

# Environmental Impact Report



for  
Pipeline Preliminary Survey Activities  
in South Australia

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# Executive Summary

Preliminary survey work for proposed pipeline development projects is a regulated activity under the *Petroleum Act 2000* and as such a Preliminary Survey Licence (PSL) can only be issued following the approval of an Environmental Impact Report (EIR) and Statement of Environmental Objectives (SEO).

As preliminary survey work is generally short term, small scale and low impact, PIRSA propose that a State-wide PSL (incorporating an EIR and SEO) will streamline the approval process for most preliminary survey work undertaken within South Australia.

The document has been prepared to meet the specific requirements of Section 97, of the South Australian *Petroleum Act 2000* and Regulations 10, 12 and 30 of the *Petroleum Regulations 2000*.

Activities covered by this EIR include:

- Land Survey;
- Geo-technical Survey;
- Ecological Survey; and
- Heritage Survey.

This document outlines the environmental hazards associated with the preliminary survey activities and identifies the following potential consequences:

- Landowner disturbance;
- Damage to crops / pasture;
- Disturbance to stock;
- Dust generation;
- Soil erosion;
- Weed / disease introduction;
- Damage to native vegetation and wildlife habitats;

- Disturbance to cultural heritage (Aboriginal and European);
- Visual impacts;
- Soil disturbance;
- Surface water and natural drainage disturbance;
- Waste management and disposal; and
- Fire.

All impacts have been assessed as being of **low significance**, based on their high degree of predicability and manageability. Mitigation strategies have also been proposed for each activity.

The application of this document should extend to most preliminary survey proponents across South Australia that utilise current industry practices.

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# 1 Introduction

## 1.1 Purpose

Preliminary survey work for proposed pipeline development projects is a regulated activity under the *Petroleum Act 2000* (the Act) and as such a Preliminary Survey Licence (PSL) can only be issued following the approval of an Environmental Impact Report (EIR) and Statement of Environmental Objectives (SEO).

As preliminary survey work is generally short term, small scale and low impact, it is considered that preparation of an EIR for each proposed pipeline development may result in unnecessary expense and delays for proponents and regulators. PIRSA have proposed that a State-wide EIR and SEO, will streamline the approval process for most preliminary survey work undertaken within South Australia.

The document has been prepared to meet the specific requirements of Section 97, of the South Australian *Petroleum Act 2000* and Regulations 10, 12 and 30 of the *Petroleum Regulations 2000*.

## 1.2 Scope

In order to adequately plan pipeline developments, conduct design work, and undertake the necessary environmental and engineering investigations, proponents and their contractors require access to the land within the project area to conduct preliminary surveys.

As a result, PIRSA have developed a State-wide EIR which applies to most preliminary survey activities to be conducted by proponents and their contractors. Activities identified include:

- Ecological survey (eg. flora and fauna);
- Heritage survey (Aboriginal and non-Aboriginal);
- Geotechnical surveys; and
- Land/Cadastral survey.

This EIR is prepared in support of the SEO for State-wide pipeline development projects. The document:

- Identifies limitations of the application of the EIR/SEO (Section 1.3).
- Describes the preliminary survey activities (Section 2);
- Describes the regional characteristics of the South Australian environment that can reasonably be expected to be affected by the activities (Section 3);
- Identifies potential environmental hazards and consequences (Section 4); and
- Proposes measures to mitigate potential consequences (Section 4.1).

The document also outlines the proposed environmental objectives that proponents shall commit to achieving. These objectives have been identified on the basis of the potential hazards and consequences highlighted by this assessment.

An accompanying SEO has subsequently been developed to outline the environmental objectives that the activities must conform with and the criteria upon which the achievement of these objectives will be assessed.

### 1.3 Limitations

This EIR is limited to the State of South Australia. Once the SEO developed on the basis of this document is established, additional environmental approval for preliminary survey activities is not required, provided that proposed activities fall within the scope described in this document. However, in all cases, a Preliminary Survey Licence must be obtained.

### 1.4 Definition

In the Act, environment is broadly defined to include its natural, social, cultural and economic aspects. The environmental objectives outlined in the SEO incorporate all these aspects.

This EIR relates to transmission pipelines as defined by the Act. 'Pipeline' means a pipe or system of pipes for conveying petroleum or another regulated substance from place to place and includes:

- Tanks, machinery and equipment necessary for, or associated with, its operation; and
- A part of a pipeline.

Under the Act a PSL authorises a licensee to carry out a survey, environmental evaluation, or other form of assessment preparatory to the carrying out of regulated activities on land. A PSL may also authorise incidental matters such as marking out the proposed route of a pipeline.

### 1.5 Environmental Commitment

Proponents shall be committed to responsible environmental management of all phases of the proposed pipeline projects. Proponents must commit to achieving the environmental objectives outlined in the SEO as part of adopting and implementing the requirements of the PSL.

# 2 Preliminary Survey Activities

As part of the engineering and environmental planning for proposed pipeline projects, proponents and their contractors will undertake a range of field based preliminary survey activities, namely associated with:

- Ecological Survey;
- Heritage Survey;
- Geo-technical Survey; and
- Land/Cadastral Survey.

These activities are briefly described below.

## 2.1 Ecological Survey

In order to determine the significance of potential ecological impact, a basic field survey will be conducted. This will involve:

- Gaining access to areas of native vegetation, identifying plant species, noting the condition of vegetation communities and undertaking faunal survey/s to identify potential wildlife habitats. Small cuttings may be collected from some plant species for off-site identification, if necessary. Minimal equipment is required for this task and is limited to the access vehicle and hand tools (eg. secateurs) and handheld camera.

## 2.2 Heritage Survey

In order to determine the significance of potential impacts to cultural heritage, a basic field survey will be conducted. This may involve:

- Traversing the alignment and surrounding lands (up to 100m) to identify sites of significance including archaeological sites and sites of significance to Aboriginal tradition, anthropology or history. Archaeological survey involves examining bare or cleared areas for the presence of historical and/or pre-historical artefacts. Shallow excavations, conducted by hand, may be undertaken if potential sites are identified. Generally, test pitting<sup>1</sup> is not expected to be undertaken during the preliminary survey phase. Field inspections will be conducted by a qualified archaeologist and shall include representatives of the local Aboriginal community and/or members of the appropriate heritage committee.

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<sup>1</sup> Test pitting involves use of a test probe, hand auger or back-hoe to sample or excavate sub-surface soils to detect the presence of artefacts.

## 2.3 Geo-technical Survey

In order to adequately design the pipe and plan construction, a limited geo-technical survey may be conducted. This would be limited to:

- Minor excavation works at selected locations to identify the presence and nature of rock. Small holes up to 1.5m deep and 600mm in width would be excavated and equipment would be limited to the access vehicle and a small backhoe.
- Soil sampling (particularly soil resistivity testing) to assist in planning the cathodic protection system. This involves collection of soil samples for later analysis. Minimal equipment is required for this task and is limited to the access vehicle and hand auger.

## 2.4 Land/Cadastral Survey

The proposed pipeline alignment will need to be identified both physically in the field and legally on maps, plans and land titles. To enable this a number of activities will need to be conducted during the preliminary survey phase of the project, including:

- Installing marker pegs at regular intervals. These will usually be installed adjacent fencelines and at bends in the proposed alignment. Minimal equipment is required for this task, and is limited to the access vehicle<sup>2</sup>, wooden pegs, flagging tape and hand tools (eg. hammer).
- Recording the legal (or cadastral) location of the alignment. This may not be undertaken until after construction, and so may be covered by the Pipeline Licence. However, there is a possibility that during the preliminary survey phase, licenced land surveyors may undertake site work. Minimal equipment is required for this task and is limited to the access vehicle, survey equipment (such as theodolite and survey rule) and hand tools.

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<sup>2</sup> Access vehicles, unless otherwise stated, are standard four-wheel drives.

# 3 Overview of Regional Environment

It is not the intention of this EIR to describe all significant (or otherwise) environmental characteristics of South Australia and associated regions, but to provide an overall perspective of the regional environments.

The existing environmental description of this report has largely been derived from Regional Biodiversity Plans and District Soil Management Plans. Biodiversity regions, developed by the Department of Environment and Heritage, have been referred to in this document to ensure that future industry development remains consistent with current strategic government conservation and land use planning policies (Figure 1).

Proponents should consult relevant documents, reports, other available literature and agencies for further site specific information pertaining to the project area.

## 3.1 South East

The South East Region has a cool moist climate with cool wet winters and long mild dry summers. The general trend is for rainfall to decrease northwards and away from the coast (ie. coastal rainfalls recorded at a maximum of 850mm and 450mm to the north). Most rain falls in the winter months.

The South East Region has a low relief with unique landforms, originating from a long geological history.

The region represents the limit of grassy woodland, forest and wetland plant communities more typical of south eastern Australia, and the southern limit of the mallee plant communities found in the north. It is estimated that 78% of the region comprises privately owned agricultural land, with 87% of native vegetation cleared primarily for agriculture. The remaining native vegetation is not evenly distributed, but concentrated in areas less suitable to agriculture. Most of the remaining areas of vegetation occur in conservation reserves, along roadsides, and in scattered woodland or as isolated trees within paddocks.

## 3.2 Kangaroo Island

Kangaroo Island lies approximately 15 kilometres off the tip of Fleurieu Peninsula in southern South Australia and covers an area of about 4,350 square kilometres. The Island comprises high coastal cliffs at the north-western end and a central plateau which is tilted gently towards the more subdued topography of limestone plains and sand dunes along the southern coastline.

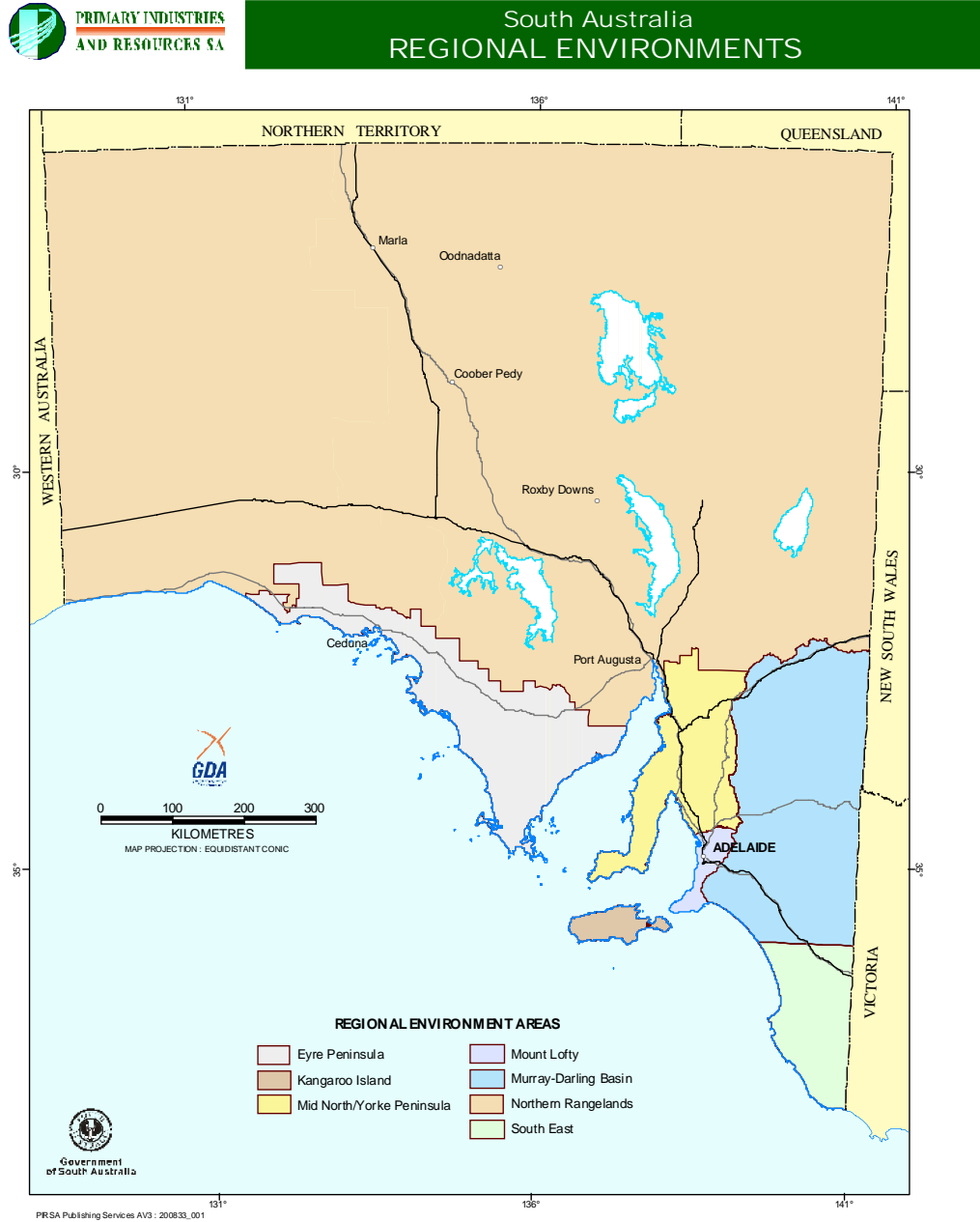


Figure 1 Biodiversity Regions of South Australia

The Island has a reliable moderate to high rainfall, ranging from 470 mm a year on the eastern and southern plains to 900 mm a year in the higher areas in the north west.

Approximately 60% of the land within the region is used for dryland agriculture, while 27% is designated as a park/conservation resource. Farming mainly involves sheep for wool and meat production.

The region comprises six land units based on a partial amalgamation of the eleven soil landscape units. The Ironstone Plateau and Outliers is the largest land unit in the region and includes flat to undulating country. Acid, yellow-brown, gravelly duplex soils predominate, with a permeable loamy to sandy topsoil overlying relatively impermeable mottled clay. Areas of greyish acid sands with a bleached subsurface are associated mainly with lower slopes and valley floors. Most of this country is prone to major land degradation problems, with salinity, waterlogging, acidity and decline in soil structure and organic matter being potentially the most widespread.

### 3.3 Mt Lofty Ranges

Mt Lofty is the single most important topographical feature causing the capital city of Adelaide to experience a different climate in contrast to those of similar latitudes. The Mt Lofty Region is characterised by a Mediterranean type climate of relatively long dry summers and cool winters with a distinct seasonal (winter) rainfall. Mean annual rainfall in the Ranges varies from 400mm to 1100mm, to 250-350mm elsewhere. The region is also susceptible to high intensity rain storms which can cause serious water erosion on unprotected land. Wind erosion may also occur on the lighter soils of the western plains where cover is not maintained.

The region comprises a well defined zone of uplands, which extends from the Flinders Ranges through to the Fleurieu Peninsula. The major soil groups of the district are clayey red-brown earths in the broad valleys to the east, loamy mallee soils to the west, and sandy mallee soils in northern areas.

Similar to many regions of the State, over 85% of native vegetation has been cleared for agriculture and urban expansion. A large proportion of remnant vegetation occurs on private land with 23% confined to conservation reserves; the latter represents just 4% of the entire Mount Lofty Ranges region. Most of the land is used for cropping and/or grazing.

### 3.4 Eyre Peninsula

Being close to the sea the Eyre Peninsula Region has a predominantly mild climate. Droughts are fairly rare, particularly in the above 400 mm annual rainfall areas. Rainfall is winter dominant, and in wet seasons, waterlogging may be a problem in some areas. Although not common, intense rainfall events and strong, erosive winds can occur at any time of the year.

About 72% of the region is cleared, and most of this is considered arable. The main land use is cereal and grain legume cropping in rotation with grazed pastures. Other minor land uses include livestock production (sheep and cattle). Semi-arable and non-arable cleared land, and areas with scattered vegetation (13 % of the district) are used mainly for grazing.

The geology of land in the area, falls into three groups (Archaean and Proterozoic basement rocks, Tertiary weathered basement rocks and sediments and Quaternary sediments, largely sands and limestones.)

Native vegetation in the region is generally restricted to lakes, coastal dunes and scattered remnant native vegetation communities, much of which is non-arable or semi-arable land. Of this, a high proportion occurs within National Parks and Wildlife Service reserves. In addition, a

significant area of native vegetation is also under private Heritage Agreements. Strips of remnant vegetation have also been retained, or restored using native vegetation species, along fencelines as windbreaks and shelterbelts for stock and crops.

### 3.5 Mid North/York Peninsula

The region experiences hot dry summers and mild winters. The Yorke Peninsula has a lower annual rainfall than the Mid North with average falls of about 480mm near Maitland. This falls away dramatically towards the coast and is as low as 288 mm in some coastal areas. Rainfall peaks during April to October in the Mid North producing an annual rainfall of approximately 650mm in the ranges and 325mm near the coast.

Much of the Mid North consists of a broad flat highland plateau in the east which is flanked by a coastal plain in the west. On the Yorke Peninsula the topography is gently undulating, with an average elevation of about 90m above sea level.

The major landuse throughout the region is barley and wheat production. Sheep grazing for wool production is also a significant landuse throughout the area.

Much of the native vegetation has been removed as a result of extensive cultivation and grazing. However, many roads were surveyed as stock routes and as such substantial vegetation remains along some road verges. Few conservation reserves exist throughout the region, with Mount Remarkable National Park and Innes National Park being the only substantial areas of native vegetation within reserves. Dominant vegetation types include mallee scrub and sclerophyll woodland and forest in inland areas and coastal dune vegetation along the coastline.

### 3.6 Northern Rangelands

The climate of the northern arid zone of South Australia is characterised by hot, usually dry summers and mild dry winters. Rainfall variability in the region is amongst the highest in Australia, while average annual totals are amongst the lowest. Mean annual rainfall ranges from less than 150 mm in the north-east to around 225 mm in the far north-west. No seasonality of rainfall is apparent.

Land use in the region consists mainly of stock grazing, mining, tourism, defence industry operations and oil and gas exploration and production. Sixty percent of the land is used for pastoral production and the majority of the remainder is either Aboriginal land or in National Parks or other conservation reserves.

Clay pans, dunefields, gibber, floodplains and tablelands are all features of the region. The topography is relatively flat and throughout much of the region the vegetation consists mainly of low open woodlands, grasslands and chenopod shrublands.

### 3.7 Murray-Darling Basin

The rainfall of the Murray-Darling Basin is low, ranging from 250 mm per year in the north to 400 mm per year in the south. In the north the rainfall is unreliable and droughts are common.

The major land use is cereal/sheep farming, with crops grown in rotation with annual medic pastures.

The district consists of a vast plain of low elevation, with sandhills and gently undulating sandy rises interspersed by flats, depressions and low rises. Most of the sandhills are long, narrow,

parallel ridges that lie in an east-west direction but large, disordered and crescent shaped dunes also occur.

The soils are generally sandy in texture and highly susceptible to wind erosion. Exceptions include very stony land and the uncleared land. Shallow soils over limestone are common in the western portion of the region but virtually absent in the east. Wind erosion is also compounded by the low and unreliable rainfall in the north and by water repellence in the south.

Much of the region was originally covered in thick mallee scrub. About 80% of this has been cleared or degraded through agricultural development and most of the remaining vegetation is in conservation parks. The uncleared land consists primarily of sandhills and limestone outcrops.

# 4 Environmental Hazards, Potential Consequences and Management Strategies

The environmental hazards associated with the preliminary survey activities and their potential consequences are outlined Table 1. Strategies to mitigate potential consequences and the proposed environmental objectives to be achieved are outlined in Table 2.

The content of these tables has been compiled to meet the requirements of Regulation 10(1). In particular, the tables:

- List the activities to be conducted as part of the preliminary survey that have the potential to result in environmental impact;
- Identify the hazards associated with these activities including atypical hazards;
- Provide an indication of the frequency of hazards;
- Identify potential consequences and their expected duration;
- Outline mitigation measures.

In addition, Regulation 10(1) requires:

- an explanation of the basis on which the hazards and their frequency and consequence have been predicted;
- an assessment of the extent to which consequences can be addressed.

These requirements are addressed below.

## Prediction of Hazards and Frequency and Consequence

Records of potential hazards and consequences associated with preliminary survey activities are not well documented. Hazards and consequences have therefore been identified by engineering, lands and environmental planners based on first hand industry experience gained over many years.

Preliminary survey activities are conducted over a short period. The frequency with which hazards occur can be confidently estimated based on the number of times that preliminary survey activities are conducted (refer Table 1).

**Table 1: Potential Environmental Hazards and Consequences**

Activity	Hazard	Frequency	Potential Consequence	Duration of Consequences
Ecological Survey (refer to Section 2.1)	Vehicle access <sup>1</sup>	<ul style="list-style-type: none"> <li>▪ Once for selected properties only.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Landowner disturbance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approximately half a day per property.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Damage to crops / pasture (restricted to vehicle wheel tracks)</li> </ul>	<ul style="list-style-type: none"> <li>▪ One year</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to stock</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approximately half a day per property.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Dust generation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approximately half a day per property.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to drainage patterns</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up to one month</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to cultural heritage sites</li> </ul>	<ul style="list-style-type: none"> <li>▪ Permanent</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Waste generation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up to one month</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Polluted surface water/groundwater from vehicle fuel and oil spills (ie. from vehicle tanks and engine)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Possibly long term (&gt;5yrs).</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Weed / disease introduction</li> </ul>	<ul style="list-style-type: none"> <li>▪ Possibly long term (&gt;5yrs).</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to native fauna</li> </ul>	<ul style="list-style-type: none"> <li>▪ Short term (ie. limited to duration of site visit)</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Fire</li> </ul>	<ul style="list-style-type: none"> <li>▪ One season</li> </ul>
	Collection of vegetation samples	<ul style="list-style-type: none"> <li>▪ Once for selected properties only.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Damage to vegetation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Permanent loss of some foliage.</li> </ul>
Heritage Survey (refer to Section 2.2)	Vehicle access <sup>1</sup>	<ul style="list-style-type: none"> <li>▪ Once for selected properties only.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Landowner disturbance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approximately half a day per property.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Damage to crops / pasture (restricted to vehicle wheel tracks)</li> </ul>	<ul style="list-style-type: none"> <li>▪ One year.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to stock</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approximately half a day per property.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Dust generation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approximately half a day per property.</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to drainage patterns</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up to one month</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Disturbance to cultural heritage sites</li> </ul>	<ul style="list-style-type: none"> <li>▪ Permanent</li> </ul>
			<ul style="list-style-type: none"> <li>▪ Waste generation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up to one month</li> </ul>

Activity	Hazard	Frequency	Potential Consequence	Duration of Consequences
Heritage Survey (refer to Section 2.2) cont.	Vehicle access <sup>1</sup> cont.	▪	▪ Polluted surface water/groundwater from fuel and oil spills (ie. from vehicle fuel tanks and engine)	▪ Possibly long term (>5yrs).
			▪ Weed / disease introduction	▪ Possibly long term (>5yrs).
			▪ Fire	▪ One season
	Localised shallow excavations	▪ Once for selected properties only.	▪ Damage to crops / pasture (<5m <sup>2</sup> )	▪ One year.
			▪ Soil disturbance	▪ Approximately half a day per property.
			▪ Erosion	▪ Up to one month.
Geo-technical Survey (refer to Section 2.3)	Vehicle access <sup>1</sup>	▪ Twice for selected properties only (associated with initial excavation and reinstatement, respectively).	▪ Landowner disturbance	▪ Approximately one day per property.
			▪ Damage to crops / pasture (restricted to vehicle wheel tracks)	▪ One year.
			▪ Disturbance to stock	▪ Approximately one day per property.
			▪ Dust generation	▪ Approximately one day per property.
			▪ Disturbance to drainage patterns	▪ Up to one month
			▪ Disturbance to cultural heritage sites	▪ Permanent
			▪ Polluted surface water/groundwater from fuel and oil spills (ie. from vehicle tanks and engine)	▪ Possibly long term (>5yrs).
			▪ Waste generation	▪ Up to one month
			▪ Weed / disease introduction	▪ Possibly long term (>5yrs).
			▪ Fire	▪ One season
	Localised excavation	▪ Twice for selected properties only (associated with initial excavation and reinstatement, respectively).	▪ Damage to crops / pasture (approx. 20 m <sup>2</sup> per site)	▪ One year.
			▪ Soil disturbance (approx. 20 m <sup>2</sup> per site)	▪ Approximately one day per property.
			▪ Disturbance to drainage patterns	▪ Up to one month.
			▪ Damage to native vegetation and wildlife habitat	▪ Small scale, permanent loss of foliage and habitat.

Activity	Hazard	Frequency	Potential Consequence	Duration of Consequences
Geo-technical Survey (refer to Section 2.3)cont.	Localised excavation cont.		▪ Dust generation	▪ Approximately one day per property.
			▪ Disturbance to cultural heritage sites	▪ Permanent
			▪ Waste generation	▪ Up to one month
			▪ Weed / disease introduction	▪ Possibly long term (>5yrs)
			▪ Visual impacts	▪ Up to one month.
	Soil sampling	▪ Once for selected properties only.	▪ Damage to crops / pasture (<1m <sup>2</sup> )	▪ One year.
			▪ Damage to native vegetation and wildlife habitat	▪ Small scale, permanent loss of foliage and habitat
			▪ Soil disturbance (<1m <sup>2</sup> )	▪ Approximately half a day per property.
	Land Survey (refer to Section 2.4)	Vehicle access <sup>1</sup>	<ul style="list-style-type: none"> <li>▪ Initial alignment pegging - not more than 3 visits expected per property.</li> <li>▪ Cadastral survey - not more than 3 visits expected per property.</li> </ul>	▪ Landowner disturbance
▪ Damage to crops / pasture (restricted to vehicle wheel tracks)				▪ One year.
▪ Disturbance to stock				▪ Approximately half a day per property.
▪ Dust generation				▪ Approximately half a day per property.
▪ Disturbance to drainage patterns				▪ Up to one month
▪ Disturbance to cultural heritage sites				▪ Permanent
▪ Polluted surface water/groundwater from fuel and oil spills (ie. from vehicle tanks and engine)				▪ Possibly long term (>5yrs).
▪ Waste generation				▪ Up to month
▪ Weed / disease introduction				▪ Possibly long term (>5yrs).
▪ Fire		▪ One season		
Installation of alignment markers		▪ Not more than 3 visits expected per property.	▪ Visual impacts	▪ Up to six months.
Set-up of survey equipment	▪ Not more than 3 visits expected per property. Once per property.	▪ Damage to native vegetation	▪ Permanent loss of some foliage.	

Note 1: Each type of survey may be undertaken independently, thus resulting in cumulative impacts. As noted in Table 2, efforts will be made to rationalise visits where possible.

**Table 2: Environmental Objectives and Mitigation Strategies**

Potential Consequence	Environmental Objectives	Issue Specific Mitigation Strategies	Extent to which consequence can be addressed	Significance of Consequence
<ul style="list-style-type: none"> <li>▪ Landowner disturbance</li> </ul>	1. To minimise disturbance to landowners.	<ul style="list-style-type: none"> <li>▪ Appoint Lands Officer with specific responsibility for maintaining contact with all potentially affected landowners.</li> <li>▪ Consult with landowners prior to preliminary survey activities to identify specific requirements.</li> <li>▪ Accommodate landowners' specific requirements wherever practicable.</li> <li>▪ Advise landowners of the scope, schedule and duration of preliminary survey activities.</li> <li>▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.</li> <li>▪ Provide landowners with adequate prior notice of proposed land access (refer Part 10(Section 60-64) of the Act).</li> </ul>	Adverse consequences can be managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Damage to crops / pasture</li> </ul>	2. To minimise damage to crops and pasture.	<ul style="list-style-type: none"> <li>▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.</li> <li>▪ Use existing tracks where available.</li> <li>▪ Provide landowners with adequate prior notice of proposed land access.</li> <li>▪ Restrict the area utilised for excavation to the smallest practicable.</li> <li>▪ Restrict disturbance to proposed construction right-of-way (ie. proposed construction corridor) where practicable.</li> <li>▪ Keep topsoil separate from subsoil.</li> <li>▪ Restore soil profile and contours to landowner satisfaction, as soon as practicable</li> </ul>	Adverse consequences can be managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Disturbance to stock</li> </ul>	3. To minimise disturbance to stock.	<ul style="list-style-type: none"> <li>▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.</li> <li>▪ Consult with landowners prior to preliminary survey activities to identify specific requirements.</li> <li>▪ Provide landowners with adequate prior notice of proposed land access.</li> <li>▪ Drive vehicles at appropriately slow speeds to avoid undue disturbance.</li> <li>▪ Leave gates as found.</li> </ul>	Adverse consequences can be managed in the short term.	LOW

Potential Consequence	Environmental Objectives	Issue Specific Mitigation Strategies	Extent to which consequence can be addressed	Significance of Consequence
<ul style="list-style-type: none"> <li>▪ Disturbance to native fauna</li> </ul>	4. To prevent disturbance to native fauna	<ul style="list-style-type: none"> <li>▪ Drive vehicles at appropriately slow speeds to avoid undue disturbance.</li> <li>▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.</li> <li>▪ Clearing native vegetation as part of survey activities to be avoided.</li> <li>▪ Undertake ecological survey prior to geo-technical and land/cadastral survey and identify any "no-go" areas.</li> </ul>	Adverse consequences can be managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Dust generation</li> </ul>	5. To minimise generation of dust.	<ul style="list-style-type: none"> <li>▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.</li> <li>▪ Drive vehicles at appropriately slow speeds to avoid undue disturbance.</li> </ul>	Adverse consequences can be managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Soil erosion</li> </ul>	6. To minimise erosion.	<ul style="list-style-type: none"> <li>▪ Rehabilitate areas of erosion.</li> <li>▪ Restore soil profile to as close to the original state as practicable.</li> <li>▪ Restrict areas of excavation to the smallest practicable.</li> </ul>	Adverse consequences can be avoided or managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Weed / disease introduction</li> </ul>	7. To avoid the introduction of weeds or disease.	<ul style="list-style-type: none"> <li>▪ Identify local weed and disease management issues prior to the commencement of preliminary survey activities (local Department of Environment and Heritage officer and PIRSA sustainable Resources local contact).</li> <li>▪ Management procedures in place to prevent the spread of identified weeds/diseases/pathogens.</li> <li>▪ Ensure all equipment and vehicles are cleaned before entry and exit between regions and properties and when exiting any roadside quarantine areas and that equipment and vehicles are free of soil and vegetative matter.</li> <li>▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.</li> <li>▪ Consult with landowners prior to preliminary survey activities to identify specific requirements.</li> <li>▪ Planning should take account of season / climates, as some pathogen born diseases (e.g. dieback) are transported during these conditions.</li> </ul>	Adverse consequences can be avoided or it is highly unlikely that they will occur.	LOW

Potential Consequence	Environmental Objectives	Issue Specific Mitigation Strategies	Extent to which consequence can be addressed	Significance of Consequence
<ul style="list-style-type: none"> <li>▪ Damage to native vegetation and wildlife habitats</li> </ul>	<p>8. To avoid or minimise damage to native vegetation and wildlife habitats.</p>	<ul style="list-style-type: none"> <li>▪ Prohibit clearing native vegetation as part of land survey. As demonstrated in Section 3.0, the remnancy levels of native vegetation in all regions are so low that any further clearance must be avoided wherever possible.</li> <li>▪ Conduct soil excavations away from areas of native vegetation.</li> <li>▪ Samples of native vegetation are to be collected by qualified botanists or appropriately trained and experienced personnel under appropriate permits from the Department of Environment and Heritage.</li> <li>▪ Any areas of clearance will be restored/rehabilitated using local seed sources, where available, and appropriate methods.</li> <li>▪ Undertake ecological survey prior to geo-technical and land/cadastral survey and identify any "no-go" areas. Survey work to be undertaken by botanist or appropriately trained and experienced personnel.</li> <li>▪ Notify DEH where disturbance to any areas of intact native vegetation may be involved.</li> </ul>	<p>Adverse consequences can be avoided or it is highly unlikely that they will occur.</p>	<p>LOW</p>
<ul style="list-style-type: none"> <li>▪ Disturbance to cultural heritage sites</li> </ul>	<p>9. To avoid damage or unnecessary disturbance to cultural heritage sites.</p>	<ul style="list-style-type: none"> <li>▪ Survey work to be undertaken by appropriately trained and experienced personnel.</li> <li>▪ The proponent shall have a mechanism in place to appropriately report and respond to any sites discovered during pipeline survey activities.</li> <li>▪ Any sites shall recorded for subsequent avoidance during construction.</li> <li>▪ Undertake heritage survey prior to geo-technical and land/cadastral survey and identify any "no-go" areas.</li> </ul>	<p>Adverse consequences can be avoided or it is highly unlikely that they will occur.</p>	<p>LOW</p>
<ul style="list-style-type: none"> <li>▪ Visual impacts</li> </ul>	<p>10. To minimise visual impacts.</p>	<ul style="list-style-type: none"> <li>▪ Limit the use of marker pegs to those essential for identifying the proposed alignment.</li> <li>▪ Install marker pegs on fencelines, where practicable.</li> <li>▪ Conduct excavations in areas away from general public view, where practicable.</li> <li>▪ Restore excavations as soon as practicable.</li> </ul>	<p>Adverse consequences can be managed in the short term.</p>	<p>LOW</p>

Potential Consequence	Environmental Objectives	Issue Specific Mitigation Strategies	Extent to which consequence can be addressed	Significance of Consequence
<ul style="list-style-type: none"> <li>▪ Soil disturbance</li> </ul>	11. To minimise soil disturbance.	<ul style="list-style-type: none"> <li>▪ Restrict the area utilised for excavation to the smallest practicable.</li> <li>▪ Restrict disturbance to proposed construction right-of-way (ie. proposed construction corridor) where practicable.</li> <li>▪ Keep topsoil separate from subsoil.</li> <li>▪ Restore soil profile and contours to landowner satisfaction, as soon as practicable.</li> <li>▪ Vehicles to use existing road tracks where practicable.</li> <li>▪ Avoid advancement of sand dunes in coastal environments from excessive or unnecessary soil disturbance.</li> </ul>	Adverse consequences can be managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Surface water and drainage pattern disturbance</li> </ul>	12. To minimise impact of surface water, groundwater and drainage patterns	<ul style="list-style-type: none"> <li>▪ Access routes shall be located to avoid any diversion of water during flood inundation.</li> <li>▪ Avoiding areas of inundation which may result in bogging, or creation of heavy wheeltrack rutting ( more than 200mm deep).</li> <li>▪ Vehicles are to be parked away from watercourses or sensitive ecological environments (minimum 50m).</li> </ul>	Adverse consequences can be managed in the short term.	LOW
<ul style="list-style-type: none"> <li>▪ Disturbance to the environment from waste handling and disposal</li> </ul>	13. To minimise the impact on the environment of waste handling and disposal	<ul style="list-style-type: none"> <li>▪ All rubbish shall be removed from survey site</li> <li>▪ All vehicle oil spills shall be managed appropriately.</li> </ul>	Adverse consequences can be avoided or are highly unlikely to occur.	LOW
<ul style="list-style-type: none"> <li>▪ Fire</li> </ul>	14. To minimise the risk of fire	<ul style="list-style-type: none"> <li>▪ Diesel vehicles shall be used where practicable.</li> <li>▪ Fire extinguishers and/or knapsacks shall be kept in all vehicles.</li> <li>▪ Avoid parking in or driving through long grass.</li> <li>▪ No smoking.</li> </ul>	Adverse consequences can be avoided or are highly unlikely to occur.	LOW

## 4.1 Mitigation Strategies

In addition to the issue specific mitigation strategies outlined in Table 2, proponents shall implement the following general management procedures:

### Awareness Program

All personnel involved with field-based preliminary survey activities will be provided with a copy of Table 1 and 2 of this EIR. Proponents shall ensure that all personnel are adequately aware of the relevant impact mitigation strategies.

### Implementation Strategies

Proponents and contractors shall develop site specific mitigation strategies. In undertaking activities proponents need to be mindful of their obligations under relevant legislation, including, but not limited to:

- *Aboriginal Heritage Act 1988;*
- *Animal and Plant Control Act 1986;*
- *Environment Protection Act 1993;*
- *Environment Protection and Biodiversity Conservation Act 1999;*
- *Forestry Act 1950;*
- *Heritage Act 1993;*
- *National Parks and Wildlife Act 1972;*
- *Native Vegetation Act 1991;*
- *Pastoral Land Management and Conservation Act 1989; and*
- *Water Resources Act 1997.*

In order to avoid disturbance to potentially significant flora and fauna species and/or cultural heritage sites ecological and heritage surveys be conducted prior to geo-technical and land/cadastral surveys.

### Contractual Obligations

All contracts with companies undertaking preliminary survey activities for the proponent shall include a requirement to:

- operate in a manner consistent with the proponents Environmental Policy; and
- to adopt mitigation strategies outlined in this EIR.

### Reporting

Any complaints from landowners that arise as a direct result of preliminary survey activities will be recorded by the Lands Officer and reported to the proponents 'Lands and Environmental Manager' or personnel of equivalent responsibility.

## 4.2 Significance of Consequences

A qualitative assessment has been made of the significance of the potential environmental consequences, using the methodology outlined in PIRSA (2000), which proposes an assessment based on the following criteria:

- The predictability (or certainty) of hazards and consequences, with regard to their:
  - size, scope, duration, likelihood and stakeholder concerns; and
- The degree to which consequences can be managed in relation to:

- being avoided, likelihood of occurring, duration; size and scope, cumulative effects and stakeholder concerns.

The result of the assessment was that all potential impacts were of **LOW** significance on the basis that:

**Predictability criterion significance score = 1**

i.e. All hazards and consequences can be accurately predicted to a high level of confidence.

**Manageability criterion significance score = 1 or 2**

i.e. Adverse consequences can be avoided or it is highly unlikely that they will occur. Or Adverse consequences can be managed in the short term.

# 5 Consultation

Consultation with external stakeholders must be conducted during the preliminary survey activities, planning, design and pre-construction phases. Proponents will consult, as appropriate, with:

- State Government Departments (in particular PIRSA, Department of Environment and Heritage and Department of Water Resources).
- Department of State Aboriginal Affairs
- Local Government.
- Landowners.
- Non-government organisations (eg. local conservation groups, farmers groups, Aboriginal communities, native title claimants).

Regulation 10e of the Act requires the identification and listing of all landholders whose property may be affected by preliminary survey activities. As this EIR applies to the whole State, this requirement is considered impractical. In response, it will be a condition that prior to the commencement of any work being undertaken a list of all landowners must be submitted to PIRSA. Following the granting of a PSL, proponents must consult with all landowners whose land may be affected by survey activities, prior to the conduct of such activities. Records of all consultations shall be kept.

# References

The following reference/s were reviewed as part of the preparation of the EIR:

Petroleum Group (PIRSA) (2000) *Criteria for Classifying the Level of Environmental Impact of Regulated Activities: Requirements under Part 12 Petroleum Act 2000*. <http://www.pir.sa.gov.au>

In addition, the existing environment description of this report was largely derived from the Department for Environment and Heritage Regional Biodiversity Plan for the South East and District Soil Management Plans. Relevant District Soil Management Plans can be accessed via: <http://www.pir.sa.gov.au>

# Abbreviations

EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EIR	Environmental Impact Report prepared in accordance with Section 97 of the <i>Petroleum Act 2000</i> and Regulation 10.
JEA	Job Environmental Analysis
km	Kilometre
mm	Millimetre
PIRSA	Primary Industries and Resources, South Australia
PSL	Preliminary Survey Licence issued in accordance with Section 10 of the <i>Petroleum Act 2000</i> .
SEO	Statement of Environmental Objectives prepared in accordance with Section 99 and 100 of the <i>Petroleum Act 2000</i> and Regulations 12 and 13.