
Iona to Adelaide Pipeline

# Preliminary Survey Activities Environmental Impact Report

July 2001
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**Figure**

# Preface

GPU GasNet Pty Ltd (GPU) currently holds Preliminary Survey Licence (PSL 2) for the South Australian portion of the proposed Iona (Victoria) to Adelaide (South Australia) pipeline corridor.

GPU and Duke Energy International Pty Ltd (DEI) have recently announced the formation of an alliance to build the pipeline ('Southern Gas Pipeline'). It is expected that the respective Boards for each Company will approve the project in October 2001 following the finalisation of joint venture agreements and the execution of contracts with prospective customers. Under the joint venture GPU will be responsible for the design, construction and operation of the pipeline with DEI assuming responsibility for commercial management. GPU and DEI have subsequently identified an additional route option via the southeast of South Australia and is seeking to vary GPU's PSL 2 to include the new option.

An Environmental Impact Report (EIR) for the original route option (referred to as the *northern corridor*) was submitted to PIRSA in March 2001 (Ecos, 2001). GPU has subsequently revised the original EIR to include the additional route option (referred to as the *southern corridor*) for submission in support of the application to vary the PSL. The request to vary the PSL will also include the addition of an alternative tie-in location in the northern plains region of Adelaide.

In the absence of a state-wide EIR for pipeline preliminary survey activities the applicant seeks to vary its PSL 2 held in the name of GPU GasNet Pty Ltd to include both the northern and southern corridor options and the alternative northern tie-in to the Adelaide gas network. The varied PSL is to remain in the name of GPU GasNet Pty Ltd, as this is the party proposing to undertake the survey activities.

# Executive Summary

GPU GasNet Pty Ltd (GPU) and Duke Energy International Pty Ltd plan to develop a pipeline to provide natural gas to the Adelaide region as well as potential customers in western Victoria and southeast South Australia. The pipeline will be designed, constructed and operated by GPU. 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 380-400 km in length and travels via two potential route options from the Victorian-South Australian border, through the South-east of South Australia, to Adelaide's northern suburbs.

GPU currently holds Preliminary Survey Licence (PSL 2) for the South Australian portion of the proposed pipeline corridor. GPU and Duke Energy International Pty Ltd (DEI) have subsequently identified an additional route option and is seeking to vary the PSL 2 to include the new option.

An Environmental Impact Report (EIR) for the original route option (to be referred to as the *northern corridor*) was prepared by GPU and submitted to PIRSA in March 2001. The original EIR has subsequently been revised to include the additional route option (to be referred to as the *southern corridor*) for submission in support of an application to vary the PSL. The request to vary the PSL will also include the addition of an alternative tie-in location in the northern plains region of Adelaide.

This revised EIR has been prepared in support of the application to vary the existing Preliminary Survey Licence (PSL 2) to allow engineering and environmental investigations to be conducted within the corridor of the proposed pipeline route options. Additional assessments have been conducted of the proposed route variations and reported in this document along with the impact assessment for the original route.

The activities covered by the PSL are:

- Land survey.
- Geo-technical survey.
- Ecological survey.
- 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.

# 1. Introduction

## 1.1 Background

GPU GasNet Pty Ltd (GPU) and Duke Energy International Pty Ltd (DEI) plan to develop a pipeline to provide natural gas to the Adelaide region as well as potential customers in western Victoria and southeast South Australia. The pipeline will be designed, constructed and operated by GPU. The pipeline will commence at Iona in southwest Victoria and connect into the Moomba - Adelaide Pipeline north of Adelaide or directly to customer locations or the distribution system.

Two corridors are proposed for investigation (Figure 1). The South Australian portion of the corridors are approximately 380-400kms in length and are described as follows:

***Northern corridor*** – travels from the Victorian-South Australian border, north of Naracoorte, through to Adelaide's northern suburbs via Murray Bridge and Williamstown.

***Southern corridor*** – travels from the Victorian-South Australian border, south of Naracoorte, through to Coonalpyn where it rejoins the northern corridor option described previously.

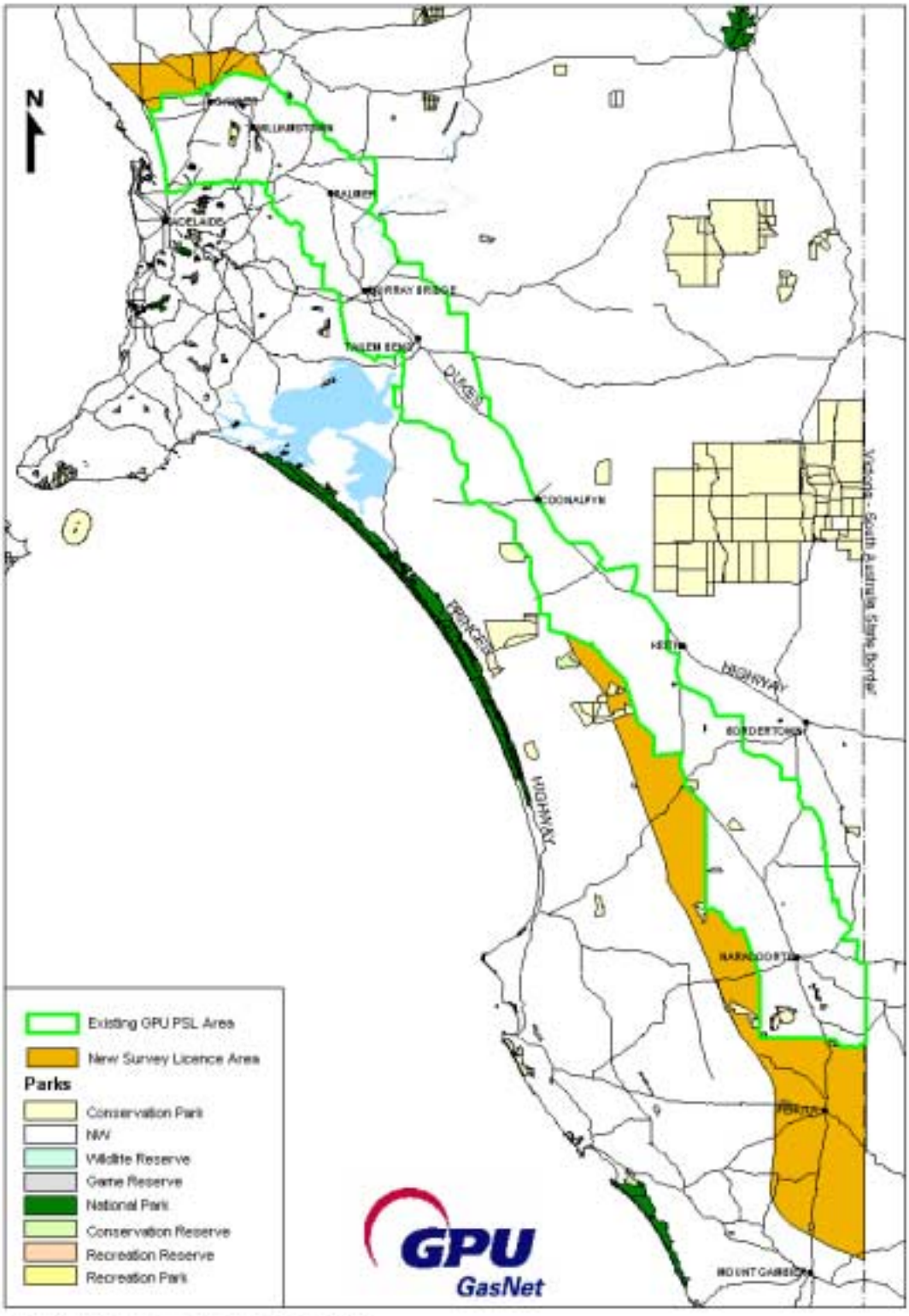
***Alternative Tie-in Location*** – allows the pipeline corridor to deviate from southeast of Gawler and travel north to the Wasleys Compressor Station.

GPU have previously obtained a Preliminary Survey Licence (PSL 2) for the northern corridor option which permits engineering and environmental investigations to be conducted within the corridor. GPU is now seeking to vary PSL 2 to include the southern corridor option. GPU is also seeking to include an alternative tie-in location in the northern suburbs of Adelaide (see Figure 1). Consequently, GPU is submitting a revised EIR in support of its application to vary the PSL.

## 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 to that of the pipeline licence and requires the preparation of a separate EIR and Statement of Environmental Objectives (SEO).




PETROLEUM ACT 2000 (SOUTH AUSTRALIA)
GPU GASNET PTY. LTD. APPLICATION FOR A
GAS TRANSMISSION PIPELINE PRELIMINARY SURVEY LICENCE

**Figure 1 Pipeline Route Corridor Location Map**

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 EIR has been prepared in support of the application to vary the existing PSL held by GPU for the proposed Iona to Adelaide pipeline. The variation is required due to the addition of a second route corridor option in the southeast of South Australia and an alternative tie-in location in the northern suburbs of Adelaide. As such, this EIR is a revision of the original EIR document submitted in March 2001 (Ecos, 2001).

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).
- Proposes measures to mitigate potential consequences (Section 4).

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 virtually all of Victoria's natural gas supplies. The pipeline network traverses much of Victoria and has over 100 off-takes 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, United Kingdom and South America.

GPU are in the process of forming a Joint Venture (JV) with DEI which is expected to be finalised in October 2001. Under the JV, GPU will be responsible for the design, construction and operation of the pipeline. It is anticipated that all

permits and licences will be in the name of a company to be formed by the joint venture participants.

## 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. GPU is committed to achieving the environmental objectives outlined in the SEO.

## GPU GasNet Environmental Policy

GPU GasNet recognises its obligation to the community to take all practicable steps to ensure that its operations and activities are conducted in an efficient and environmentally responsible manner.

GPU GasNet recognises the key role of staff in achieving good environmental performance and will actively encourage staff participation in the development, implementation and maintenance of its environment program.

In order to achieve these goals GPU GasNet makes the following commitments:

GPU GasNet will:

- Aim to have responsible environmental practices equal to or better than general gas transmission practice within Australia.
- Identify aspects of GPU GasNet's business affairs and operations which may have environmental impact and implement appropriate measures to minimise any deleterious effects.
- Ensure GPU GasNet has policies, procedures, plans, targets and performance indicators in place in support of environment management reporting.
- Train staff on environment issues to promote a sense of responsibility to the environment.
- Ensure compliance with State and Federal laws, guidelines and industry standards.
- Actively work with Government, industry Departments and the community to develop solutions to environment issues that affect the industry.
- Minimise the release of greenhouse gas to the environment.
- Integrate environmental considerations into the planning and conduct of all business operations, both existing and new.
- Ensure that GPU GasNet environment standards are followed by making certain that when contractors and service providers are engaged in work on behalf of GPU GasNet, their workers are properly trained in standards and environmental requirements and that suppliers are required to provide goods that meet GasNet environmental standards.

# 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.
- 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, including 4WD vehicles, 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 4WD vehicles, survey equipment (such as theodolite and survey rule) and hand tools.

## 2.2 Geo-technical Survey

To assist pipeline design and construction planning, 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 and soil profiles. 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, alternatively a hand auger or rock probe may be used.

## 2.3 Ecological Survey

In order to determine the significance of potential ecological impact, a systematic 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

A systematic field survey will be carried out to assess the potential impact of pipeline construction on Aboriginal and non-indigenous heritage sites.

This will entail a foot or vehicle traverse of the pipeline corridors, with most detailed field investigation in areas of high heritage potential, for example, near water courses, lakes and particularly on sand dunes near water. Detailed survey effort will be directed to areas where ground surface visibility is highest, for example in areas with erosion or clearing. Historical archaeological sites will be sought in areas around existing settlements. All survey work will be conducted by a qualified archaeologist assisted by representatives of the local Aboriginal community.

# 3. Existing Environment

The two pipeline route corridors of 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.
- 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 northern pipeline corridor option crosses the Victorian-South Australian border approximately eight kilometres southeast of Koppamurra before tracking directly northwest toward Murray Bridge. The pipeline passes just north of both Naracoorte and Padthaway (see Figure 1).

The southern pipeline corridor option crosses the Victorian-South Australian border some 50 kms south of the eastern corridor option, then tracks ENE below Penola, then NNW to rejoin the eastern corridor option at Coonalpyn, and on to Murray Bridge (see Figure 1).

### 3.1.1 Land Use

Livestock grazing and plantation forestry are the dominant land uses in the region (Laut et al. 1977). The plantation forests are dominated by *Pinus* and *Eucalyptus* species. 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 northern pipeline corridor 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, approximately one kilometre from the pipeline route. The western corridor passes within 1-2 kms of conservation reserves, however, none are impacted by this corridor.

### 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 both proposed pipeline routes in the South-east portion are comprised mainly of sandy aeolian sediments.

Generally there is a lack of surface streams and rivers. A greater occurrence of swamps is noted along the southern corridor, however, much of the area has been subject to drainage aimed at increasing arable and grazing land. Consequently, the environmental significance of the remnant wetlands is significantly reduced for much of this corridor. Similarly, the northern corridor does not traverse 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 along both corridor options predominantly consists of cleared agricultural land.

### 3.1.4 Cultural Heritage

Moderate numbers of Aboriginal archaeological sites have been found in the swampy regions of the South East of South Australia, through which the pipeline corridors pass. It is likely that further systematic survey, such as is proposed for this study, will result in the detection of additional sites. In the interior, sites are most commonly found on dunes near reliable water sources: swamps, soaks (including interdunal soaks), and/or waterholes. Aboriginal sites found in these areas include scatters of stone artefacts, burials and scarred trees near the larger rivers. The abundance of high quality raw materials suitable for tool manufacture, has led to a widespread distribution of sites containing this raw material. General archaeological sensitivity in this area is low, particularly given the extent of land clearance across the region and its consequences upon site preservation.

Significant historical sites are likely to be concentrated around the major settlements and transport routes. These are likely to relate to early European occupation of the region, which commenced in the 1840s. Rural buildings associated with the rapid pastoral expansion in the mid 19$^{th}$ century are also likely to be encountered. It is likely that sites associated with the series of drainage schemes that commenced in the 1860s will be found through the southeast. Most rural settlement in the mallee portion of this region only commenced in the 1950s with the discovery that the soil infertility could be overcome through the application of trace elements.

## 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 northwest to Murray Bridge. The proposed pipeline crosses the River Murray approximately four kilometres north of Murray Bridge then travels NNW 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 southwest 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 dense 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 most intensive Aboriginal occupation in this region was along the Murray River and around the lakes on the Lower Murray. Significant numbers of sites are known from these areas, and include: scarred trees, burials, scatters of stone artefacts, rock shelters, hearths and earth ovens, and shell middens. In the river hinterland the most common sites are stone artefact scatters and these are mostly small and localised, the result of short-term visitation. These sites are mainly found near water sources: soaks in the dunefields and near ephemeral water courses.

In the colonial era, historical activities were also concentrated along the Murray River with a number of settlements and enterprises established from the mid-1800s. The village of Mobilong was established on the Murray River in 1866. This later became known as Murray Bridge with the completion of a road and rail bridge in 1879. Historical sites are known in the vicinity of the Murray River and the transport routes that led from Adelaide to the river. Scattered rural settlements are found throughout the surrounding district.

## 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 land uses 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

Isolated stone artefact scatters, scarred trees and burial sites are known from the Mount Lofty Ranges. Field survey to date has mainly been concentrated on recording the abundant rock art in the ranges, and many additional campsites are likely to be found, mainly along the creeks and rivers that traverse this area. Despite the extensive modification of the landscape as a result of the expansion of rural industries from the mid-1840s, evidence of the prior Aboriginal expansion is widespread.

Historical sites are likely to be concentrated around the main settlements, with scattered rural dwellings through the ranges. Rural expansion through this region was enhanced with the construction of a railway from Adelaide in 1857, allowing rural produce to more easily be transported to Adelaide.

## 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 land use 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 southwest 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

Large numbers of Aboriginal sites are known from the Adelaide Plains. The high site density results from the diverse and rich resource zones through this region. Numerous Aboriginal sites having been recorded, including earthen mounds, scatters of stone artefacts and burials. Many of these sites are found along the coastal strip, although urban expansion across the Adelaide Plains has led to extensive site destruction. Other sites are found along major watercourses and around swamps.

Steady expansion of Adelaide and surrounding villages from the late 1830s has left abundant evidence of early settlements and pastoral buildings throughout the northern Adelaide Plains. This expansion accelerated with the growth of the rail network from the 1850s.

# 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 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 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.<br>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 |

## Table 1 (continued) Potential Environmental Hazards and Consequences

| Activity | Hazard | Frequency | Potential Consequence | Duration of Consequences |
|---|---|---|---|---|
| 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 |
| | | | 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 |

## Table 1 (continued) Potential Environmental Hazards and Consequences

| Activity | Hazard | Frequency | Potential Consequence | Duration of Consequences |
|---|---|---|---|---|
| Geo-technical Survey (refer to Section 2.2) (continued) | Localised excavation (continued) | | Weed / disease introduction | Possibly long term (>5yrs) |
| | | | Visual impacts | Up to one month |
| | Soil sampling | Once for selected properties only | Damage to crops / pasture (<1$m^2$ ) | One season |
| | | | Soil disturbance (<1$m^2$ ) | 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 |
| | | | 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) |

## Table 1 (continued) Potential Environmental Hazards and Consequences

| Activity | Hazard | Frequency | Potential Consequence | Duration of Consequences |
|---|---|---|---|---|
| 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 (<5$m^2$) | 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 practicable.

## Table 2 Environmental Objectives and Mitigation Strategies

| Potential Consequence | Environmental Objectives | Issue Specific Mitigation Strategies | Extent consequence can be addressed | Significance of Consequence |
|---|---|---|---|---|
| Landowner disturbance | 1. To minimise disturbance to landowners. | • Appoint Land Liaison Officers with specific responsibility for maintaining contact with all potentially affected landowners.<br>• Consult with landowners prior to preliminary survey activities to identify specific requirements.<br>• Accommodate landowners' specific requirements wherever practicable.<br>• Advise landowners of the scope, schedule and duration of preliminary survey activities.<br>• Plan / rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.<br>• 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.<br>• Use existing tracks where available.<br>• Provide landowners with adequate prior notice of proposed land access.<br>• Restrict the area utilised for excavation to the smallest practicable.<br>• Restrict disturbance to proposed construction right-of-way where practicable.<br>• Keep topsoil separate from subsoil.<br>• Restore soil profile and contours to landowner satisfaction, as soon as practicable. | Adverse consequences can be managed in the short term. | LOW |

## Table 2 (continued) Environmental Objectives and Mitigation Strategies

| Potential Consequence | Environmental Objectives | Issue Specific Mitigation Strategies | Extent consequence can be addressed | Significance of Consequence |
|---|---|---|---|---|
| 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.<br>• Consult with landowners prior to preliminary survey activities to identify specific requirements.<br>• Provide landowners with adequate prior notice of proposed land access.<br>• Drive vehicles at appropriately slow speeds to avoid undue disturbance.<br>• Leave gates as found. | Adverse consequences can be managed in the short term. | LOW |
| 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.<br>• 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.<br>• 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.<br>• Plan/rationalise preliminary survey activities to ensure the number of site visits is as few as practicable.<br>• 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 |

## Table 2 (continued) Environmental Objectives and Mitigation Strategies

| Potential Consequence | Environmental Objectives | Issue Specific Mitigation Strategies | Extent consequence can be addressed | Significance of Consequence |
|---|---|---|---|---|
| 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.<br>• Conduct soil excavations away from areas of native vegetation.<br>• 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.<br>• The proponent shall have a mechanism in place to appropriately report and respond to any sites discovered during pipeline survey activities.<br>• 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.<br>• Install marker pegs and stakes on fence lines, where practicable.<br>• Conduct excavations in areas away from general public view, where practicable.<br>• Restore excavations as soon as practicable. | Adverse consequences can be managed in the short term. | LOW |

## Table 2 (continued) Environmental Objectives and Mitigation Strategies

| Potential Consequence | Environmental Objectives | Issue Specific Mitigation Strategies | Extent consequence can be addressed | Significance of Consequence |
|---|---|---|---|---|
| Soil disturbance | 9. To minimise soil disturbance. | • Restrict the area utilised for excavation to the smallest practicable.<br>• Restrict disturbance to proposed construction right-of-way where practicable.<br>• Keep topsoil separate from subsoil.<br>• Restore soil profile and contours to landowner satisfaction, as soon as practicable.<br>• Vehicles to use existing road tracks where practicable.<br>• 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 wheel ruts (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.<br>• 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.<br>• Fire extinguishers and/or knapsacks shall be kept in all vehicles.<br>• Parking in or driving through long grass shall be prohibited.<br>• 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 general management procedures outlined in the following.

***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 (see Section 1.5).
- 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 Officers 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 potential impacts were of **LOW** significance on the basis that:

**Predictability criterion significance score = 1** – that is, all hazards and consequences can be accurately predicted to a high level of confidence.

**Manageability criterion significance score = 1 or 2** – that is, 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 Primary Industries and Resources South Australia (PIRSA), Department of Environment and Heritage and Department of Water Resources).
- Local Government.
- Landowners.
- 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

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