for work involving significant off ROW disturbance)?		If yes, include date completed and reference to any reports
Will the site require an ecological assessment? (for work involving significant off ROW disturbance)?		If yes, include date completed and reference to any reports
Name of person completing checklist:		
Position Title:	Date:	

UNDERTAKING TASK		Date Completed : _____	
Environmental Photo Point			
Location of photo point (s):		Photo Record No.	Date
Checklist	Y/N	Comment	
Did work involve opening a trench or significant excavation?		Date Trench Opened _____ Date Trench Closed _____	
Has topsoil and overburden been stockpiled separately?			
Have soil stockpiles been placed outside drainage lines?			
Has vegetation been removed and stockpiled separately?			
Is the open trench being monitored for fauna?		Raise incident report for any trapped fauna & include reference to report number	
Is Hydrotesting required?		Record if chemicals added, disposal location and method	
Name of person completing checklist :			
Position Title :		Date :	

REINSTATEMENT		Date Completed _____	
Environmental Photo Point			
Location of photo point:		Photo Record No.	Date
Checklist	Y/N	Comment/Details	
Have topsoil and overburden been replaced in the correct profile?			
Name of person completing checklist:			
Position/Title:		Date:	

Photo Monitoring

Photo-points should provide a comparison with adjacent land and a record of the following impacts:

- Pre-disturbance condition of area
- Activities undertaken
- Area of clearing (has it been minimised)
- Post disturbance condition (erosion, contamination, litter, soil inversion, contours, 3rd party infrastructure)

Appendix D
Stakeholder Feedback Form

YOUR CONTACT DETAILS (OPTIONAL)				
Name:		Contact Address:		
Phone:				
Fax:		Organisation & Position: <i>(where relevant)</i>		
Email:				
Stakeholder Category:	Landholder/Occupier		Aboriginal Group	
	Government		Other	
KEY ENVIRONMENTAL ISSUES IDENTIFIED (Please add any additional issues/comments that you may have)				
Disturbance/Disruption to Landuse <ul style="list-style-type: none"> - Disruption to landuse over the pipeline - Disturbance to infrastructure (fences, gates etc) - Access to the pipeline - Use of private roads / tracks - Changes to landuse over the pipeline - Excavations 	<i>Your Issues / Comments</i>			
Flora and Fauna <ul style="list-style-type: none"> - Protection of sensitive vegetation and habitats - Maintenance of regrowth - Introduction and spread of pest species 	<i>Your Issues / Comments</i>			
Erosion / Runoff <ul style="list-style-type: none"> - Protection of drainage channels and watercourses - Erosion and sediment runoff - Maintenance of soil stability - Protection of topsoil 	<i>Your Issues / Comments</i>			
Emissions <ul style="list-style-type: none"> - Noise - Odour - Uncontrolled/unplanned discharges - Dust - Land contamination 	<i>Your Issues / Comments</i>			

Cultural Heritage <ul style="list-style-type: none">- Protection of known heritage sites- Accidental discovery of previously unknown heritage sites- Protection of areas of cultural significance	<i>Your Issues / Comments</i>
Public Safety <ul style="list-style-type: none">- Identification of the pipeline- Signage- Controlling external activities on the easement- Risk from third party activities- Protection of the public during normal operations and maintenance- Protection of the public during uncontrolled events	<i>Your Issues / Comments</i>
Other Issues <p><i>Please include any other issues that you would like to see addressed during the preparation of the Environmental Impact Report and Statement of Environmental Objectives for the Moomba Port Bonython Liquids Pipeline.</i></p>	

Once completed, please return in the reply paid envelope, or fax to 08 8357 0411.

Appendix E
Stakeholder Response

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
NP	NP	L/O	NC	NC	NC	NC	NC	NC	Landholders have no problems and know where to contact Epic if and when they need to.
NP	NP	L	NC	NC	NC	NC	NC	NC	Has no issues with the pipeline operation.
NP	NP	L/O	No issues at present – landholder may want to plant vines on the property.	No issues	No issues	No issues	No issues	Signage is adequate on their land	NC
Transport SA	Manager, Statewide Operational Coordination	G		TSA has developed a Weed Management Plan for TSA's Northern and Western Region – appreciate Epic advising Port Augusta Office of any instances where certain weeds (refer list) are identified, controlled, removed etc					Weeds of concern include Prosopis spp. (mesquite), Acacia farnesiana (Mimosa Bush), Parkinsonia culeate (Parkinsonia), Parthenium hysterophorus (Parthenium weed) and Acacia nilotica (Prickly acacia).

Organisation	Position	Category	Key Environmental Issues							
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues	
NA	NA	L/O	Gates have been left open and fences have been cut	NC	NC	NC	NC	NC	Have been unauthorised people travelling through our property	Unauthorised people are gaining access via the easement, cutting locks and fences and leaving our gates open
NP	NP	L/O	No disruption to land after the initial pipe laying	No issues – no-one would know pipeline was there (except for signs)	No Issues	No Issues	No Issues	No issues – Signage is more than adequate	No concerns about pipeline going through the property. Appreciates that David Fotheringham calls regularly for a PR visit and comments that it is always good to catch-up on pipeline news.	
Regional Council of Goyder	Manager, Environmental Services	LG	Fire prevention-adequate measures need to be taken to prevent any fires being caused by workmen.	NC	NC	NC	NC	Pipeline identification-maintain clear identification by signage on location of pipeline	NC	

Organisation	Position	Category	Key Environmental Issues							
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues	
NP	NP	L/O	Concern regarding the importing of soil- potential for weed seeds in the soil. We have to keep going back to this spot to keep controlling the weeds.	NC	NC	NC	NC	NC	NC	NC
NP		L/O	NC	NC	NC	NC	NC	Signage – 3 signs within approx 100m, on posts approx 1 metre from fence line. Comment that it was better when signs were on the fence line.	NC	NC
NP	NP	L/O	Landholder concerned that she may not be able to farm the land over the easement, or develop it in another way. This landholder has existing fencing securing the property and is concerned that it may be damaged by those accessing the pipeline.	The introduction and spread of pest species through any machinery bought onto the property is a grave concern to this landholder.	Protection of topsoil in any excavation work is important as the land is used for farming	Any emissions are of concern to this landholder as neighbours are close to pipeline and the landholders home is on the same property.	No issues	No issues	No Issues	No Issues

Organisation	Position	Category	Key Environmental Issues							
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues	
Management Group	NP	L/O	For any disturbance to the landholders will require notification except in emergencies where serious situation requires instant action	No Issues	No Issues	No Issues	No Issues	No Issues	Signage could be better. No other comments	No Issues
Gregor & Co Pty Ltd.	Manager/ Director	L/O	Subsoil left on surface creating crop yield variation. Limestone rocks brought to surface which have to be removed by hand.	No Issues	No Issues	No Issues	No Issues	No Issues	No Issues	The easement creates opportunity for other organisations to use it. The land owner is obliged to deal with the associated issues for the 'public good'.
NP	NP	L/O	NC	NC	NC	NC	NC	NC	NC	The landholder would like to see people educated about the pipeline better-recently neighbours using machinery to knock down stumps. The landholder contacted Epic, who acted promptly – but neither the owner or contractor

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
									realised the pipeline was there.
NP	NP	L/O	No Issues	No effect on vegetation or regrowth. No introduction or spread of pest species has occurred	Erosion related problems regularly inspected and controlled sufficiently on this property.	Never experienced any problems in relation to emissions	Not applicable	Excellent signage. Pipeline easement regularly inspected to control external activities. Knowing the pipeline is there the landholder does not take any risks. Protection of public sufficient.	Landholder frequently visited by pipeline officials, are well informed on pipeline operations and are happy for the pipeline to continue.
NP		L/O	NC	NC	NC	NC	NC	NC	NC

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
TXU TI	Performance Monitoring Officer	L/O	Need consultation with the land owner/occupiers in conjunction with a hazard identification and risk assessment on work proposals	Torrens island has a sanctuary located in the southern half. Is covered under the National Parks and Wildlife Act.	Operator is obligated to control erosion, runoff and any discharge into the environment as per regulations and codes of practice.	Open air abrasive blasting should give regard to fugitive emissions, deposition and clean up or waste material on land owners property	Torrens island has sites of cultural significance. Landowners should be consulted and care should be taken to disturbing such sites prior to inspections or work on the pipeline.	NC	NC
NP	NP	L/O	No problems	No concerns	ok	Nil	Nil	ok	NC
NP	NP	L/O	Disturbance to land use through access to the pipeline	Natural grassland regrowth. No problems with pest species exists.	Maintenance of soil stability and protection of topsoil is good. No erosion and sediment runoff problems.	No issues	No issues	Signage exists.	NC
NP	NP	L/O	NC	NC	NC	NC	NC	NC	Landholder has no issues relating to the pipeline through their property.

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
NP	NP	L	No damage to land, I crop over the pipeline. Have not had any disturbance to infrastructure and have no problems with Epic using private roads or access the pipeline.	Always in contact with me regarding weeds	I have no problems, holes are always filled in. Topsoil is not an issue as it is not disturbed.	No worries with noise. No problem with dust. No odour. Not aware of any uncontrolled emissions.	Does not apply to me. Have not heard of any problem.	Signage is good. Always in contact with me.	I do not have any complaint at all. I have a relief valve on my sons property and it is no problem at all. Epic men are good at communication and their boss Pat O'Dea is always talking to the farmers and informs them of changes.
Taylors Wines	Vineyard Supervisor	L/O	No real disturbance/disruption	No native flora/fauna on line, mostly vineyards around pipeline, so therefore no issues	Appears to be no erosion problems	Would like some guidelines/ emergency procedures if there is some problem with the pipeline (i.e. uncontrolled/unplanned gas emissions)	No Issues	Main issues are landholders remembering to notify third parties when they are working around pipeline.	NC

Organisation	Position	Category	Key Environmental Issues							
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues	
Lower North Animal and Plant Control Board	Authorised Officer	Other	NC	Prior to excavation/soil removal from any properties, check with local animal and plant control board for any proclaimed plant restrictions. Always clear machinery prior to leaving a property	NC	NC	NC	NC	NC	NC
NA	NA	L	Surface soil different to rest of paddock. Plant back periods extended if we use sulphur ureas. There are stones on surface	NC	NC	Noise from power station	NC	Risk from third party activities.	NC	NC
Upper North Animal and Plant Control Board	Senior Authorised Officer	LG	NC	Continue with control, aim at eradication of outbreaks of African Rue. This is a proclaimed pest plant and is predominately found between Com Station 5 & 6.	NC	NC	NC	NC	NC	Address and rabbit issues that may arise over the pipeline and work in conjunction with the landholders eradication plans
NP	NP	L/O	No Issues	No Issues	No Issues	No Issues	No Heritage sites known.	Satisfactory	NC	NC

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
Ambro Pty Ltd	NP	L/O	Loss of part of crop over pipeline. Restrict use of private roads and tracks. Replace topsoil correctly after any excavation.	Do not import foreign growth/material which may contain pest species.	Do not leave pipeline trench open for any period. Replace topsoil after backfill.	Precent dust from blowing over existing crops	Epic to cover costs or losses associated with discovery of previously unknown heritage sites.	Risk from third party activities is an Epic risk. Epic has responsibility to protect public during normal operations and maintenance. Epic is responsible for protection of public during uncontrolled events.	NC
Transport SA	Environmental Officer	G	Crossing of roads a potential problem	Control of weeds along roads and pipeline	Refer to Flinders Ranges Soil Conservation Board	NC	NC	Road trains carrying pipes on our unsealed network. Increased traffic flows etc.	
NP	NP	L	Landholder uses pipeline road as a station road.	Introduction and spread of pest species not a problem on Minburra or Koonabore stations	Nil erosion/ runoff problems	Nil emissions	No Issues	Signage and control of external activities on easement good. Low risk from third party activities and public safety concerns in relation to pipeline operation or uncontrolled events.	In relation to African Rye seed spread, if Epic would like more information contact landholder on number provided at night.

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
NP	NP	L/O	No disturbance or disruption to normal usage of property	Vegetation well maintained (reserve next door to landholder property)	Drainage channel has been a little dubious in the past – recent work is a big improvement	Rarely	NC	Signage and maintenance thereof very good.	NC
Australian Rail Track Corporation Ltd	Property Development Manager	L/O	Access to ARTC land must be approved in advance and the appropriate "Authority & Indemnity" form executed in advance. The presence of a rail safe worker may be needed, which will have to be arranged in advance and costs met by Epic.	NC	NC	NC	NC	Pipeline to be marked pursuant to AS4799	Current Pipeline Licences must be in place for every undertrack crossing of the pipeline on ARTC property. ARTC is not confident that this is in place at present.
NP	Grazier	L/O	We have had no problems	The native vegetation and weeds are no different to the rest of the paddock	No problems	No problems	No problems	I leave responsibility of signage to you	NC
NP	Manager	L/O	NC	NC	Erosion Hamilton Creek flood out area – just North of communication tower.	NC	NC	NC	NC

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
NP	NP	L/O	NC	NC	NC	NC	NC	Lack of fire knapsacks/ equipment/ shovels. Lack of fire awareness when driving through properties (particularly in fire season periods) – keeping in mind underside of vehicles warm up.	NC
NP	NP	L/O	Concern regarding pipeline workers not closing gates to property. Also concerned that pipeline workers do not understand where the ROW ends and make use of private property tracks.	NC	NC	NC	NC	NC	NC
NP	NP	L/O	NC	NC	NC	NC	NC	NC	All issues on this property have been addressed. Landholder feels that Epic has met its obligations in regard to the pipeline where it traverses this

Organisation	Position	Category	Key Environmental Issues						
			Disturbance to Land	Flora & Fauna	Erosion/ Runoff	Emissions	Cultural Heritage	Public Safety	Other Issues
									property.
NP	NP	L/O	All most nil disturbance	No problems. No problems with spread of weeds	No problems	Nil	NC	NC	NC
N/A	N/A	LO	NC	NC	NC	NC	NC	NC	We have no problems with the pipeline set-up.
Partacoona Pastoral Co	Director	LO	Small but OK	NC	Normal maintenance	Small	N/A	OK	NC

Legend

- L - Landholder
- LG - Local Government
- L/O - Landholder/Occupier
- N/A - Not applicable provided in feedback form
- NC - No comment made on feedback form
- NP - Not provided - information has not provided on feedback form

Appendix F
Workshop Meeting Record

Client	Epic Energy	Pages: 5
Project	Pipeline Licence 1 EIR/SEO Consultation Phase	Meeting No. 1
Location	Stanford Hotel – Adelaide	Date of Meeting 01 Nov 02
Recorded by	Z. Bowen, S. Smith	Time meeting started 9.35 am Time meeting ended 12.00pm

Purpose of meeting: Information & Consultation Session for key government stakeholders

Present at meeting:

<u>Name</u>	<u>Company</u>
John Bourne	DWLBC
Vince Rigter	DWLBC
Stephen Howles	DWLBC
Simon Wheaton	Planning SA
Brian Moore	NPWS – DEH
David Hart	NPWS – DEH
Terry Aust	PIRSA
Michael Malavazos	PIRSA
Richard McDonough	PIRSA
Angela Crimes	PIRSA
Tawake Rakai	Epic Energy
Tim Cleary	Epic Energy
David Fotheringham	Epic Energy
Geoff Balmer	Epic Energy
Susie Smith	Ecos Consulting
Zoe Bowen	Ecos Consulting

Copies issued to: Epic Energy, Ecos Consulting

Apologies: Kym Davie, Ecos Consulting

Item No.	Description of Discussion	Action
1.	Meeting opened by TR	
2.	TR provided an overview of legislative requirements of EIR & SEO process	
3.	TC Provided an overview of current MAP and Liquids Line operations	
4.	<p>Questions/Observations from the floor relating to Operational practices:</p> <ol style="list-style-type: none"> 1. Cathodic Protection Ground-beds – how many are there, where are they placed, how often are they installed, what depth are they installed at? (NPWS/PIRSA) 2. What is the depth of the pipeline? (DWLBC) approx 900mm, AS2885 is 750mm, risk assessment undertaken to determine depth. 3. 3rd Party use of ROW is likely to lead to degradation of ROW in northern area of state (PIRSA) 4. African Rue control is not just Epic problem but also a regional problem. What control measures are being undertaken by Epic? (NPWS) – vehicle exclusion control measures already in place and additional spraying program measures planned. 5. Spencer Gulf – how is the underwater section of pipeline managed? (NPWS) – pipeline was buried next to water pipeline. 6. Spencer Gulf – how are the issues of seagrass/benthic fauna rehabilitation and erosion associated with strong tidal currents addressed/managed? (NPWS) – erosion matting & sand bags installed over pipeline. 	Discussion at meeting - note
5.	<p>SS provided an overview of the environmental regions traversed by the pipeline.</p> <p>SS opened the floor for the discussion of Activities and Potential Impacts associated with operation of PL1.</p> <p>A summary of comments is provided in Table 1.</p>	Ecos to add additional activities & impacts to SEO
6.	<p>Questions/Observations from the floor relating to Discussion of Potential Impacts:</p> <ol style="list-style-type: none"> 1. Consultation with other stakeholders – needs to be widened to cover other government organisations. NPWS can provide Epic with a list of other potential government stakeholders (e.g. local plant & animal control boards, soil boards, CFS, etc) who could be included in current consultation process. 2. There appear to be 2 aspects of today's discussions – the discussion of EIR & SEO impacts and risks, and discussion of the consultation phase of the process. 3. River crossings in flash-flood areas – there appears to be a risk of large items hitting an exposed pipeline during extreme flood events (ie 1 in 50 yrs) (NPWS). 	Epic / Ecos to obtain & include in consultation process

	<p>4. PIRSA explained that pipeline standards are regularly re-worked and that the SEO must be reviewed within 5 years of approval. This review accommodates the re-assessment of risks.</p> <p>5. Below surface soil tunnelling and dispersive soils should be considered as a risk as they can act as a conduit for groundwater movement (DWLBC).</p> <p>6. Risk assessment should include impact of response to and clean-up from emergencies (PIRSA)</p> <p>7. Venting & Purging – objectives & goals need to include EPA Act triggers (PIRSA)</p>	<p>Note</p> <p>Note</p> <p>Note</p>
7.	<p>SS continued discussion of Draft Environmental Objectives & Measures. A summary of comments is provided in Table 2.</p>	
8.	<p>Questions/Observations from the floor relating to Discussion of Draft Environmental Objectives & Measures:</p> <p>1. Does pipeline rehabilitation involve the use of local/endemic species? (NPWS) – yes</p> <p>2. Hydrostatic testing needs to be included to items covered by objectives (PIRSA)</p> <p>3. Ramsar sites need to be considered, if not already included (NPWS)</p> <p>4. No spill to watercourses (NPWS)</p>	<p>Include as Goal 6.4</p>
9.	<p>To facilitate the consultation process for the EIR/SEO review PIRSA have suggested that the Presentation Notes be posted on the PIRSA web page for easy access by interested stakeholders</p>	<p>Ecos to forward PDF to PIRSA for posting</p>
10.	<p>PIRSA explained to the forum that they would like to be able to define acceptable/workable levels for assessment of Objectives. They are seeking feedback from other stakeholders on suitable assessment parameters.</p>	<p>Note</p>

Table 1: Suggested Additional Activities & Potential Impacts to be added to SEO

Operation	Activity/Aspect	Issue/Potential Impact	Relevant Objective/Goal Reference
Pipeline operation & Maintenance	Land disturbance/dig ups	Soil erosion / Loss of topsoil / Subsidence	
		Soil inversion / crown	
		Groundwater	As per Water Resources Act
	Normal Operations	Tunnelling	
	Emergency situation	Fire	
	Testing & inspection of relief valves	Noise emissions	
		Disturbance to 3 rd party	
ROW Maintenance	Marine Environment		
Facility Operation & Maintenance - accommodation facilities	Spill or discharge of hazardous substances		EPA Act
	Venting / Purging		EPA Act
	Production of hazardous wastes	Tunnelling & movement of fluids along sub-surface soil corridors	

Table 2: Suggested additions to Draft Environmental Objectives & Measures

Objective	Goal	Measure	GAS – Objective Achieved
2.To promote & maintain soil stability	2.5 Prevent redirection of subsurface water & tunnel erosion along pipeline trench		Measuring soil movement?
	2.6 Avoid drainage lines or minimise disturbance to drainage lines		
3. To promote & maintain vegetation cover on ROW & minimise disturbance to fauna	3.2 Avoid disturbance of terrestrial & marine habitats		
5. To minimise the impact of operations on water	5.2 Management of hydrostat water		
6 To manage risk to environment of contamination	6.4 Prevent spills into watercourses (especially those of Ramsar sites) or significant environmental habitats		
	6.5 Management of hydrostat water		