Iona to Adelaide Pipeline

Preliminary Survey Activities

Environmental Impact Report

March 2001

GPU GasNet

ecos CONSULTING (AUST) PTY LTD

Prepared for:

GPU GasNet Pty Ltd
180 Greens Road
DANDENONG
Victoria 3175

Prepared by:

Ecos Consulting (Aust) Pty Ltd
ABN 57 081 918 194
26 Greenhill Road
WAYVILLE
South Australia 5034

ph: (08) 8357 0400
fax: (08) 8357 0411
ecos@ecos.com.au
www.ecos.com.au

DOCUMENT CONTROL SHEET
Iona to Adelaide Pipeline Preliminary Survey Activities - Environmental Impact Report

Document Reference	Revision Number	Revision Date	Compiled by	Checked by	Approved by	Comment
gpu001rsc	**A**	**12/03/01**	**SC/MCW**	**JW**	**MCW**	**Issued for review by GPU GasNet Pty Ltd**
gpu001rsc	**0**	**14/03/01**	**SC**	**MCW**	**MCW**	**Issued to PIRSA**

Executive Summary

GPU GasNet Pty Ltd (GPU) is part of a consortium comprising Australian National Power, Origin Energy and SAMAG that plans to develop a pipeline to provide natural gas to the Adelaide region. GPU will design, construct and operate the pipeline. The pipeline will commence at Iona in south-west Victoria and connect into the Moomba - Adelaide Pipeline north of Adelaide or directly to customer locations or the distribution system. The South Australian section of the proposed pipeline is approximately 380km in length and travels from the Victorian-South Australian border, north of Naracoorte, through to Adelaide's northern suburbs (refer Figure 1).

This Environmental Impact Report has been prepared in support of an application for a Preliminary Survey Licence (PSL) to allow engineering and environmental investigations to be conducted in a corridor, approximately 20km wide, along the proposed pipeline route. The activities to be covered by the PSL are:

- 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;
- Weed / disease introduction;
- Damage to native vegetation;
- Visual impacts;
- Soil disturbance;

- Disturbance to cultural heritage sites;
- Surface water and drainage disturbance;
- Waste generation;
- Fire

Mitigation strategies have been proposed and all impacts have been assessed as being of **low significance**, based on their high degree of predictability and manageability.

Table of Contents

Table of Figures

1 Introduction

1.1 Background

GPU GasNet Pty Ltd (GPU) is part of a consortium comprising Australian National Power, Origin Energy and SAMAG that plans to develop a pipeline to provide natural gas to the Adelaide region. GPU will design, construct and operate the pipeline. The pipeline will commence at Iona in south-west Victoria and connect into the Moomba - Adelaide Pipeline north of Adelaide or directly to customer locations or the distribution system. The South Australian section of the proposed pipeline is approximately 380km in length and travels from the Victorian-South Australian border, north of Naracoorte, through to Adelaide's northern suburbs via Murray Bridge and Williamstown (refer Figure 1).

GPU are currently seeking a Preliminary Survey Licence (PSL), to allow engineering and environmental investigations to be conducted in a corridor, approximately 20km wide, along the proposed pipeline route.

1.2 Regulatory Framework

To adequately plan the project, design the pipeline and conduct the necessary environmental investigations, GPU and its contractors require access to the land within the project area, to conduct preliminary surveys.

Preliminary survey activities associated with a proposed pipeline are "regulated activities" under Section 10 of the *Petroleum Act 2000* **(the Act) and can only be conducted under a PSL. The licensing process for preliminary surveys is separate from that of the pipeline licence and requires the preparation of a separate Environmental Impact Report (EIR) and Statement of Environmental Objectives (SEO).**

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

1.3 About this Document

This document is the EIR prepared in support of the application for a PSL for the proposed Iona to Wasleys pipeline. The document:

- **Describes the preliminary survey activities (Section 2);**
- **Describes the specific features of the 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).**

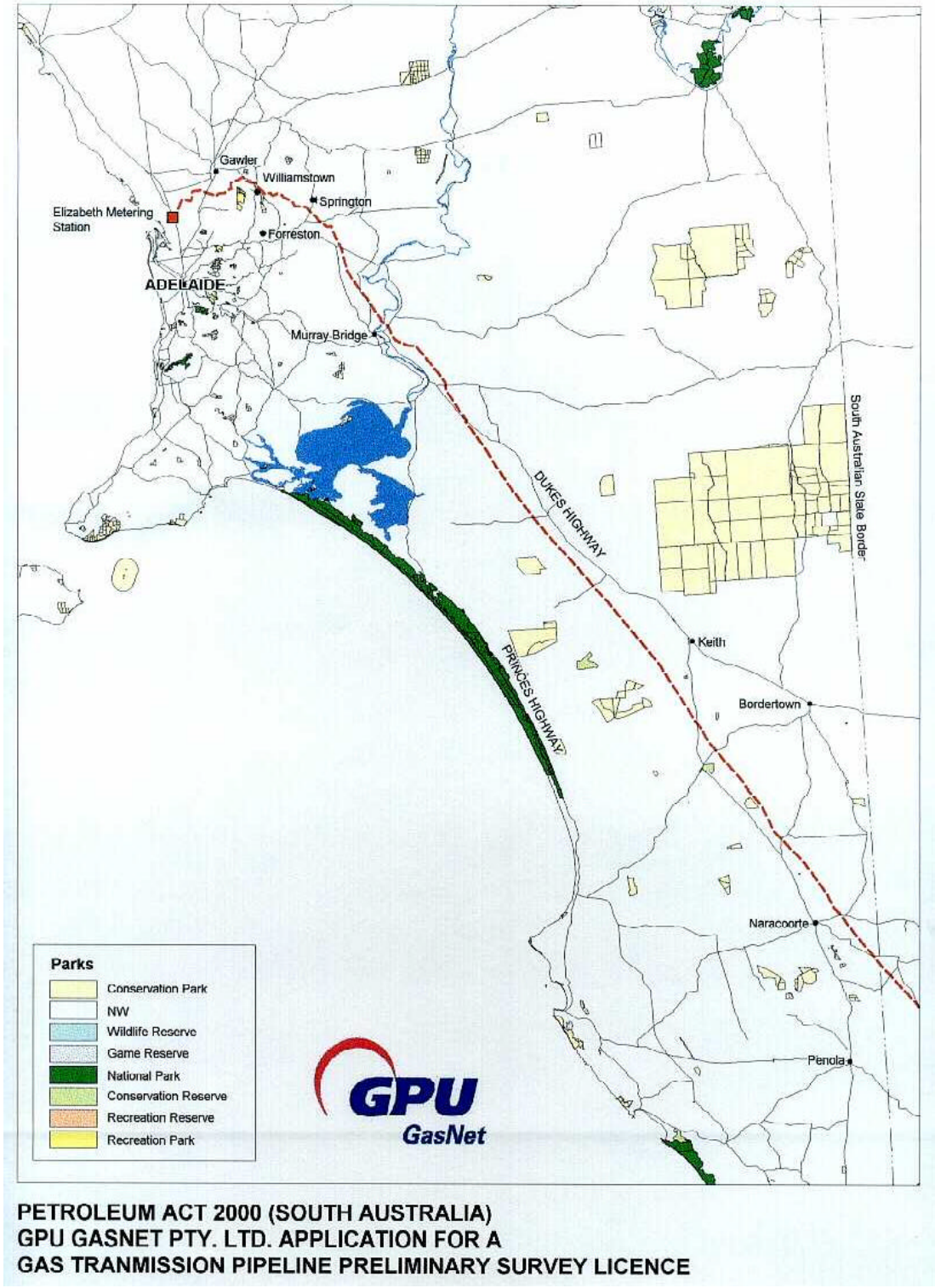

Figure 1: South Australian section of the proposed Iona to Adelaide pipeline.

The document also outlines the proposed environmental objectives that GPU commit to achieving. These objectives have been identified on the basis of the potential hazards and consequences highlighted by this assessment. These objectives are carried over into the accompanying SEO.

1.4 About GPU

GPU owns and maintains almost 2000 kilometres of high-pressure transmission pipeline in Victoria and is responsible for transporting almost all of Victoria's natural gas supplies. The pipeline network traverses much of Victoria and has over 100 offtakes to most of Victoria's regional centres and cities. The annual throughput is typically in excess of 200 petajoules.

As well as its pipeline network, GPU also owns and operates a liquefied natural gas storage and vaporisation facility in Dandenong, compressor stations at Gooding, Brooklyn, Wollert, Springhurst and on two sites in New South Wales and other facilities including metering, odourant injection, monitoring, control and communication systems.

GPU GasNet is a subsidiary of GPU Inc., one of the world's leading providers of energy-related infrastructure and services. GPU Inc. has significant transmission and distribution assets in the United States, the United Kingdom and South America.

1.5 Environmental Commitment

GPU is committed to responsible environmental management of all phases of the Iona to Adelaide pipeline project. All planning, construction and operation activities will be conducted in accordance with GPU's Environmental Policy (refer Appendix A). GPU is committed to achieving the environmental objectives outlined in the SEO.

2 Preliminary Survey Activities

As part of the engineering and environmental planning for the proposed Iona to Adelaide Pipeline, GPU and its contractors will undertake a range of field based preliminary survey activities associated with:

- **Land survey;**
- **Geo-technical survey;**
- **Ecological survey; and**
- **Heritage survey.**

These activities are briefly described below.

2.1 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 and stakes at regular intervals. These will usually be installed adjacent to fencelines and at bends in the proposed alignment. Minimal equipment is required for this task, and is limited to the access vehicle[1], wooden stakes, flagging tape and hand tools (eg. hammer).**
- **Recording the legal (or cadastral) location of the alignment. During the preliminary survey phase, licenced land surveyors will 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.**

2.2 Geo-technical Survey

In order to adequately design the pipe and plan construction, a limited geo-technical survey may be conducted. It is highly unlikely that excavation work will be required as part of any geo-technical survey. However, if required minor excavation works would be restricted to selected locations to identify the presence and nature of rock. Small holes up to 1.5m deep and 600mm in diameter would be excavated and equipment would be limited to the access vehicle and a small backhoe.

---

1 **Access vehicles, unless otherwise stated, are standard four-wheel drives.**

2.3 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 and noting the condition of vegetation communities and 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.**

2.4 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) and 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[2] is not expected to be undertaken during the preliminary survey phase. The work will be conducted by a qualified archaeologist and may involve field inspection by representatives of the local Aboriginal community.**

[2] **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.**

3 Existing Environment

The South Australian section of the proposed Iona to Adelaide Pipeline traverses four major regional environments, namely:

- **South-East South Australia;**
- **Murray Darling Basin;**
- **North Mount Lofty Ranges; and**
- **Northern Adelaide Plains.**

A description of the key environmental characteristics of each region is provided below.

3.1 South-East South Australia

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) (Croft *et al.* **1999). Most rain falls in the winter months.**

The proposed pipeline crosses the Victorian-South Australian border approximately eight kilometres south-east of Koppamurra before travelling directly north-west toward Murray Bridge. The pipeline passes just north of both Naracoorte and Padthaway.

3.1.1 Land Use

Livestock grazing and plantation forestry are the dominant land uses in the region (Laut *et al.* **1977).**

Approximately 2.7% of the land area in the South-East region falls within National Parks and Conservation Reserves (Croft *et al.* **1999). The proposed pipeline does not traverse any areas of conservation significance, with the closest conservation reserve, proclaimed under the** *National Parks and Wildlife Act 1972,* **being Padthaway Conservation Park which is approximately one kilometre from the pipeline route.**

3.1.2 Landform and Soils

The South-East Region has a low relief with unique landforms, originating from a long geological history. The dominant relief features in the region are a series of consolidated calcarenite dune ridges that rise some 20 to 50 metres above the surrounding plains (Laut *et al.* **1977).**

The soils along the proposed pipeline route comprise mainly of sandy aeolian sediments.

Generally there is a lack of surface streams and rivers. The pipeline route does not cross any significant areas of permanent or perennial lakes and swamps.

3.1.3 Flora and Fauna

The region represents the limit of grassy woodland, forest and wetland plant communities more typical of South 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 (Croft *et al.* 1999). The remaining native vegetation is not evenly distributed, but is concentrated in conservation reserves, roadside reserves or scattered blocks of woodland. The proposed survey area predominantly consists of cleared agricultural land.

3.1.4 Cultural Heritage

In comparison to 'coastal' South East, few sites have been recorded on the inland plains in this region. From those studies undertaken, it appears that Aboriginal sites are most commonly found on dunes in close association with swamps, soaks (including interdunal soaks), and/or waterholes. This is likely to reflect the Aboriginal preference for camping in these elevated, well-drained areas. Site types include stone artefact scatters/campsites and isolated artefacts, with burials and scarred trees less common. General archaeological sensitivity in this area is low, particularly given the extent of land clearance across the region and its consequences upon site preservation.

3.2 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 (Murray Mallee District Soil Conservation Board 1992).

From Keith the pipeline follows the Dukes Highway through to Cooke Plains where it crosses the highway and travels north-west to Murray Bridge. The proposed pipeline crosses the River Murray approximately four kilometres north of Murray Bridge then travels north-north-west toward Springton.

3.2.1 Land Use

The major land use in the region is cereal and sheep farming, with crops grown in rotation with annual medic pastures (Murray Mallee District Soil Conservation Board 1992).

There are few National Parks or Conservation Reserves in the Murray-Darling Region. The closest conservation reserve is Mt Boothby Conservation Park which lies approximately 15 km south-west of the pipeline. North of Murray Bridge the pipeline passes through the Reedy Creek Area which contains an area listed on the Register of the National Estate.

3.2.2 Landform and Soils

The region consists of a vast plain of low elevation, with sandhills and gently undulating sandy rises interspersed by flats, depressions and low rises. The sandhills are long, narrow, parallel ridges that lie in an east-west direction but large, disordered and crescent shaped dunes also occur. Most of the district is less than 100 m above sea level (Murray Mallee District Soil Conservation Board 1992).

The soils of the region are naturally infertile and commonly have a sand to sandy loam surface texture because of their origin from wind blown material. The exception is the soils in the vicinity of the River Murray which are of alluvial origin. Shallow soils over limestone are common throughout much of the region.

Not surprisingly the main drainage feature of the region is the River Murray. The proposed pipeline route crosses the River Murray approximately four kilometres north of Murray Bridge.

3.2.3 Flora and Fauna

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 (Murray Mallee District Soil Conservation Board 1992). The proposed pipeline route primarily occurs within cleared agricultural land.

3.2.4 Cultural Heritage

The focus of Aboriginal occupation in this region is undoubtedly the Murray River where site densities are very high. Site types found in the vicinity of the River and its floodplains include scarred trees, middens/stone artefact scatters/campsites and burials. In the mallee expanses of the Basin, there is a clear focus of occupation around water points, most notably soakages in areas of sand dunes. Sites include stone artefact scatters and isolated artefacts. The archaeological sensitivity of this area can therefore be regarded as being high close to the Murray River and declining from moderate to low as one travels away from the river. Site preservation has been affected to varying degrees through agricultural practices and land clearance.

3.3 North Mt Lofty Ranges

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 (Northern Hills Soil Conservation Board 1996). The region is also susceptible to high intensity storms that can cause serious water erosion on unprotected land.

The proposed pipeline route travels between Springton and Mount Pleasant before passing north of Williamstown and heading down onto the northern Adelaide Plains.

3.3.1 Land Use

Viticulture, cropping, grazing, rural living and plantation forestry are the main landuses in the North Mount Lofty Ranges (Northern Hills Soil Conservation Board 1996).

A significant proportion of land in this region is contained within conservation reserves. Nonetheless, the proposed pipeline does not pass through any areas of conservation significance, with the closest conservation reserve being Hale Conservation Park, which is approximately half a kilometre from the proposed pipeline route.

3.3.2 Landform and Soils

The region comprises part of a well defined zone of uplands, which extend from the Flinders Ranges through to the Fleurieu Peninsula. The project area is characterised by gently undulating hills and broad valley flats (Ellis 2000). The eastern face of the Ranges is characterised by steep rocky hills and escarpments dissected by seasonal creeklines with watercourses draining to the Murray River (Murray Plains Soil Conservation Board 1995).

The major soil groups of the district are clayey red-brown earths and loams in the broad valleys and gentle slopes. Steep hills and slopes typically consist of shallow loams and lithosols (Northern Hills Soil Conservation Board 1996).

The North Mount Lofty Ranges is dissected by several main watercourses, which have their origins outside of the area. These include the North Para River and Jacobs Creek. Several smaller creeks flow into the North Para River, including Sandy Creek.

3.3.3 Flora and Fauna

Over 85% of the native vegetation in the area has been cleared for agriculture and urban expansion. A large proportion of remnant vegetation occurs on private land with less than 4% confined to conservation reserves. Most of the land is used for cropping and/or grazing.

3.3.4 Cultural Heritage

The archaeological record within the ranges is poorly documented with previous investigations having focused largely on the recording of Aboriginal art sites. Other sites types that have been recorded include stone artefact scatters/campsites, scarred trees and burial sites. These sites tend to be found in association with creeklines and rivers draining the Ranges. The archaeological sensitivity is moderate to high in these areas with few sites likely to be found away from these locations, particularly given the degree of landscape modification in the region generally.

3.4 Northern Adelaide Plains

The northern Adelaide Plains has a well-defined Mediterranean climate, with long dry summers and cool to mild winters. Rainfall has a strong seasonal distribution (i.e. distinct winter rainfall) and a mean annual rainfall of 400 - 500 mm (Northern Hills Soil Conservation Board 1996).

The pipeline travels from the North Mount Lofty Ranges through to a transmission pipeline connection point and/or customer north of Adelaide.

3.4.1 Land Use

The landuse within the project area consists mainly of horticulture, broadacre farming and livestock grazing. Some areas of rural living / urban fringe are also present.

Generally, land parcels are medium to large in size and as a result the population density is moderate to low.

There are no noted areas of conservation significance along the pipeline route, with the closest conservation reserve being Torrens Island Conservation Park some 15 - 20 km south-west of the pipeline terminus.

3.4.2 Landform and Soils

The project area is characterised by a gently undulating plain of metasediments, with broad floodplains. The main soil groups on the plains comprise of brown loamy sands, fine sandy loams, grey brown silty clays and clay loams (Northern Hills Soil Conservation Board 1996). Saline soils are common along the coast.

3.4.3 Flora and Fauna

The project area has largely been cleared of original native vegetation. Prior to clearance, much of the native vegetation was red mallee - white mallee woodland and peppermint gum woodland. There is now less than 10 hectares of native vegetation remaining in the area and most of this is coastal and estuarine vegetation (Northern Hills Soil Conservation Board 1996).

The only significant vegetation in the region is found in scattered patches of open forest dominated by eucalypt species such as sugar gum (*Eucalyptus cladocalyx***), long sugar gum (***E. gonicalyx***) and blue gum (***E. leucoxylon***). Mallee vegetation and tussock sedgelands (***Lomandra* **spp), which originally were found on the sandy soils of the region, have virtually disappeared.**

3.4.4 Cultural Heritage

This region, like the Murray River and coastal areas of the South East, is a resource rich ecological zone likely to have supported large numbers of Aboriginal people. The general region has been shown to be archaeologically sensitive with numerous Aboriginal sites having been recorded, including earthen mounds, stone artefact

scatters/campsites, isolated artefacts and burials. The distribution of these sites suggests a concentration of settlement along the coastal fringes and about the major watercourses traversing the plains, as well as ephemeral swamps and drainage lines. The preservation of sites in this region is likely to have been highly compromised by an increasingly urbanised landscape.

4 Environmental Hazards, Potential Consequences and Management Strategies

The environmental hazards associated with the preliminary survey activities and their potential consequences are outlined in Table 1. Strategies to mitigate potential consequences and the proposed environmental objectives to be achieved are outlined in Table 3.

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.

<u>Prediction of Hazards and Frequency and Consequence</u>

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 occurrences that the activities are conducted over the survey period.

Table 1: Potential Environmental Hazards and Consequences

Activity	Hazard	Frequency	Potential Consequence	Duration of Consequences
Land Survey (refer to Section 2.1)	Vehicle access[1]	▪ Initial alignment pegging - once per property. ▪ Cadastral survey - once per property.	▪ Landowner disturbance	▪ Approximately half a day per property.
			▪ Damage to crops / pasture (restricted to vehicle wheel tracks).	▪ One season.
			▪ 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
			▪ Waste generation	▪ Up to month
			▪ Weed / disease introduction	▪ Possibly long term (>5yrs).
			▪ Fire	▪ One season.
	Installation of alignment markers	▪ Once per property.	▪ Visual impacts	▪ Up to six months.
	Set-up of survey equipment	▪ Once per property.	▪ Damage to native vegetation	▪ Permanent loss of some foliage.
Geo-technical Survey (refer to Section 2.2)	Vehicle access[1]	▪ 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 season.
			▪ 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
			▪ Waste generation	▪ Up to one month

Activity	Hazard	Frequency	Potential Consequence	Duration of Consequences
Geo-technical Survey (cont)	**Vehicle access (cont)**		▪ **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. 20m^2 per site)**	▪ **One season.**
			▪ **Soil disturbance (approx. 20m^2 per site)**	▪ **Approximately one day per property.**
			▪ **Disturbance to drainage patterns**	▪ **Up to one month.**
			▪ **Damage to native vegetation and wildlife habitat**	▪ **Permanent loss of some foliage (ie a single branchlet from each plant).**
			▪ **Dust generation**	▪ **Approximately one day per property.**
			▪ **Disturbance to drainage patterns**	▪ **Up to one month**
			▪ **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^2)**	▪ **One season.**
			▪ **Soil disturbance (<1m^2).**	▪ **Approximately half a day per property.**
Ecological Survey (refer to Section 2.3)	**Vehicle access[1]**	▪ **Once for selected properties only.**	▪ **Landowner disturbance**	▪ **Approximately half a day per property.**
			▪ **Damage to crops / pasture (restricted to vehicle wheel tracks).**	▪ **One season.**
			▪ **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**

Activity	Hazard	Frequency	Potential Consequence	Duration of Consequences
Ecological Survey (cont.)	**Vehicle access**		▪ **Disturbance to cultural heritage sites**	▪ **Permanent**
			▪ **Waste generation**	▪ **Up to one month**
			▪ **Weed / disease introduction**	▪ **Possibly long term (>5yrs).**
			▪ **Fire**	▪ **One season**
	Collection of vegetation samples	▪ **Once for selected properties only.**	▪ **Damage to vegetation**	▪ **Permanent loss of some foliage (ie a single branchlet from each plant).**
Heritage Survey (refer to Section 2.4)	**Vehicle access[1]**	▪ **Once for selected properties only.**	▪ **Landowner disturbance**	▪ **Approximately half a day per property.**
			▪ **Damage to crops / pasture (restricted to vehicle wheel tracks).**	▪ **One season**
			▪ **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**
			▪ **Waste generation**	▪ **Up to one month**
			▪ **Weed / disease introduction**	▪ **Possibly long term (>5yrs).**
			▪ **Fire**	▪ **One season**
	Localised shallow excavations	▪ **Once for selected properties only.**	▪ **Damage to crops / pasture (<5m^2)**	▪ **One season**
			▪ **Soil disturbance**	▪ **Approximately half a day per property.**
			▪ **Erosion**	▪ **Up to one month.**
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 3: Environmental Objectives and Mitigation Strategies

Potential Consequence	Environmental Objectives	Issue Specific Mitigation Strategies	Extent to which consequence can be addressed	Significance of Consequence
▪ **Landowner disturbance**	**1. To minimise disturbance to landowners.**	▪ **Appoint Land Liaison Officer with specific responsibility for maintaining contact with all potentially affected landowners.** ▪ **Consult with landowners prior to preliminary survey activities to identify specific requirements.** ▪ **Accommodate landowners' specific requirements wherever practicable.** ▪ **Advise landowners of the scope, schedule and duration of preliminary survey activities.** ▪ **Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.** ▪ **Provide landowners with adequate prior notice of proposed land access (in accordance with Section 60-64 of the** *Petroleum Act 2000*).	**Adverse consequences can be managed in the short term.**	**LOW**
▪ **Damage to crops / pasture**	**2. To minimise damage to crops and pasture.**	▪ **Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.** ▪ **Use existing tracks where available.** ▪ **Provide landowners with adequate prior notice of proposed land access.** ▪ **Restrict the area utilised for excavation to the smallest practicable.** ▪ **Restrict disturbance to proposed construction right-of-way where practicable.** ▪ **Keep topsoil separate from subsoil.** ▪ **Restore soil profile and contours to landowner satisfaction, as soon as practicable**	**Adverse consequences can be managed in the short term.**	**LOW**
▪ **Disturbance to stock**	**3. To minimise disturbance to stock.**	▪ **Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.** ▪ **Consult with landowners prior to preliminary survey activities to identify specific requirements.** ▪ **Provide landowners with adequate prior notice of proposed land access.** ▪ **Drive vehicles at appropriately slow speeds to avoid undue disturbance.** ▪ **Leave gates as found.**	**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
▪ Dust generation	4. To minimise generation of dust.	▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable. ▪ Drive vehicles at appropriately slow speeds to avoid undue disturbance.	Adverse consequences can be managed in the short term.	LOW
▪ Weed / disease introduction	5. To avoid the introduction of weeds or disease.	▪ Identify local weed and disease management issues prior to the commencement of preliminary survey activities. ▪ Ensure all equipment and vehicles are free of excess soil and vegetative matter prior entry to and exit from properties, in areas where weeds/disease are a recognised problem. ▪ Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable. ▪ Consult with landowners prior to preliminary survey activities to identify specific requirements.	Adverse consequences can be avoided or it is highly unlikely that they will occur.	LOW
▪ Damage to native vegetation and wildlife habitats	6. To avoid or minimise damage to native vegetation and wildlife habitats.	▪ Prohibit clearing native vegetation as part of land survey. ▪ Conduct soil excavations away from areas of native vegetation. ▪ Samples of native vegetation are to be collected by qualified botanists under appropriate permits from the Department of Environment and Heritage.	Adverse consequences can be avoided or it is highly unlikely that they will occur.	LOW
▪ Disturbance to cultural heritage sites	7. To avoid damage or unnecessary disturbance to cultural heritage sites.	▪ Survey work to be undertaken by appropriately trained and experienced personnel. ▪ The proponent shall have a mechanism in place to appropriately report and respond to any sites discovered during pipeline survey activities. ▪ Any sites shall recorded for subsequent avoidance during construction.	Adverse consequences can be avoided or it is highly unlikely that they will occur.	LOW
▪ Visual impacts	8. To minimise visual impacts.	▪ Limit the use of marker pegs and stakes to those essential for identifying the proposed alignment. ▪ Install marker pegs and stakes on fencelines, where practicable. ▪ Conduct excavations in areas away from general public view, where practicable. ▪ Restore excavations as soon as practicable.	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
▪ Soil disturbance	9. To minimise soil disturbance.	▪ Restrict the area utilised for excavation to the smallest practicable. ▪ Restrict disturbance to proposed construction right-of-way where practicable. ▪ Keep topsoil separate from subsoil. ▪ Restore soil profile and contours to landowner satisfaction, as soon as practicable. ▪ Vehicles to use existing road tracks where practicable. ▪ Avoid advancement of sand dunes in coastal environments from excessive or unnecessary soil disturbance.	Adverse consequences can be managed in the short term.	LOW
▪ Surface water and drainage pattern disturbance	10. To minimise impact of surface water and drainage patterns	▪ In the unlikely event of inundation, which may result in bogging, the creation of heavy wheeltrack rutting (more than 200mm deep) should be avoided.	Adverse consequences can be managed in the short term.	LOW
▪ Disturbance to the environment from waste handling and disposal	11. To minimise the impact on the environment of waste handling and disposal	▪ All rubbish shall be removed from survey site ▪ All vehicle oil spills shall be managed appropriately.	Adverse consequences can be avoided or are highly unlikely to occur.	LOW
▪ Fire	12. To minimise the risk of fire	▪ Diesel vehicles shall be used where practicable. ▪ Fire extinguishers and/or knapsacks shall be kept in all vehicles. ▪ Parking in or driving through long grass shall be prohibited. ▪ Smoking shall be prohibited.	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 in the field-based preliminary survey activities will be provided with a copy of Table 1 and 2 of this EIR. GPU shall ensure that all personnel are adequately aware of the relevant impact mitigation strategies.

Implementation Strategies

GPU and its contractors shall develop specific strategies to implement the proposed mitigation strategies.

Contractual Obligations

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

- **operate in a manner consistent with the GPU Environmental Policy (refer Appendix A); 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 Land Liaison Officer and reported to the GPU Project Manager.

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. GPU will consult, as appropriate, with:

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

GPU will 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 references were reviewed as part of the preparation of the EIR:

Croft, T., Carruthers, S., Possingham, H. and Inns, B. (1999). Biodiversity Plan for the South East of South Australia. Department for Environment, Heritage and Aboriginal Affairs.

Ellis, M.F. (2000). Mount Lofty Ranges Regional Revegetation Strategy. PIRSA, Adelaide.

Laut, P., Heyligers, P.C., Keig, G., Loffler, E., Margules, C., Scott, R.M. and Sullivan, M.E. (1977). Environments of South Australia Province 1 South East. CSIRO, Canberra.

Murray Mallee District Soil Conservation Board. (1992). District plan and three year program. Department of Primary Industries, SA.

Murray Plains Soil Conservation Board. (1995). District Plan. Murray Plains Soil Conservation Board.

Northern Hills Soil Conservation Board. (1996). Northern Hills Soils Conservation Board district plan and three year plan: guidelines for management. Northern Hills Soil Conservation Board.

PIRSA. (2000). Criteria for Classifying the Level of Environmental Impact of Regulated Activities: Requirements under Part 12 Petroleum Act 2000. Petroleum Group PIRSA, Adelaide.

Abbreviations

EIR	**Environmental Impact Report prepared in accordance with Section 97 of the** *Petroleum Act 2000* **and Regulation 10.**
km	**Kilometre**
mm	**Millimetre**
PIRSA	**Primary Industries and Resources, South Australia**
PSL	**Preliminary Survey Licence issued in accordance with Section 10 of the** *Petroleum Act 2000.*
SEO	**Statement of Environmental Objectives prepared in accordance with Section 99 and 100 of the** *Petroleum Act 2000* **and Regulations 12 and 13.**

Appendix A:

GPU Environmental Policy

Print GPU Env Policy file and Insert