SEA Gas Pipeline System

South Australian Environmental Impact Report 2020

SEA Gas					
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1	10/9/2015	Section 5.8.4 and 5.8.5 modified to address DSD comments
2	15/2/2016	Updated to address comments from government agencies as listed in Appendix B.
3	18/11/2020	Five Year Review updated to reflect changes to legislation, SEA Gas operational procedures and operational experience.
4	22/3/2021	Minor amendment to address comments from DEM.
5	13/07/2021	Amendments to address outcomes from Government consultation.

Executive Summary

South East Australia Gas Pty Ltd (SEA Gas) owns and operates a high pressure underground natural gas transmission pipeline system linking Adelaide to the Otway Basin natural gas reserves in Victoria (Pipeline System). The Port Campbell to Adelaide pipeline is 689 km in length. The South Australian section of the SEA Gas Pipeline System consists of approximately 434 km of the Port Campbell to Adelaide pipeline, lateral pipelines and associated facilities. The pipeline is operated under Pipeline Licence 13 under the *Petroleum and Geothermal Energy Act 2000*.

This Environmental Impact Report (EIR) relates to the South Australian section of the SEA Gas Pipeline System. It covers all activities associated with operation of the Pipeline System, as well as construction activities, such as for small laterals and above ground facilities. The possible future construction of the Yallamurray compressor station was covered in the original 2001 SEA Gas Project Environment Effects Report / Environmental Impact Report and has been retained in this EIR.

Environment

The pipeline crosses the State border south-east of Naracoorte and travels north-west past Murray Bridge, crossing the River Murray at Jervois. It traverses the Mount Lofty Ranges north of Mount Pleasant before turning south-west across the northern Adelaide plains towards Dry Creek. The pipeline crosses the North Arm of the Port River onto Torrens Island and crosses the Port River to terminate at Pelican Point.

The majority of the pipeline route traverses plains, low hills and tablelands with gentle to moderate slopes. There are locally steep sections in the Mount Lofty Ranges and several wide, deep valleys. Soils along the route occur on a range of parent materials including limestone, sandstone and mudstone, and typically have clearly differentiated A and B horizons.

The majority of the southern part of the pipeline route is generally poorly drained, while the northern part is traversed by the River Murray and numerous watercourses that originate in the Mount Lofty Ranges. Shallow groundwater occurs in a number of areas, including Naracoorte, Cooke Plains and coastal areas of the northern Adelaide plains.

The area traversed by the pipeline has been largely cleared of native vegetation by rural land uses and urban development. The pipeline route was selected to avoid native vegetation wherever possible and consequently passes through a very limited amount of native vegetation or intact fauna habitat. A small number of significant fauna species occur in the regions crossed by the pipeline, however suitable habitat for these species in the vicinity of the pipeline is generally very limited.

Cultural heritage values along the pipeline route have been impacted by land clearance, agricultural land use and rural and urban development. The pipeline alignment avoids all known sites.

The noise environment in the region is dominated by incidental traffic and agricultural noise. Traffic, residential and small industrial based noise generally increases near larger rural townships. Between Gawler and Pelican Point, traffic from major arterials, airport movements, industry and local traffic contribute significantly to the ambient noise environment.

Air quality across the region is generally good. Ambient air quality across the Adelaide Plains is influenced by industrial and transport emissions as well as daily and seasonal climatic conditions.

The pipeline traverses ten local government areas. Larger regional towns in proximity to the pipeline alignment include Naracoorte, Keith, Tailem Bend, Murray Bridge and Gawler.

Land use along the pipeline route is dominated by agriculture, with land uses such as forestry, viticulture, rural living, industry, power generation and residential also occurring. Some urban development has occurred adjacent to the pipeline since construction, particularly in the Gawler East and Munno Para areas. The pipeline intersects one conservation reserve (a section of the Torrens Island Conservation Park). The pipeline crosses numerous roads and utilities such as gas pipelines, optic fibre cables, water pipelines and power lines.

Potential Environmental Impacts and Management

This EIR identifies the potential impacts to the environment as a result of operations and new construction activities, and outlines the strategies that are implemented to mitigate environmental impacts.

Operational pipelines generally have very little environmental or landholder impact. Routine operational activities (e.g. patrols and inspections, repair or replacement of equipment, pigging and cleaning of the pipeline and line of sight vegetation trimming) have a very low level of impact. More significant maintenance activities such as dig-ups are generally infrequently required. They can have localised environmental impacts, however these impacts are short term and readily managed by implementing measures outlined in this EIR.

Similarly, the potential environmental impacts from new construction activities such as small laterals and above ground facilities are generally localised and short term and are also readily manageable.

Detailed planning and design is undertaken prior to new construction activities in order to select a site or alignment that minimises the impact to the environment, landholders and other stakeholders, and to identify appropriate environmental management measures. Site specific considerations and management requirements (e.g. the Environmental Line List) are also reviewed and integrated into planning for operational activities that are likely to result in surface disturbance.

Key environmental issues and their management discussed in this EIR include:

- Managing soil disturbance during earthworks associated with operation and construction to minimise the potential for impacts such as inversion, erosion, compaction or contamination. Key measures include separation of topsoil, installation of sediment and erosion controls, management of fuel and chemicals in accordance with regulatory guidelines, and reinstatement and revegetation / reseeding of disturbed areas following construction.
- Selection of watercourse crossing timing, location and methods to minimise impacts, use of sediment and erosion controls and, where appropriate, methods such as horizontal directional drilling to minimise surface water impacts.
- Avoiding or minimising native vegetation clearance through site / route selection and by narrowing the construction right-of-way where feasible and undertaking appropriate revegetation work where clearance is unavoidable.
- Implementing measures to minimise the impact of excavations or open trenches on fauna, including escape ramps and regular inspections, and implementing management protocols for construction (e.g. buffer zones around nest trees) to avoid significant impacts to species such as the nationally Endangered Red-tailed Black Cockatoo.

- Undertaking cultural heritage surveys prior to construction activities in areas that have not been previously surveyed and avoiding cultural heritage sites and standing buildings / structures where practicable.
- Designing and ensuring routine operations at above ground facilities (particularly compressor stations) meet relevant EPA noise criteria and implementing noise control measures where required and restricting noisy activities to normal working hours where practicable.
- Designing and operating compressor stations to comply with EPA air quality criteria, minimising gas venting activities, tracking emissions for greenhouse gas abatement and reporting purposes, and implementing dust suppression measures during construction where appropriate.
- Working with landowners and managers to minimise conflict with existing land use activities where practicable, entering into formal easement agreements outlining the legal responsibilities of both SEA Gas and the landowner, implementing appropriate weed, pest and disease control and management protocols, and rehabilitating construction areas in consultation with landholders.
- Working closely with local and state road managers and utility companies to plan and implement crossings to avoid or minimise disturbance, including the use of methods such as boring or horizontal directional drilling where appropriate.
- Ensuring that the design, construction and operation of the Pipeline System is in accordance with Australian Standard AS 2885: Pipelines – Gas and Liquid Petroleum, including implementation of measures to protect public safety, such as physical and procedural measures that protect the pipeline from credible threats, as determined by the Safety Management Study process.
- Maintaining regular contact with landholders and other directly affected stakeholders for pipeline operational activities, and actively seeking input from stakeholders for any new construction or major operational projects throughout the planning and approval process.

SEA Gas is committed to responsible environmental management and has effective procedures in place to minimise the impact of the pipeline on the environment. The Pipeline System has been constructed and operated since 2004 with a very high standard of environmental management. SEA Gas is confident that operation and future construction activities will continue to be carried out in a manner that reduces the impact to the environment or stakeholders to as low as reasonably practicable.

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1 Introduction

1.1 Background

South East Australia Gas Pty Ltd (SEA Gas) owns and operates a high pressure underground natural gas transmission pipeline system linking Adelaide to the Otway Basin natural gas reserves in Victoria (Pipeline System). The Port Campbell to Adelaide pipeline is 689 km long, commences at the Iona gas hub, north-east of Port Campbell in Victoria, and terminates at Pelican Point, north of Adelaide in South Australia. The South Australian section of the SEA Gas Pipeline System consists of approximately 434 km of the Port Campbell to Adelaide pipeline, lateral pipelines and associated facilities.

The South Australian section of the Pipeline System is operated under Pipeline Licence 13 (PL 13). The licence was granted in February 2002. Construction of the pipeline commenced in October 2002, with commencement of operation on 1 January 2004. The route of the pipeline is shown in Figure 1-1.

1.2 About This Document

This document has been revised to support the revision of the SEA Gas Statement of Environmental Objectives (SEO). It has been prepared to satisfy the requirements of an Environmental Impact Report (EIR) under the *Petroleum and Geothermal Energy Act 2000* and has been prepared in accordance with current legislative requirements, in particular Section 97 of the Act and Regulation 10 of the *Petroleum and Geothermal Energy Regulations 2013*.

This EIR is the result of an update to the 2015 EIR that resulted from review and consolidation of existing documentation, including; the SEA Gas Project Environmental Effects Report / Environmental Impact Report (SEA Gas 2001), the additional impact assessment reports that had been produced for PL 13 to cover pipeline extension and pipeline laterals (see Table 1-1) and current operational documentation including the SEA Gas Environment Management Plan, Safety Case and other documents that make up the Pipeline Management System. Information gathered during construction and since operation of the pipeline began in 2004 was also been utilised where relevant.

Table 1-1: Impact assessment reports for the Pipeline System

Report Title	Date
SEA Gas Project Environment Effects Report / Environmental Impact Report	October 2001
EER / EIR supplement	December 2001
Coomandook Compressor Station EIR	September 2002
Pelican Point Extension EIR	October 2002
Naracoorte Lateral Pipeline – Pipeline Licence Extension EIR	August 2004
Jervois Lateral Pipeline – Pipeline Licence Extension EIR	November 2004
SEA Gas Project Quarantine Meter Station Pipeline Licence Variation EIR	November 2007
Bolivar Lateral Pipeline Environmental Assessment Report	June 2013

This document relates to the South Australian section of the Pipeline System and applies to:

- all activities associated with operation of the Pipeline System;
- construction activities such as small laterals and above ground facilities (subject to an environmental assessment being undertaken to confirm that the SEA Gas pipeline SEO is adequate for the new installation); and
- future construction of the Yallamurray compressor station (which was covered in the original SEA Gas EER / EIR (SEA Gas 2001)).

1.3 SEA Gas Company Profile

SEA Gas is a partnership that was established to develop, own and operate the underground pipeline system transporting natural gas from the Otway and Bass Basins to South Australia and Victoria.

SEA Gas is an established pipeline operator with a management team consisting of personnel capable of managing all aspects of the operation and maintenance of the Pipeline System. Some maintenance functions are contracted, however SEA Gas, as the licensee, remains responsible for all operational activities and outcomes.

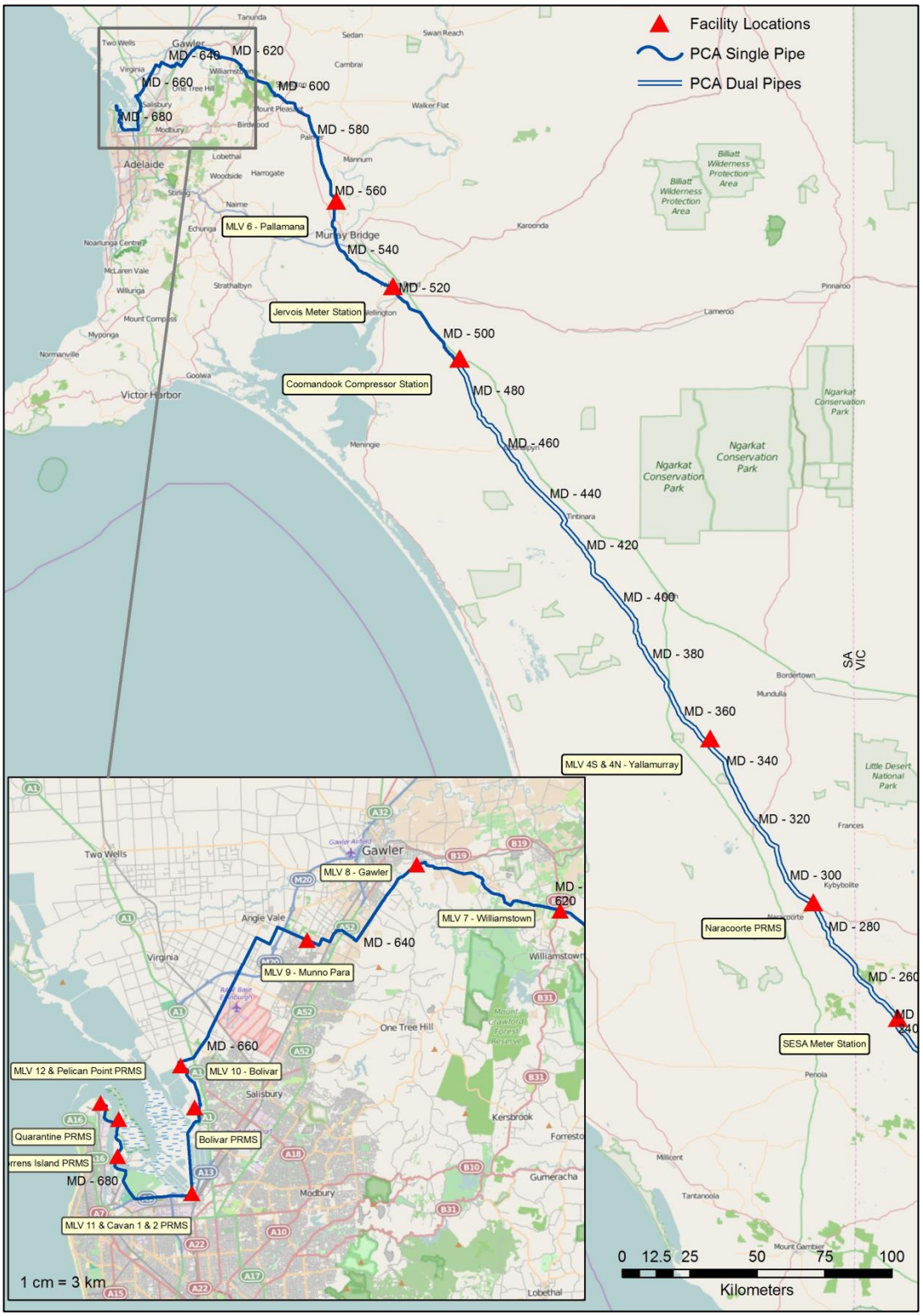

Figure 1-1: SEA Gas Pipeline System route

2 Legislative Framework

This section briefly describes the legislative framework that applies to pipeline activities in South Australia.

2.1 Petroleum and Geothermal Energy Act

Pipeline construction and operation in South Australia is undertaken pursuant to an approved Pipeline Licence under the South Australian *Petroleum and Geothermal Energy Act 2000*. The Act and the *Petroleum and Geothermal Energy Regulations 2013* are administered by the Department for Energy and Mining (DEM).

2.1.1 Statement of Environmental Objectives

As a requirement of Part 12 of the Act, a regulated activity can only be conducted if an approved Statement of Environmental Objectives (SEO) has been developed. The SEO outlines the environmental objectives that the regulated activity is required to achieve and the criteria upon which the objectives are to be assessed. The SEO is developed on the basis of information provided in an EIR (unless activities are classified as 'high impact' and an environmental impact assessment under the provisions of the *Planning, Development and Infrastructure Act 2016* is required to be undertaken).

Under Regulation 14 of the Petroleum and Geothermal Energy Regulations, an approved SEO must be reviewed at least once in every five years. An SEO for the SEA Gas pipeline was prepared in conjunction with the original EER / EIR (SEA Gas 2001) and approved in 2002. An updated version was approved in 2009 and then in 2016 (SEA Gas 2016).

The SEO was reviewed in 2020 and has been revised in parallel with the revision of this EIR.

2.1.2 Environmental Impact Report

In accordance with Section 97 of the Act, the EIR must:

- take into account cultural, amenity and other values of Aboriginal and other Australians in so far as those values are relevant to the assessment;
- take into account risks to the health and safety of the public inherent in the regulated activities; and
- contain sufficient information to make possible an informed assessment of the likely impact of the activities on the environment.

As per Regulation 10 of the Petroleum and Geothermal Energy Regulations the following information must be provided for the purposes of an EIR:

- a description of the regulated activities to be carried out under the licence (including their location);
- a description of the specific site features of the environment that can reasonably be expected to be affected by the activities, with particular reference to the physical and biological aspects of the environment and existing land uses;
- an assessment of the cultural values of Aboriginal and other Australians which could reasonably be foreseen to be affected by the activities in the area of the licence, and the

public health and safety risks inherent in those activities (insofar as these matters are relevant in the particular circumstances);
- if required by the Minister – a prudential assessment of the security of natural gas supply;
- a description of reasonably foreseeable events associated with the activity that could pose a threat to the relevant environment (including events during the construction, operational and abandonment stages, atypical events, estimated frequency of events and the basis of predictions);
- an assessment of the potential consequences of these events on the environment (including size and scope, duration, cumulative effects (if any), the extent to which these consequences can be managed or addressed and proposed management actions);
- an explanation of the basis on which these consequences have been predicted;
- a list of all owners of the relevant land; and
- information on consultation undertaken during the preparation of the EIR.

This EIR has been prepared to meet the requirements of the Act and Regulations with regard to the operation and decommissioning of the South Australian section of the SEA Gas Pipeline System, as well as any new construction projects or major operational works.

2.2 Other Legislation

A range of other legislation is relevant to the pipeline activities, including the legislation outlined in Table 2-1 and described in the following sections.

Table 2-1: Key additional legislation

Legislation	Activity	Agency
South Australia		
Adelaide Dolphin Sanctuary Act 2005	Duty of care to prevent or minimise harm to the Sanctuary. Under Section 103A(1) of the *Petroleum and Geothermal Energy Act 2000*, approval of an SEO applying to the Sanctuary requires concurrence of the Minister for Sustainability, Environment and Conservation.	Department for Environment and Water (DEW)
Aboriginal Heritage Act 1988	Ministerial authorisation required if Aboriginal sites, objects or remains are to be damaged, disturbed or interfered with.	Aboriginal Affairs and Reconciliation, Department of State Development
Environment Protection Act 1993 (including all Environment Protection Policies (EPP) e.g. *Environment Protection (Water Quality) Policy 2015, Environment Protection (Air Quality) Policy 2016* and National Environment Protection Measures which operate as an EPP under the EP Act)	General duty to prevent environmental harm Protection of water quality Disposal of water to marine or inland waters EPA licence conditions	Environment Protection Authority (EPA)

Legislation	Activity	Agency
Radiation Protection and Control Act 1982	Non-destructive testing	EPA
Heritage Places Act 1993	Permission required if listed heritage places or related objects are to be destroyed / disturbed.	Heritage South Australia, DEW
National Parks and Wildlife Act 1972	'Taking' of protected plant and animal species. Activities in parks and reserves established under the Act.	DEW
Native Title (South Australia) Act 1994	Matters relating to Native Title rights in South Australia.	Attorney General's Department (SA)
Native Vegetation Act 1991	Disturbing or removing native vegetation Note: Vegetation disturbance incidental to the maintenance of infrastructure is exempt under Regulation 5(1)(g)	Native Vegetation Council, DEW
Landscape South Australia Act 2019	Management of pest plants and animals Water sourcing (e.g. from new bores) Water affecting activities	Landscape Boards, DEW
Work Health and Safety Act 2012	Establishes health and safety duties, including the primary duty to protect any person from exposure to hazards and risks that arise from work	SafeWork SA
Commonwealth		
Environment Protection and Biodiversity and Conservation Act 1999	Protects matters of "national environmental significance" including World Heritage properties, National heritage places, Ramsar wetlands of international importance, listed threatened species and ecological communities and migratory species	Department of Agriculture, Water and the Environment
Native Title Act 1993	Recognition and protection of Native Title.	Attorney-General's Department (Cth)

2.2.1 Environment Protection Act

The *Environment Protection Act 1993* imposes a general environmental duty not to undertake an activity that pollutes, or might pollute the environment unless all reasonable and practicable measures have been taken to prevent or minimise any resulting environmental harm.

Environmental authorisations are required to undertake activities prescribed under the Act. SEA Gas holds a licence (number EPA43402) for the Coomandook compressor station that covers the following prescribed activity:

- *8(2)(a) Fuel burning: rate of heat release exceeding 5 megawatts*.

The Environment Protection Act also imposes an obligation to report incidents causing or threatening serious or material harm to the EPA, where applicable, in accordance with s.83 of the Act.

2.2.2 Native Title Act

The pipeline alignment in South Australia is within the area covered by the Ngarrindjeri and Other Registered Claimants (registered claim SC1998/004 in the south-east of South Australia) and the Kaurna Peoples (registered claim SC2000/001 over the Adelaide area), as shown in Figure 2-1.

Under the Commonwealth *Native Title Act 1993*, indigenous land rights apply to registered Crown Land titles intersected by the pipeline. Under the Act, native title is extinguished where the land is held under freehold title, registered as road reserves or under forestry (that is, secondary land use).

The existing pipeline traverses predominantly freehold land, or Crown Land where native title has been extinguished. The relevant Commonwealth Native Title Act processes were followed for the small number of areas of Crown Land on the pipeline alignment where native title still applied.

If indigenous land rights do apply to any land titles intersected by future pipeline activities, the appropriate Native Title process will be undertaken in accordance with all legislative requirements under the Act, in full consultation with relevant claimants, heritage groups and regulatory agencies.

2.2.3 Native Vegetation Act

The *Native Vegetation Act 1991* and *Native Vegetation Regulations 2017* apply to the management and clearance of native vegetation on private and public land in South Australia.

New activities authorised under the Petroleum and Geothermal Energy Act, including pipeline construction projects, are permitted to clear native vegetation, provided that either:

- the clearance is undertaken in accordance with a management plan, approved by the Native Vegetation Council for implementation, that results in a significant environmental benefit (see Regulation 14(1a)).; and
- for work authorised under the Petroleum and Geothermal Energy Act 2000, the work is undertaken in accordance with an SEO under that Act (see Regulation 14(1c); or
- the person undertaking the clearance has made a payment into the Native Vegetation Fund of an amount considered by the Native Vegetation Council to be sufficient to achieve a 'significant environmental benefit' in the manner contemplated by Section 21(6) or (6a) of the Act (see Regulation 14(2)).

SEA Gas was granted PL 13 on 12 February 2002. Pursuant to Schedule 1, Part 5, Division 3 (30) of the *Native Vegetation Regulations 2017*, PL 13 is exempt from SEB requirements for operations and maintenance activities. The exemption only applies to vegetation clearance that would reasonably be expected to have been required per the licence authorisation under the Petroleum and Geothermal Energy Act, taking into account the circumstances that existed immediately before 25 August 2003, which is when SEB provisions were introduced. Accordingly, the Jervois, Naracoorte and Bolivar laterals are not exempt from complying with any applicable SEB requirements for operations and maintenance activities.

Schedule 1, Part 1, Division 1 (2)) of the *Native Vegetation Regulations 2017* also permits clearance of vegetation that is incidental to the repair or maintenance of infrastructure, subject to the vegetation to be cleared being located in the vicinity of the structure that is being repaired or

maintained in an area in which vegetation was previously cleared in connection with the construction, repair or maintenance of the structure; and clearance consisting only of plants or parts of plants that have grown or regrown since that earlier clearance; and /or the clearance being undertaken in accordance with a standard operating procedure determined or approved by the Native Vegetation Council for the purposes of this provision.

The SEA Gas Project SEO committed to "offset loss of native vegetation by carrying out suitable revegetation, in consultation with the Department of Environment and Heritage". Consequently, a number of revegetation projects to offset clearance for the construction of the pipeline have been undertaken (both on and off the pipeline easement) in consultation with the Department of Environment and Water (formerly the Department of Environment and Heritage) and DEM as discussed in Section 5.3.2.

If clearance of native vegetation is required for future construction activities, SEA Gas will comply with the requirements of the *Native Vegetation Act 1991*, largely through avoidance and / or minimisation of impacts, but also through compliance with the relevant SEB requirements.

2.2.4 Landscape South Australia Act

The *Landscape South Australia Act 2019* applies to a range of aspects of natural resources management. Of particular relevance to the pipeline area are provisions in the Act addressing activities which affect surface water and groundwater resources, as well as management of pest plants and animals.

South Australia is divided into nine Landscape Management regions, with eight corresponding Regional Landscape Management Boards and a metropolitan board, Green Adelaide, having responsibility for management of the state's natural resources. The pipeline crosses the Green Adelaide, Hills and Fleurieu, Murraylands and Riverland, and Limestone Coast landscape regions.

Under Section 104(3) of the Act, a permit is required to undertake 'water affecting activities', which may include (depending on the specific requirements of a water allocation plan or a water affecting activities control policy):

- construction of dams or other structures to collect or divert water in prescribed watercourses, the Mount Lofty Ranges watershed or other areas defined by the regional water allocation plan or a water affecting activities control policy;
- construction of buildings or structures in a watercourse, lake or floodplain;
- depositing solid material in a watercourse or lake;
- obstructing a watercourse or lake;
- destroying vegetation growing in a watercourse, lake or floodplain; and
- excavating or removing rock, sand or soil from a watercourse, lake or floodplain.

Future pipeline construction projects may need to obtain water affecting activity permits for construction activities in watercourses, depending on the specific requirements a water allocation plan or a water affecting activities control policy that applies to the region or area in which the activity is to be undertaken.

The Act also regulates the taking and use of water in Prescribed Wells Areas or Prescribed Water Resources Areas, as discussed in Section 5.2.2.

2.2.5 EPBC Act.

Approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is required for activities that will, or are likely to, impact matters of national environmental significance including World Heritage properties, National Heritage places, Ramsar wetlands of international importance, listed threatened species and ecological communities, listed migratory species and a water resource.

SEA Gas will undertake an assessment for any new construction or major operational works to determine if a referral is required under the EPBC Act. Based on current expectations and knowledge, SEA Gas does not consider that any such activities, if appropriately managed, would be likely to adversely affect 'matters of national environmental significance'.

Figure 2-1: Native Title claims along the Pipeline System

3 Description of Activities

3.1 Overview

The SEA Gas Pipeline System consists of high pressure natural gas pipelines, laterals and associated facilities, which extend from Iona in Victoria to Adelaide in South Australia. The Pipeline System's primary function is to provide safe, reliable transportation of high pressure natural gas from receipt points to delivery points. Its design caters for a range of operational scenarios including flow in either direction. The design life of the Pipeline System is 80 years; however in-service components requiring periodic maintenance will typically have a commercial operating life which is less than this period.

3.2 Pipeline Alignment

Figure 1-1 shows the location of the Pipeline System. The main pipeline, the Port Campbell to Adelaide pipeline commences at the Otway Gas Plant and the Underground Gas Storage Plant at Iona, near Port Campbell, connects with the Port Campbell to Iona pipeline and the Athena Gas Plant at the Langley crossover and continues in a generally north-westerly direction to Adelaide, terminating at Pelican Point.

The pipeline alignment crosses the South Australian – Victorian border south-east of Naracoorte in South Australia, then travels directly north-west toward Murray Bridge, passing north of Naracoorte. The pipeline crosses the Murray River near Jervois, approximately 25 km south-east of Murray Bridge, traverses the western fringe of Murray Bridge and continues north-westerly to the north of Mount Pleasant in the northern Mount Lofty Ranges. The alignment continues north-west through the Williamstown and South Gawler areas, before turning south-west and travelling across the northern Adelaide Plains towards Bolivar and Dry Creek. The pipeline follows the Port River Expressway to Gillman where it crosses the North Arm of the Port River onto Torrens Island. The pipeline crosses the Port River from Torrens Island to terminate at Pelican Point.

3.3 Design and Engineering

The South Australian section of the pipeline consists of approximately 434 km of buried internally lined and externally coated steel pipe. The last 197 km of the pipeline (from Coomandook to Pelican Point) is constructed using a single DN450 pipeline, whilst the remaining pipe from the State border to Coomandook is constructed using twin DN350 pipelines laid in a common trench with a nominal separation of 300 mm. The pipeline was manufactured to API 5L X70 specification using the Electric Resistance Welded (ERW) process.

The pipeline has one connection to the Adelaide gas distribution network, at the SEA Gas Pressure Reducing Metering Station (PRMS) at Cavan. The pipeline also connects to the Moomba-Adelaide pipeline system at Pelican Point. There are a number of lateral pipelines and provisions for future offtakes, as outlined in Section 3.6. Above ground facilities associated with the Pipeline System are discussed in Section 3.5.

The Port Campbell to Adelaide pipeline was designed in accordance with AS2885.1 – 1997: Pipelines – Gas and Liquid Petroleum Part 1: Design and Construction. Subsequent laterals were designed to the current version of AS 2885.1 at the time of construction. The pertinent design parameters are summarised in Table 3-1.

Table 3-1 Port Campbell to Adelaide Pipeline design parameters

Component	Parameter
Design Life, Pipeline:	80 years
Design Life, Cathodic Protection System:	40 years (Anode ground beds designed for up to 20 years life expectancy)
Commissioning Date:	January, 2004
Maximum Allowable Operating Pressure(1):	15,306 kPag
Pipeline Operating Pressure Range:	3,100 to 15,000 kPag
Design Maximum Temperature(1):	+55°C
Design Minimum Temperature(1):	0°C normal operation (-10°C during pipeline repressurisation)
Transport Fluid	Clean, dry, odourised natural gas
Maximum Daily Flow (Capacity):	242 TJ/day in free flow 314 TJ/day with two compressors operational
Pipeline Material and Size:	API 5L-X70, ERW (a) 355.6 mm O.D (7.84 and 9.8 mm wall thickness) (b) 457 mm O.D (10.1 and 12.1 mm wall thickness) Specified Minimum Yield Strength, 482 MPa
Protective Coatings:	External: Trilaminate system, fusion bonded epoxy (FBE) directly onto the steel, a copolymer layer to bond the FBE to the outer layer, and outer layer of high density polyethylene (HDPE). Internal: Epoxy paint with a minimum thickness of 50 microns.
Installed Length:	689 km
(1) The operating pressure and temperature are continuously monitored at the receipt and delivery stations. SCADA alarms are activated at levels not exceeding the design limits and automated safety critical equipment has been installed to ensure the design maximum pressures, temperatures and flow rates are not exceeded.	

3.4 Risk Management

SEA Gas manages risk along the pipeline using the qualitative Safety Management Study methodology described in AS 2885.6. A Safety Management Study in accordance with AS 2885 was undertaken for the Pipeline System during the design and construction. The Study is reviewed and updated every 5 years, or more frequently if required. A broader discussion of risk management is covered in Section 5.8.4.

To manage the risk associated with particular operations or project activities SEA Gas has a Risk Management Policy (CORP-PO-005), which is used to assess environmental risks and hazards associated with operational activities. The identification, analysis, prioritisation, mitigation and treatment of environmental hazards will be managed in accordance with this framework.

SEA Gas manages the operation and maintenance of the Pipeline System to reduce risk to the environment, personnel and the public to As Low As Reasonably Practicable (ALARP). Through a systematic evaluation of hazards against stated environmental objectives, a determination will be made of the most effective control method(s) to reduce the risk(s) associated with each hazard.

Appropriate management strategies will be developed for each hazard, with due regard to the "hierarchy of hazard controls":

- Eliminate the hazard at its source;
- Substitute with a less hazardous process;
- Engineering controls to reduce the hazard;
- Administrative controls such as workplace procedures; and
- Use of protective equipment.

This approach ensures that hazards are eliminated where practicable and where elimination is not practicable the most effective controls are put in place.

3.4.1 Environmental Impacts and Risks

This EIR identifies potential environmental risks, hazards and consequences associated with the construction, operation and future decommissioning of the Pipeline System.

An overview of potential environmental impacts and mitigation strategies is detailed in Appendix A. The Pipeline System Environmental Line List (OHSE-PR-018) is also utilised to identify and enable management of high risk areas along the pipeline route.

There are no significant environmental risks from normal pipeline operations. As noted above, the risk of pipeline failure has been further evaluated using the qualitative Safety Management Study methodology described in AS 2885.6.

3.5 Above Ground Facilities

The Pipeline System incorporates a number of above ground facilities including metering stations, compressor stations, scraper trap facilities and mainline valves to facilitate gas flow along the pipeline.

Metering stations are provided at delivery point interfaces at Naracoorte, Jervois, Cavan, Torrens Island Power Station, Quarantine Power Station and Pelican Point Power Station. Examples of meter stations on the pipeline are shown in Plate 3-2 and Plate 3-3.

Scraper trap facilities have been installed at each end of the different pipeline diameter sections of the pipeline. Mainline valve (MLV) block valves installed at the end of the pipeline and at eight intermediate sites in South Australia, divide the pipeline into isolatable sections. There is an above ground facility at each MLV site, which includes pipeline venting facilities, so each section of the pipeline can be depressurised. Plate 3-1 shows a typical mainline valve.

The above ground facilities along the pipeline in South Australia are summarised in Table 3-2. The table lists the mainline valves (MLV), scraper stations, compressors, laterals and meter stations at the Measured Distance (MD) points (MD being the distance in kilometres from the commencement of the pipeline at Port Campbell in Victoria). The locations of these facilities are shown in Figure 1-1.

Table 3-2 South Australian pipeline facilities

MD (km)	Site Name	Facility
288.86	Naracoorte	Lateral and Meter Station
349.47	Yallamurray	MLVs and Future Compressor Off take
491.5	Coomandook	MLVs, Scraper Stations and Compressor
520.0	Tailem Bend	Future Offtake
522.33	Jervois	Lateral and Meter Station
557.8	Pallamana	MLV
619.86	Williamstown	MLV
632.95	Gawler	MLV
645.63	Munno Para	MLV
662.4	Bolivar	MLV
666.96	Bolivar	Lateral and Meter Station
673.8	Cavan (Train 1)	Meter Station
673.8	Cavan MLV	MLV
673.8	Cavan (Train 2)	Meter Station
682.65	Torrens Island	Meter Station
685.45	Quarantine	Meter Station
688.0	Pelican Point	Meter, MLV and Scraper Station

The Pipeline System also includes a cathodic protection system which consists of a number of buried anode beds and above ground tests points. The anode beds and test points are located at intervals along the pipeline and connected to the pipeline by electrical cables.

3.5.1 Compressor Stations

Compressor stations use natural gas turbine driven compressor units to maintain the required gas throughput and pressure in the pipeline. One compressor station is situated along the South Australian section of the pipeline at Coomandook (MD 491.5). Provision has been made for the future installation of an additional compressor station at Yallamurray (MD 349.47). Construction and operation of the Yallamurray compressor station was described in the original EER / EIR, and is covered by this EIR, although it has not yet been constructed. The Coomandook compressor station is shown in Plate 3-4.

Plate 3-1: Pallamana Mainline Valve

Plate 3-2: Jervois Meter Station

Plate 3-3: Quarantine Meter Station

Plate 3-4: Coomandook Compressor Station

3.6 Lateral Pipelines

Lateral pipelines are pipelines which branch off the main pipeline. They are usually smaller in diameter than the main pipeline and may connect to specific customers or to regional centres. The South Australian pipeline laterals are summarised in Table 3-3.

Table 3-3 South Australian pipeline laterals

Pipeline	Description	Year Commissioned	MAOP (kPa)	Length (km)	Diameter (mm)	Steel Grade	Wall Thickness Standard Wall (mm)	Wall Thickness Heavy Wall (mm)	Protective Coating
Cavan lateral	Lateral pipeline from Cavan Meter Station (offtake at MD 673.8)	2004	1,875	0.264	355.7	API 5L X70	7.84	9.80	External: Trilaminate system Internal: Epoxy paint with a minimum thickness of 50 microns.
Torrens Island lateral	Lateral pipeline to Torrens Island Meter Station	2004	15,306	0.095	355.7	API 5L X70	7.84	9.80	External: Trilaminate system Internal: Epoxy paint with a minimum thickness of 50 microns.
Quarantine lateral	Lateral pipeline to Quarantine Meter Station (offtake at MD 685.45)	2009	15,306	0.445	355.7	API 5L X70	7.84	9.80	External: Trilaminate system Internal: Epoxy paint with a minimum thickness of 50 microns.
Bolivar lateral	Lateral pipeline to Bolivar Sewage Treatment Plant (offtake at MD 666.96)	2014	15,306	0.42	114.3	API 5L X52 PSL2	4.8	N/A	External: Trilaminate system Internal: N/A
Tailem Bend Offtake	Offtake at Tailem Bend (offtake at MD 520.0)	2004	15,306	0.001	219.1	ASTM A106B	12.70	N/A	External: Polyken® 2 layer tape wrap Internal: N/A
Naracoorte Lateral	Lateral to Teys Brothers Meter Station (offtake at MD 288.86)	2004	15,306	1.500	60.3	ASTM A106B	5.54	5.54	External: Yellow Jacket Internal: N/A

Pipeline	Description	Year Commissioned	MAOP (kPa)	Length (km)	Diameter (mm)	Steel Grade	Wall Thickness Standard Wall (mm)	Wall Thickness Heavy Wall (mm)	Protective Coating
Jervois Lateral	Lateral to Dairy Farmers Meter Station (offtake at MD 522.33)	2004	15,306	0.900	60.3	ASTM A106B	5.54	5.54	External: Yellow Jacket Internal: N/A

3.7 Operation

The Pipeline System is operated in accordance with the Environment Management Plan, which is aligned with the SEA Gas pipeline Statement of Environmental Objectives, and AS 2885.3. SEA Gas is responsible for all aspects of environmental management during operations and maintenance of the Pipeline System.

A routine operation and maintenance program is in place, which includes ground and aerial patrols, inspection and repair or replacement of faulty equipment, pigging and cleaning of the pipeline, coating surveys, monitoring of corrosion protection systems and remediation of the easement. Aerial and / or ground inspections include detection of subsidence or erosion, checking vegetation for discolouration (which can be an indicator of a gas leak) and detection of weed species. Access to the easement is necessary to follow-up any issues identified from inspection and patrol activities.

More significant maintenance activities, such as dig-ups to verify in-line inspection data or to address coating defects, are generally infrequently required. Dig-ups involve the excavation of material from around the pipeline (typically referred to as a bellhole) to allow sufficient room for operations technicians to safely undertake any remedial works that may be required. Topsoil is stockpiled separately from trench spoil, and the site is restored as soon as practical following completion of maintenance works.

Prior to commencing extensive work, or where numerous sites are involved, operations personnel consult with regulatory authorities as appropriate. The Environmental Line List (ELL) is also consulted to identify any site specific environmental issues and management requirements as discussed in Section 6.1.5. Consultation with road authorities will also be undertaken, where applicable, with peak traffic periods avoided to minimise disruption.

Regular consultation is maintained with landowners whose properties are traversed by the pipeline. The Dial Before You Dig referral service is promoted for use by third parties wishing to locate the pipeline prior to undertaking excavations and work in the immediate area of the pipeline, which may affect its continued safe operation.

Operational pipelines generally have very little environmental or landholder impact.

Activities undertaken as part of pipeline operations are summarised in Table 3-4. These activities are also described in more detail in Appendix A.

Table 3-4: Summary of pipeline operational activities

Activity	Description
Easement Maintenance	
Weed Management	Localised control of weeds is undertaken along the easement as required in response to identified occurrences.
Line-of-sight vegetation trimming and / or clearance	Vegetation trimming and removal along the easement to maintain line-of-sight is restricted to regrowth species in predominantly cleared agricultural or forestry land. Trees retained on the easement during construction will not be removed, however it may be necessary to trim or remove trees that regenerate within 2 m of the pipeline as they pose a threat to pipeline integrity.

Activity	Description
Patrolling / inspections and easement access	These are undertaken by travelling along the easement, on private / public roads or over cleared paddocks, and involve access to private property and use of private tracks. Access over paddocks is only required to address a particular issue and is not a routine activity. Routine patrols are generally restricted to road crossings on public land.
Aerial inspection of easement	Aerial inspections of the pipeline easement. No rotary wing (helicopter) landings along the easement unless immediate safety or environmental concerns are observed.
Erosion and subsidence repairs	Following major rainfall events, creek lines or run-off areas on the easement can experience soil erosion. Repairs are carried out as soon as practicable following the erosion event and include the replacement of similar materials, re-profiling or revegetation to improve stability.
Pipeline Operations	
Pipeline Incident / Emergency	The main threats to public safety from pipeline operation and maintenance are fire, explosion or heat radiation exposure as a result of pipeline rupture. The pipeline risk assessment indicates that the threats are primarily associated with factors such as unauthorised third party or external interference to the pipeline and pipeline corrosion. Pipeline design in accordance with AS2885, inspection and maintenance procedures ensure that the risk is reduced to As Low As Reasonably Practicable.
Pipeline Maintenance	
Cathodic Protection surveys	Surveys involve travelling the easement and stopping to inspect Cathodic Protection points (above ground posts) on foot. Typically conducted once per year.
Excavations, including for coating inspection or refurbishment, installation and / or servicing of anode beds, and new tie-ins	Excavations of the pipeline follow the same processes as those undertaken during pipeline construction, namely clear and grade, trenching, backfill, restoration and rehabilitation but are generally on a much smaller scale. Once vegetation and topsoil have been cleared and stockpiled, the excavation is performed and excavated spoil is stockpiled. The pipeline maintenance is then undertaken (this may include welding, painting, sand blasting). Once complete the trench is then backfilled, the ground surface is re-contoured and the topsoil and vegetation respread. Some re-seeding may be undertaken if necessary.
Pigging	A pipeline 'pig' is placed in the pipe via a scraper launcher, enabling internal inspection. The pig travels along inside the pipe before being removed at a scraper receiver site. Launching and receiving a pig results in minor venting of gas to atmosphere. Any hydrocarbon liquids or solid debris collected by the pig is disposed of in accordance with EPA waste tracking requirements. Intelligent pigging programs include scheduled pigging at maximum intervals of 10 years.
Welding	Welding is usually required when pipeline repairs or modifications are made to existing infrastructure. Pipeline welding may occur above ground or following the excavation of the pipeline.
Pipeline coating repairs	Affected areas are abrasive blasted to remove existing coating and corrosion and to prepare the surface prior to coating or tape wrap application. Tape wraps or epoxy coatings are expected to be used to repair the pipeline protective coating or at weld margins along the pipeline.
Venting (pipeline repair)	Venting a section of the pipeline may be necessary either in the event of an emergency where gas is escaping from the pipeline or to facilitate a planned repair. This is a rare occurrence. Large quantities (10-100 TJ) of gas are vented over a relatively short period of time (in the order of 1-6 hours). When venting occurs noise levels are extremely high, with an unattenuated peak sound power level of 160-170 dB(A) at the source and predicted likely noise levels at 100m of 135 L_{Cpeak} dB(A) and 108 $L_{Aeq,8Hr}$ level, dB(A). (Note: Noise exposure for persons indoors would be reduced by 10 – 25 dB(A)).

Activity	Description
Replacement or repair of a pipeline section	Once vented, the damaged section of pipeline is excavated and either cut out and removed or repaired. This may include welding, abrasive blasting and re-coating. The site is then reinstated. Again, this is expected to be very rare.
Pressure testing	Hydrostatic pressure testing may be undertaken when a section of pipe is replaced. The pipe section is filled with water and pressurised for up to 24 hours. Fresh water is used where possible, however chemicals such as biocide, oxygen scavengers and corrosion inhibitors may be required. Hydrotest water is disposed to land if it meets water quality guidelines and has landholder approval, but may be contained and treated on site or removed off site.
Facility Operation and Maintenance	
Stations operations / maintenance	Pipeline system has Compressor Stations, Pressure Reducing and Metering Stations (PRMS), Mainline Valve (MLV) facilities and Scraper Stations. Stations are contained in fenced compounds and operate continuously.
Weed management	Localised control of weeds is undertaken in and around compounds, typically annually.
Production of hazardous waste	Waste hydrocarbons generated from maintenance or pigging operations, liquids and heavy metals are not expected in the gas stream, but if present would be trapped in coalescing filters. Contaminated filters from maintenance change-overs are bagged and stored on site within a bunded area prior to offsite recycling and disposal by an EPA certified waste contractor. Filters and other waste material are recycled by a waste removal contractor.
Waste disposal	General waste generated during operations is collected on site and removed to licensed facilities for disposal.
Venting (planned operations and maintenance)	Gas is released to the atmosphere as a result of pipeline operations and some facility maintenance activities (e.g. compressor station venting, facility venting for maintenance purposes, testing of pressure safety valves and valve actuation). Approximately 2 TJ of gas is vented in South Australia per annum. SEA Gas reports vented gas in accordance with EPA and Greenhouse gas emission reporting requirements. Total greenhouse gas emissions for pipeline operations in both South Australia and Victoria typically range between 15 and 25 tCO_{2e} per annum.
Venting (unplanned facility operations)	Unplanned venting may occur as a result of equipment malfunction or failure causing overpressure, which may result in a pressure safety valve lifting and releasing gas to atmosphere. This is an unlikely event that occurs on average once or twice per year. The volume of gas released is only sufficient to control the pressure until Emergency Safety Valves are shut in. Venting will typically cease within minutes.
Abrasive blasting and painting	Epoxy enamel paint coatings may be applied (sprayed) at above ground facilities to maintain coating integrity. High-pressure abrasive surface blasting of pipe work is used to prepare the surface, which is then painted in accordance with SEA Gas Abrasive Blasting and Painting Procedure.

Pipeline and facility operation is normally controlled remotely using a Supervisory Control and Data Acquisition (SCADA) system, in addition to options for manual operation of critical components. The SEA Gas System Control Centre (SCC) operates 24 hours a day, 7 days a week with two 12 hour shifts.

The SCC is responsible for operating plant and equipment to safely deliver pipeline flows. The SCC monitors the Pipeline System and responds to alarms announced via SCADA. Shipper gas nominations are also processed in the SCC and reports are provided on metered flows and gas quality.

The SCC is also responsible for issuing work permits and monitoring remote activities on the Pipeline System. SCC receives calls via the SEA Gas emergency phone number and initiates any emergency response required.

Plate 3-5: Operational pipeline easement

3.8 Construction

Any new construction projects would go through a detailed planning and design process prior to the commencement of construction. The following activities would typically be undertaken:

- route or site selection;
- landholder liaison and easement negotiations;
- ecological and cultural heritage surveys;
- stakeholder consultation;
- regulatory approvals (e.g. pipeline licence variation and any additional approvals);
- alignment finalisation and survey; and
- detailed engineering design.

A principal aim of the detailed planning and design process is to select a site or alignment that minimises the impact to the environment, landholders and other stakeholders and is also technically feasible and economically viable.

Standard pipeline construction practices will be adopted for any new construction projects, and techniques will be in accordance with the requirements of the SEO and AS 2885, and will follow the guidelines provided by the current edition of the *Australian Pipelines and Gas Association* (APGA) *Code of Environmental Practice: Onshore Pipelines*.

Pipeline construction is undertaken on a 'right-of-way', which is a cleared corridor, typically 15 – 25 m wide that is used to install the pipeline. Extra work space may be required in some areas to allow

sufficient room for activities such as stock piling of pipe and equipment, excavation of bellholes or establishment of horizontal directional drilling sites.

A larger diameter pipeline usually requires a right-of-way in the order of 25 m in width, to allow the pipeline to be constructed safely and the topsoil to be conserved for successful restoration. The right-of-way for a smaller diameter pipeline is generally in the order of 15 m. Typical right-of-way layouts for large and small diameter pipelines are shown in Figure 3-1 and Figure 3-2.

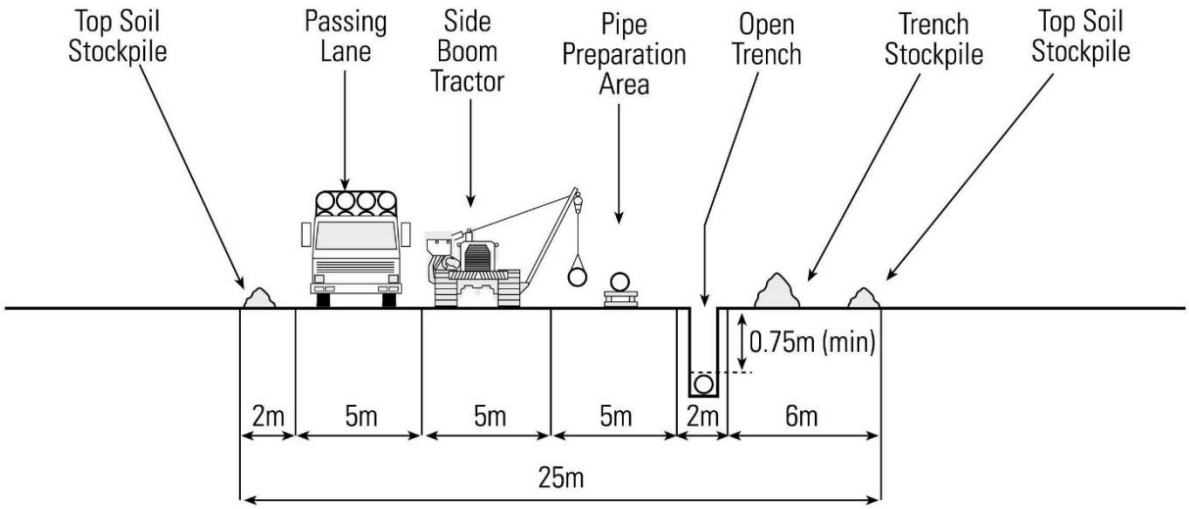

Figure 3-1: Typical right-of-way for cross-country pipeline construction of large diameter pipeline

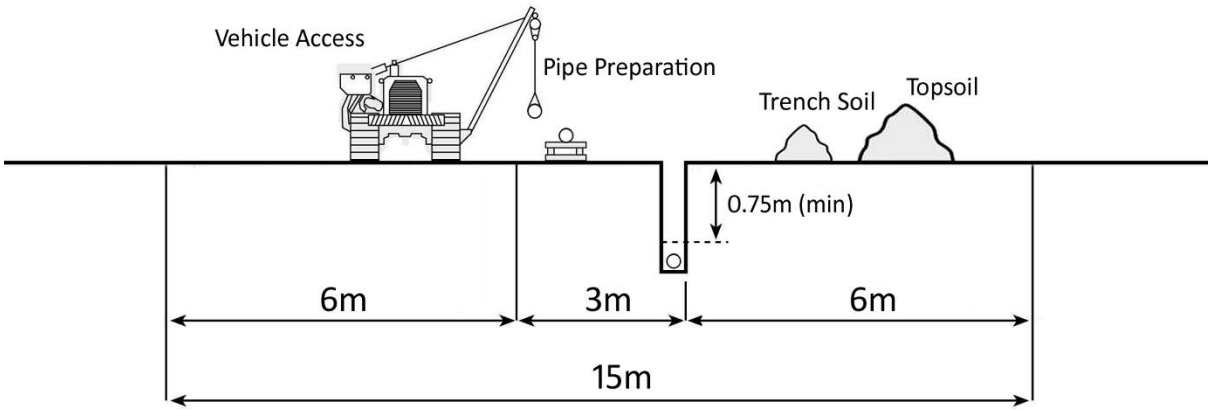

Figure 3-2: Typical layout of construction right-of-way for a small diameter pipeline

Graders and bulldozers are used to clear the right-of-way of vegetation and topsoil ready for construction to commence. Subsequent activities, including trenching, stringing, welding, coating, lowering in, backfill and restoration, move along the right-of-way in sequence. The typical construction sequence is outlined in Table 3-5.

Table 3-5: Typical pipeline construction sequence

Construction Activity	Description
Detailed Survey	Engineering, environmental and cultural heritage surveys are used both in route selection and to determine if any special construction techniques or mitigation measures are required. Once the preferred pipeline route has been determined, then the centreline is surveyed and engineering aspects are finalised. Markers (pegs) are placed to identify pipeline route and right-of-way.
Fencing	Fences crossed by the right-of-way are cut and replaced with construction gates.
Clear and Grade	Graders and bulldozers are used to clear the right-of-way of vegetation and topsoil ready for construction to commence. Vegetation and topsoil are stockpiled separately on the right-of-way. Topsoil will typically be graded to a depth of 100 to 150 mm for a blade-width over the trench line or the entire non-working side or the full right-of-way, depending on factors such as the soil type, terrain, construction requirements and weather conditions.
Trenching	After the route is cleared, a trench (approx. 1.5 m in depth in cross-country sections) is dug for the pipeline either by a trenching machine or excavator. Trench spoil is stockpiled on the right-of-way, usually on the non-working side.
Stringing	Steel pipe is trucked to the construction site and sections, each approximately 12-18 metres long, are laid end-to-end next to the trench. The sections are placed on sandbags that are raised on blocks of wood (timber skids) to protect the pipe from corrosion and coating damage.
Bending	Where required, pipe sections are bent to match changes either in elevation or direction of the route.
Welding	Pipe sections are welded together.
X-raying	The pipes are inspected using x-ray equipment as per AS 2885.2.
Joint Coating	The area around the weld is then grit blasted or wire-brushed and coated, with a protective coating to reduce corrosion.
Padding	Where required, padding machines are used to sift the excavated subsoil to remove coarse materials. To protect the pipe coating the remaining fine material is used to pad beneath and on top of the buried pipe. In some instances (e.g. very rocky soils) imported sand or foam pillows are used for padding.
Lowering-in	Sidebooms (bulldozers with cranes) or excavators are used to lower the welded pipe into the trench.
Backfilling	Trench spoil (subsoil and topsoil) is returned to the trench and material compacted to minimise risk of subsidence of material over the pipe.
Pressure Testing	Pipeline integrity is verified using hydrostatic testing in accordance with AS 2885.5. During hydrostatic testing the pipeline is capped with test manifolds, filled with water and pressurised up to 125% of maximum operating pressure for a minimum of two hours. A 24-hour leak test or a 3-hour combined strength and leak test then follows. Providing it meets relevant water quality guidelines and has landholder approval, hydrotest water is discharged to the surrounding environment. If water fails to meet quality guidelines it will be treated prior to disposal (e.g. by chemical neutralisation). Hydrotest water is sometimes treated with chemicals such as biocide, oxygen scavengers and corrosion inhibitors prior to testing.
Restoration and Rehabilitation	The easement is recontoured to match surrounding landform and erosion controls constructed where appropriate. Separately stockpiled topsoil is then respread evenly across the easement and any cleared vegetation placed across the easement, to assist in soil retention and provision of seed stock. Reseeding or revegetation of the easement, using appropriate species (i.e. crops / pasture or indigenous native species) is undertaken to restore vegetation cover.
Signage	Pipeline marker signs are erected along the easement as per AS 2885.1.

These construction activities are shown in Plate 3-6 to Plate 3-11, using images taken during construction of the Pipeline System.

Plate 3-6: Clear and grade (large diameter pipeline)

Plate 3-7: Pipeline delivery (left) and stringing (right)

Plate 3-8: Trenching (Left: large diameter pipeline construction. Right: small lateral construction)

Plate 3-9: Lowering in (Left: large diameter pipeline construction. Right: small lateral construction)

Plate 3-10: Padding (left) and backfill (right). (Left: large diameter pipeline construction. Right: small lateral construction)

Plate 3-11: Reinstated watercourse crossings (large diameter pipeline). (SEA Gas pipeline is installed on the right of the above-ground water pipeline in the left image)

The length of the open trench will vary depending of the scale of the pipeline construction and the sensitivity of the surrounding area and can typically be 1–10 km for large scale pipeline construction. For a small lateral, the entire trench would be likely to be open prior to lowering-in the pipe. The time between clear-and-grade and restoration can typically be in the order of three months for a large scale pipeline, depending on the sensitivity of the area, but is typically several weeks for a small lateral.

Watercourse crossings are generally constructed using standard open cut (trenching) methods. This technique is most suited to the dry or low flow conditions. If water is present, flow diversion techniques are employed where necessary. The standard open cut method involves establishing a stable working platform either side of the watercourse and creating a trench using excavators. The trench is not completed through the banks until immediately prior to pipe installation. Tie-in points are located on high ground, well away from the banks.

Horizontal directional drilling (HDD) is generally used to cross major watercourses where standard open cut methods are not feasible. The feasibility of using HDD is strongly limited by site conditions such as soil stability, slope, access, available workspace and the nature of subsurface rock. The installation of the pipeline by HDD involves drilling a hole at a shallow angle beneath the surface through which the pipe is threaded, as shown in Figure 3-3. Drilling is conducted by a specially designed drill rig, operated by a specialist contractor. A variety of associated equipment and infrastructure is required. HDD is also commonly used to cross main roads and other significant infrastructure.

Thrust boring may also be used to install pipelines beneath infrastructure such as roads, railways, and buried utilities, or to cross watercourses. A typical watercourse boring operation is shown in Figure 3-4.

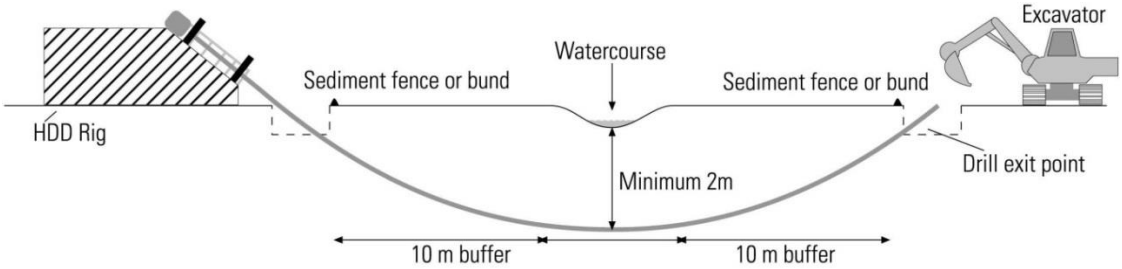

Figure 3-3: Typical profile of horizontal directional drilling

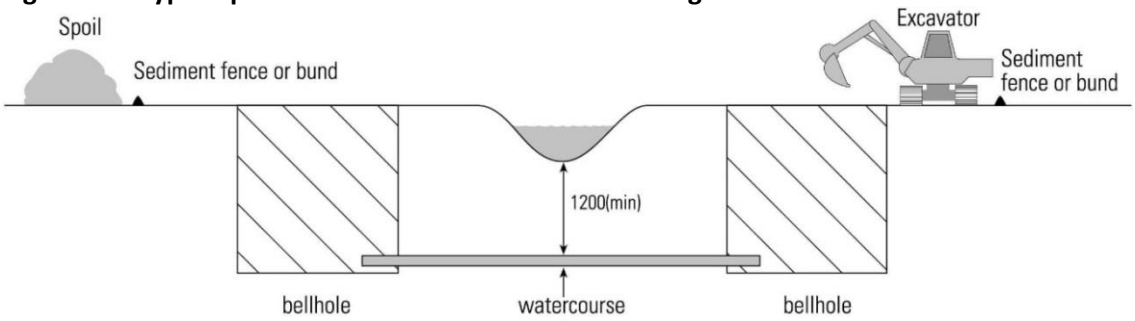

Figure 3-4: Typical watercourse boring operation (profile view)

Construction of Above Ground Facilities

Above ground facilities are typically constructed as a component of the main pipeline construction activities. For facilities such as the Yallamurray Compressor Station, construction of the facility would be likely to be managed as a stand-alone project by a specialist contractor.

The construction process for above ground facilities typically involves:

- clearing of vegetation;
- earthworks, including grading of the site and installing hardstand / gravel;
- installing foundations (where required);
- installing / constructing piping, equipment and associated infrastructure (e.g. control hut, buildings); and
- limited radiographic and hydrostatic testing of facility piping.

Mainline valves and scraper stations are typically constructed within the pipeline easement, however facilities such as meter stations or compressor stations require a larger area. A typical meter station would be in the order of 50 m by 50 m in area, while the area provided for the Yallamurray compressor station would be approximately 200 m by 200 m. Additional workspace may be required adjacent to facility compounds during construction (e.g. for stockpiling materials) and would be rehabilitated following completion of construction.

Construction Workforce and Accommodation

Construction workforce numbers vary depending on the scale of construction required and the environment of the pipeline area. Construction of small lateral pipelines and facilities may require a workforce of approximately 10-30 people to install the pipeline, with approximately 5-10 additional personnel involved as contractors and project management. The workforce required for construction of the main SEA Gas pipeline was in the order of 300 personnel. The construction workforce may be accommodated in a variety of forms. Preference is generally given to using local commercial accommodation rather than establishing construction camps, particularly for small projects.

Construction Depot

A construction depot may be required for pipeline construction; however this is unlikely to be necessary for smaller laterals and above ground facilities. A construction depot would typically be situated in an existing industrial area, or may be located adjacent to the construction site (e.g. for construction of a compressor station). The construction depot is primarily used for equipment storage, vehicle lay-down, vehicle maintenance and refuelling, site office and administration and as a rendezvous point for the crew each morning prior to commencing works on the easement.

Waste management, spill response and depot maintenance will be carried out in accordance with procedures summarised in Section 6. Relatively small amounts of domestic and industrial wastes are generated during construction and will be managed as described in Section 5.8.5.

A Construction Safety and Environmental Management Plan (CSEMP) will be developed for any new construction activities. It will outline the environmental objectives, roles and responsibilities for environmental management, site specific environmental management procedures, training programs and monitoring, auditing and reporting systems. The SEA Gas Environmental Management System (EMS) and requirements of the Construction Safety and Environmental Management Plan are described in Section 6.

3.9 Decommissioning

When the utility is no longer required, the pipeline will be decommissioned in accordance with the AS 2885.3, prevailing regulatory requirements and accepted environmental practices of the day.

At the time of decommissioning a decision will be made regarding the opportunities for future use of the assets. If no longer required, the pipeline will be disconnected from all sources of gas and pigged to ensure there is no residual liquid in the line, then purged of gas with a non-flammable fluid, ensuring that the disposal of the purging fluids meets the relevant safety and environmental requirements.

The pipeline will be abandoned in place, taking care to ensure no future risk from long term road or ground subsidence or from soil contamination. This may be achieved through maintaining the Pipeline Cathodic Protection System to prevent corrosion. If it is considered that the pipeline may offer some future benefits, it will be filled with an inert material and the cathodic protection system will be maintained.

The above ground facilities, including buildings and fences will be removed and buried pipelines and transition pipework will be cut at least 750mm below the natural surface. The land will be rehabilitated and monitored for a period of time, where required.

It is possible that some components of the Pipeline System may be decommissioned during the operational life (e.g. small laterals or meter stations that are no longer required). Specific decommissioning plans would be developed and would typically involve removal of above ground facilities, with below ground facilities allowed to degrade in-situ. The activities would be similar in scope to the construction or operational repair / maintenance works described in Sections 3.7 and 3.8 and would be managed in a similar manner.

4 Overview of Existing Environment

The Pipeline System traverses a variety of landscapes. To assist in describing the character of the existing environment, the area traversed by the pipeline has been divided into environmental regions based on broad land characteristics.

Five environmental regions with similar geological, topographical, biological and land use characteristics have been defined for the South Australian section of the pipeline. These environmental regions have been used in Section 5 as a basis for discussing the potential environmental impacts associated with pipeline operational or construction activities.

The environmental regions are illustrated in Figure 4-1 and the following discussion broadly describes the characteristics of these regions.

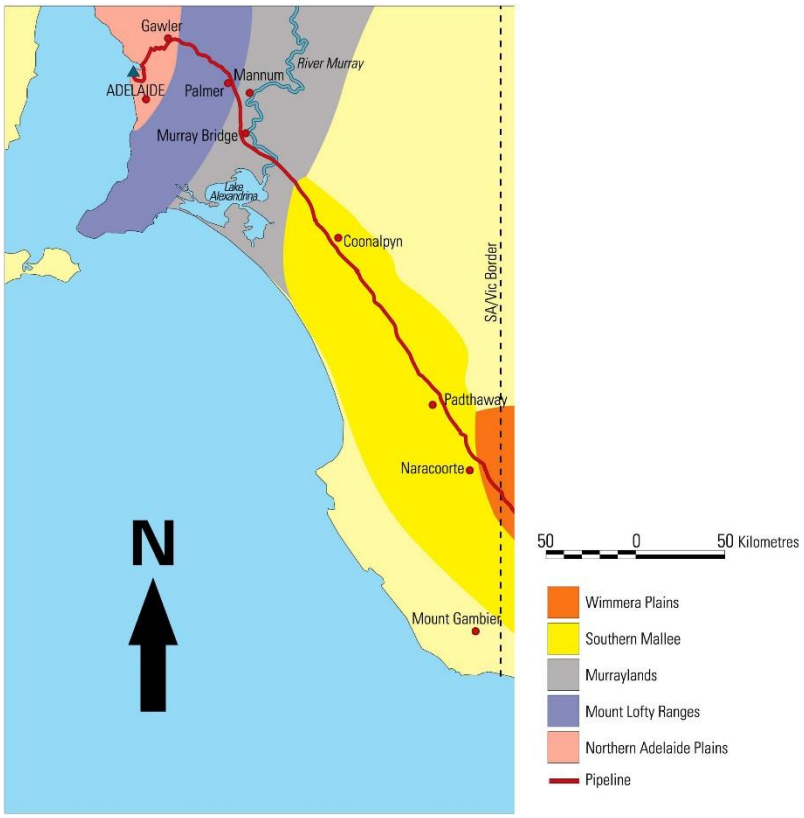

Figure 4-1: Environmental regions on the Port Campbell to Adelaide pipeline route

4.1 Wimmera Plains

The Wimmera Plains environmental region extends from Casterton (Victoria) to Naracoorte in South Australia. The majority of the environmental region lies in Victoria to the east.

The western extension of the Wimmera Plains is comprised of a flat dune-free plain in the south, and a dune covered sand plain in the north. Substantial swampy depressions, such as Benoch and Groker swamps, and smaller depressions and sinkholes are common throughout.

Native vegetation communities are likely to have been dominated by open woodlands of River Red Gum over the heavier clay soils of interdune corridors and along major stream courses, lakes and swamps.

Several intermittent streams traverse the plain and these include Mosquito, Yelloch and Naracoorte creeks. The land is largely cleared to open parkland and pastures dominate. Remnant woodland is occasionally preserved around the lakes, swamps and creek lines.

The Wimmera Plains region experiences cool, wet winters and long, mild, dry summers. The hottest months are between December and March, and coolest between May and September. May to October are the wettest months and January to March the driest (Bureau of Meteorology 2020). Average annual rainfall at Naracoorte is 485 mm.

4.2 Southern Mallee

The pipeline traverses the Southern Mallee environmental region from immediately north of Naracoorte to approximately Cooke Plains, south of Tailem Bend. The Southern Mallee contrasts markedly to other environmental regions, and is characterised by flat, featureless landscape of impermeable soils derived from marl, clay and silt. These areas are subject to seasonal flooding with lakes, swamps and poorly drained soils common. Morambro Creek represents the only significant watercourse and some artificial drainage has also been constructed.

The land has been extensively cleared and the plains are generally devoid of remnant vegetation apart from roadside mallee corridors with some scattered larger remnants. Pastoral and agricultural land-uses dominate.

The region also experiences cool, wet winters and long, mild, dry summers. The hottest months are between December and March, and coolest between May and September (Bureau of Meteorology, 2020).

Rainfall decreases northwards away from the coast (Croft *et al.* 1999), with May to September being the wettest months and January to March the driest. Average annual rainfall at Keith is 460 mm, decreasing to 371 mm at Cooke Plains (Bureau of Meteorology 2020).

4.3 Murraylands

The pipeline traverses this environmental region between Cooke Plains and Palmer. Near the Murray River, the plain becomes increasingly sandy with low dunes and frequent calcrete outcrops. The floodplain is under intensive dairying and is highly modified. However, a variety of fluvial forms can still be recognised. The dominant remnant vegetation is mallee woodlands with broombush or heath understorey. Remnant stands are commonly restricted to dune ridges. Grazing or cereal cultivation are the principal land-uses.

The Murraylands are characterised by cool, wet winters and dry, hot summers. The coolest months occur from May to September. Rainfall across the Murraylands is low, with the highest rainfall occurring between May to October (Bureau of Meteorology 2020). Average annual rainfall at Murray Bridge is 348 mm (Bureau of Meteorology 2020). Rainfall can be unreliable and drought conditions are common.

4.4 Mount Lofty Ranges

The Mount Lofty environmental region extends from Palmer to Gawler, incorporating the Mount Pleasant, Mount Crawford, Williamstown and Barossa areas. Landscapes vary from undulating plains to steep dissected marginal hills, gullies and gorges, escarpments and strike ridges. Marginal hills overlook broad alluvial footslopes.

Intermittent streams, such as Milendella Creek, are dominant features, while waterholes and soakages are common. The upper catchment of the South Para River is located within this environmental region. However, the watercourse crossing occurs immediately south of Gawler, in the Northern Adelaide Plains environmental region. The pipeline skirts the southern margin of the Barossa Valley.

The region contains larger areas of remnant vegetation on private properties, forestry land and conservation parks. However, the pipeline traverses areas that have been extensively cleared leaving a landscape of open woodland and isolated trees. The principal land uses in the region are grazing, forestry, viticulture, mining and conservation.

The Mount Lofty Ranges and the Northern Adelaide Plains environmental regions share a Mediterranean climate with long, hot summers and cool winters, with the Mount Lofty Ranges experiencing cooler conditions than the Northern Adelaide Plains.

The Mount Lofty Ranges is a high rainfall area dominated by winter seasonal rainfall. Annual rainfall can range from under 400 mm to over 1200 mm. Average annual rainfall at Mount Crawford Forest Headquarters is 758 mm (Bureau of Meteorology 2020).

4.5 Northern Adelaide Plains

The pipeline traverses the Northern Adelaide Plains environmental region between Gawler and Pelican Point and incorporates the northern and north-western suburbs of Adelaide. The alluvial slopes bounding the western edge of the Mount Lofty Ranges adjoin the coastal plain that extends to a flat, poorly drained landscape. The plains have been almost completely cleared of native vegetation to allow agricultural and more recently residential and industrial land uses. The coastline originally was bounded by a belt of coastal ephemeral wetlands (or outwash swamps). These have largely been reclaimed through drainage and development. Areas of mangrove remain in the coastal margins.

The Northern Adelaide Plains experiences long, hot summers and cool winters. The region receives substantially less rainfall than the Mount Lofty Ranges, on average ranging between 400 mm and 500 mm per annum. Average annual rainfall at Edinburgh RAAF Base is 428 mm (Bureau of Meteorology 2020).

5 Impact Assessment

This section describes in more detail the existing environment along the pipeline, the potential impacts to the environment as a result of operations and new construction activities, and the proposed impact mitigation strategies. Existing environmental values are described in the context of the environmental regions which the pipeline traverses, which are summarised in Section 4.

The information presented in this section is based on information presented in the original EER / EIR (SEA Gas 2001) and additional EIRs that were produced for PL 13 to cover pipeline extension and pipeline laterals (see Section 1.2), supplemented by information collected throughout pre-construction planning, construction and operation of the pipeline. Information relating to potential events that may impact the environment and their frequency and consequences has been derived by SEA Gas and JBS&G personnel based on extensive construction and operational experience with the SEA Gas pipeline and numerous other pipelines in South Australia and interstate.

Implementation of the proposed impact mitigation strategies will be consistent with the guidance provided by the current edition of the APGA Code of Environmental Practice.

5.1 Soils and Terrain

5.1.1 Existing Environment

Geology

The surface geology for much of the pipeline route consists of unconsolidated or deeply weathered materials. Basement rock exposure is restricted to small areas in the hills between Palmer and Gawler. East of the Mount Lofty Ranges, the pipeline crosses surfaces principally of Cainozoic (Tertiary and Quaternary) geology. Much of this is calcareous rock, including the section from south of Naracoorte to the Murray River. Basement rocks of Proterozoic and Palaeozoic age are exposed across the Mount Lofty Ranges. These rocks occur in north-south trending belts and are predominantly highly deformed and metamorphosed sedimentary and granitic rocks. Outcrops are restricted to ridge crests and steep side slopes and incised channels of the small gorges that dissect the ranges.

Geomorphology

The majority of the pipeline area traverses plains, low hills and tablelands with gentle to moderate slopes. There are locally steep sections in the Mount Lofty Ranges and several wide, deep valleys, although the watercourse channels contained in these are small and have intermittent flow.

Temperate climate and moderate to low rainfall across most of the region restricts the rate of geomorphic processes. Many of the landscape features, such as deepened valleys and dune ridges, are relict features from wetter or drier climates or result from geologically young tectonic and volcanic activity.

Soils

Soil variation along the route is a reflection of parent materials and climate. A predominant characteristic of the soils of the Cainozoic geology is the presence of clearly differentiated A and B horizons, the B horizon containing a much higher content of clay relative to the A horizon. The boundary between the horizons in these texture contrast soils or duplex soils (Northcote 1979) is

relatively sharp, occurring over an interval of 10 cm or less. These soils occur on a range of parent materials including limestone, sandstone and mudstone.

Soils and Terrain of the Environmental Regions

Wimmera Plains

The region comprises a broad, level plain elevated by the Kanawinka fault about 30 m above the Follett coastal plains. The predominant surface materials are leached acid white sands and laterites (ironstone). The relief on the plain is provided by the gently sloping sand sheets and sand ridges, weakly incised streams and shallow depressions with remnant drained swamps. The more prominent sand ridges are arcuate lunettes on the eastern edges of the swamps and ephemeral lakes. Soils of the sand sheets and ridges are typically podosols and peaty podosols, with sodosols on parent materials with a higher clay and ironstone content.

Sothern Mallee

Topographically, the area is part of the Pleistocene shoreline ridge sequence of the Naracoorte Range and is differentiated from the Wimmera Plains by including a small area of Gambier Limestone and more extensive of outcrops of Bridgewater Formation (calcareous dunes and dune limestones). There is a complex of former shoreline sediments in this environmental region, including calcareous sands, quartz sands, and the lagoonal and lacustrine muds of the Padthaway Formation.

The pipeline parallels the Kanawinka Escarpment before crossing the northern end of the escarpment and travelling north-northwest between the former shoreline ridges of the Black Range and Mount Monster Range. Small enclaves of east-west aligned calcareous and siliceous dunes also occur. The topography and surface materials change character at Cooke Plains. A complex of sodosols exist in the region in response to the varied origin and composition of parent materials.

Murraylands

The region is bisected by the trench incised by the Murray River into Miocene limestones. The base of this trench extends well below present sea level and is now partially filled with alluvium. The river plain forms a distinct sub-unit in the land system. The surface away from the river trench is dominated by prominent ridged dunes and lake depressions with saline muds. Both calcareous and siliceous sands occur in the dunes and plates and nodules of calcrete are common.

Mount Lofty Ranges

This is an area of varied topography including rolling hills, broad valleys and some deeply incised watercourses with narrow terraced floodplains and alluvial fans. The region has complex geology with a variety of the geological units intercepted by the pipeline. Geological (lithological) boundaries are abrupt and the rocks are typically strongly folded and fractured. The eastern edge of the Ranges consists of highly metamorphosed Cambrian sedimentary rocks including brecciated (crushed) and marbleised zones, and Ordovician rocks including the high grade Rathjen Gneiss and the Palmer Granite. The siliceous character of the bedrock and the higher rainfall of much of the Ranges has produced yellow podsolic soils with strong texture contrast. Many of the cleared steeper slopes in the Mount Lofty Ranges show evidence of old and recent mass movements typically debris flows involving rock and weathered mantle.

Northern Adelaide Plains

This area is a broad piedmont and plain built by alluvial fans and downwash from the Mount Lofty Ranges, supplemented by fluvial sediments of the small streams that drained the western side of the Ranges. The materials are sandy clays with lenses of gravel closer to the Ranges. Near the coast, sediments are of tidal flat, coastal barrier and mangrove and salt marsh origin. Urban development, particularly pavements, drainage channel realignment, and landfill has greatly altered the natural processes that produced this topography.

In addition to the area's natural geological features, historical land use practices in the Northern Adelaide Plains (and in particular the section of the pipeline between Dry Creek and Pelican Point) have resulted in site contamination in some areas. Investigations undertaken for the Port River Expressway construction (Tonkin 2002a and 2002b) identified some contaminated sites along the Expressway, however much of the SEA Gas pipeline alignment was identified as low contamination status (Ecos 2003). Targeted investigations along other sections of the SEA Gas pipeline alignment did not detect significant site contamination, however a number of areas were identified as having moderate risk of encountering contamination during construction (Ecos 2003).

5.1.2 Potential Impacts

The following activities have the potential to affect soils and terrain:

- earthworks associated with operation (e.g. excavation for pipe or coating repair or replacement);
- earthworks associated with construction (e.g. clear-and-grade operations, trenching, backfilling and reinstatement);
- movement of vehicles along pipeline corridor and access tracks; and
- storage, handling and transport of hydrocarbons and chemicals.

Potential localised impacts to the soils and terrain include:

- erosion and sedimentation;
- mass movement;
- soil inversion;
- soil compaction;
- soil contamination; and
- acid sulphate soil formation.

These are discussed further below. Further detail on potential impacts and their management for operational activities is also provided in Appendix A.

The potential impacts to soils and terrain discussed below are typically short term and localised and strategies for avoidance or mitigation that are implemented during construction and operations reduce these impacts to an acceptable level. Given the low operational impact and the expectation that new construction activities will be minimal and primarily small diameter pipelines with a narrow right-of-way, the overall impact is considered low.

Soils and terrain can also present potential constraints to pipeline construction and operation activities. These are typically addressed during alignment selection, pipeline design and construction. These constraints may include the surface rock, near-surface caves in limestone areas, potential for

trench collapse in sandy or wet soils and construction and safety constraints associated with contaminated soils.

Erosion and Sedimentation

Erosion and sedimentation are key potential environmental impacts associated with excavation activities for pipeline construction and (to a lesser extent) operation. These activities require earth moving to remove surface cover and disturbance to soil profiles and there is potential for sedimentation of the adjacent environments if adequate controls are not implemented.

During rainfall events (particularly over winter), recently disturbed areas of the pipeline easement can be subject to erosion by water and subsequent transportation and deposition of this sediment off the alignment (sedimentation). Appropriate drainage controls, topsoil / spoil stockpile management and maintenance of erosion control devices during construction protect soils and surface water environments from significant erosion and sedimentation impacts. Rehabilitation and revegetation / reseeding of the pipeline easement, with installation and maintenance of erosion control devices where required, are implemented to prevent erosion issues during operation.

Inadequate soil compaction over the trench line can also lead to trench subsidence and subsequent erosion, particularly in regions of heavy clays which have a high shrink / swell potential. Soils that expand and contract naturally have the potential to subside if disturbed. Shrinkage can be a particular issue as reinstated sections of the trench may subside, changing the local surface flow patterns, which can lead to trenchline erosion. Limestone areas can also result in localised subsidence if activities result in localised collapse of caverns. Areas around Naracoorte are of particular sensitivity. Trench spoil is returned to the trench and material compacted to minimise risk of subsidence of material over the pipe. Alignment selection also considers geotechnical surveys to avoid areas prone to subsidence.

During the summer months when rainfall is low, erosion can result from wind action on soils where prolonged exposure occurs following initial clearing. Areas particularly sensitive to wind erosion are the dune ridges in the Wimmera Plains, Southern Mallee and Murraylands environmental regions. SEA Gas has revegetated sites with natural species to complement nearby remnant vegetation in areas prone to wind erosion.

Erosion and sedimentation are typically not significant issues on rehabilitated pipeline easements during operation. Over the operating history of the SEA Gas pipeline, there has been minimal erosion of the pipeline easement. In response to erosion events, SEA Gas has implemented erosion remediation and site stabilisation measures including: planting of native vegetation and pasture in broad acre areas, installation of berms, geofabric and rock stabilisation, fencing of creeklines to exclude livestock and establishing trough water points in consultation with landholders.

A major pipeline failure during operation that involved pipeline rupture would result in localised soil disturbance during the incident and subsequent rehabilitation. Such an incident is considered to be a very rare event, and extensive mitigation measures are in place to manage this risk, as discussed in Section 5.8.4.

Mass Movement

Earthworks have the potential to aggravate local surface instability problems resulting in slope failure, land-slip and mass movement. Steep valleys, for example in the Mount Lofty Ranges environmental

region, are particularly susceptible to mass movement. Steep slopes, particularly those at risk of mass movement, are generally avoided by pipeline alignment selection.

On a smaller scale, localised bank collapse can occur at watercourse crossings, particularly those with large red gums on the channel margins. These areas would be identified for avoidance or site specific management measures prior to construction.

Soil Inversion

Without effective soil management, topsoil may be 'lost' during construction or operational excavation activities by burial beneath (or mixing with) trench spoil during stockpiling, covering with sediment washed in from adjacent areas or returning trench spoil and topsoil to the trench in a sequence different to original profiles.

The loss of topsoil reduces the effectiveness of easement restoration and agricultural based land use activities by limiting the amount of available nutrients, biomass and productivity. The topsoil separation and management measures implemented along the pipeline alignment effectively mitigate loss of topsoil.

Soil Compaction

Pipeline construction and excavations require compaction of the backfilled trench to prevent the disturbed soil from subsiding. Vehicle traffic on the easement for construction and operational inspection and maintenance activities can lead to soil compaction, in particular equipment and machinery laydown areas or areas of heavy vehicle traffic. Soil compaction may change local drainage patterns and prevent effective plant growth. Activities that may cause soil compaction will be restricted to approved areas (e.g. the right-of-way and access tracks) and will be temporary, as it will be rectified during rehabilitation by ripping or scarifying.

Soil Contamination

The potential also exists for pipeline activities to result in localised soil contamination. The main potential sources of contamination are:

- minor spills of fuel or chemicals;
- leachate from acid sulphate soils created by exposure of soils to oxygen during trenching;
- discharged hydrotest water;
- pumping of saline water out of trenches; and
- waste hydrocarbons from 'pigging' operations.

Potential issues associated with the presence of contaminated soils involve the health risks to workers and the public through exposure.

Pipeline projects involve relatively small quantities of chemicals and likely volumes of spills are extremely low. Environmental controls and quality systems are implemented as discussed below, including spill prevention, hydrocarbon collection and disposal and clean-up measures. Minor oil spills may occur at facilities on a few occasions each year due to venting of valve cavities that may contain very small quantities of liquids or minor quantities of oil carried over from valve actuators that is released with vented gas. All spills at SEA Gas facilities are addressed in accordance with a Spill Response Procedure to ensure site clean-up and off-site disposal to a licensed facility where appropriate. All spills are recorded and reported internally and all spills are reported to DEM, other

than spills contained in bunded areas and minor spills (e.g. less than one litre) in fenced compounds that are promptly cleaned up with no residual or off-site impacts.

Contaminated soils can potentially be encountered during excavation activities, particularly in developed areas such as the Northern Adelaide Plains. Potential contaminants of concern include heavy metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc), hydrocarbons, phenols and oil and grease. Investigations for the Port River Expressway and SEA Gas pipeline identified several areas of medium or high risk of encountering contaminated soils along the pipeline alignment. Site-specific management measures are implemented when working in such areas, which may include undertaking additional site investigations, soil stockpile containment, 'wet trenching' or restrictions on trench dewatering or removal of material off-site for treatment or disposal.

Hydrotest water is preferably fresh but can contain low levels of corrosion inhibiting chemicals depending on the water source and total time required for the test. Inappropriate disposal of this water may result in localised soil contamination. This impact is mitigated through the implementation of measures described below.

Acid Sulphate Soil

Acid sulphate soils form where exposure of sulphate rich soils to oxygen results in the production of acid (sulphuric acid) which can mobilise heavy metals in the soil. The creation of acid sulphate soils can affect soil quality, water quality and land use. Risk areas for encountering these sulphate rich soils during excavation activities have been identified along the pipeline alignment, particularly in the Murraylands and Northern Adelaide Plains Environmental Regions. No acid sulphate soil encounters were reported during construction, however sulphate soils were identified in excavations in the Gilman area, Torrens Island and at a very deep excavation adjacent to Mutton Cove during pipeline operations between 2018 and 2020. Site-specific management measures are implemented when working in such areas.

5.1.3 Impact Mitigation

Measures to reduce the risk and impact to soils and terrain include:

<u>General</u>

- undertaking planning and assessment to identify constraints and areas where special management measures are required (e.g. acid sulphate soils, erodible soils, contamination, steep banks) and locating any new construction to avoid such areas as far as practicable; minimising the area cleared during excavation and construction activities and minimising the time period between clearing and restoration, particularly in areas susceptible to erosion;
- installing and maintaining erosion and sediment control structures where required;
- keeping topsoil stockpiled separate from subsoils;
- returning trench spoil in the appropriate horizon order where practicable;
- backfilling and compaction of soils to a level consistent with surrounding soils;
- reinstating surface contours and natural drainage patterns;
- promoting rapid restoration by conserving and re-spreading topsoil and ripping or scarifying compacted areas where necessary to facilitate vegetation growth;
- reinstating watercourse banks as soon as practicable;
- implementing appropriate physical and biological stabilisation and site rehabilitation measures;

- restricting the use of heavy machinery to the minimum necessary to complete the task;
- restricting vehicle use during excavations and construction activities in wet or boggy conditions;
- restricting all vehicles and equipment movements to the pipeline easement or construction right-of-way;
- monitoring for erosion, evidence of inversion, subsidence, compaction and ground stability and implementing remediation and prevention measures where required; and
- identifying means of disposal of any excess soil prior to construction and operational activities.

Fuel, Oil, Chemicals and Contamination

- managing all fuel, oils, chemicals and wastes in a manner that minimises the risk of spills to the environment (e.g. storage in bunded areas in accordance with AS 1940 and EPA guidelines) and having in place appropriate contingency plans in the event of a spill;
- cleaning up all spills at SEA Gas facilities in accordance with the SEA Gas Spill Response Procedure with off-site disposal to a licensed facility where appropriate;
- regularly inspecting machinery for fuel and oil leaks and maintaining in good working order;
- inserting and removing pipeline pigs within a bunded area to enable collection (for disposal) of hydrocarbon liquids or solid debris;
- implementing site-specific measures for soil management in areas of contaminated soils or acid sulphate soils where required; and
- implementing appropriate measures for trench dewatering, hydrotest water disposal and management of contaminated water (e.g. highly saline groundwater, leachate from acid sulphate soils). These may include measures to:
  - dispose of water to land on site after assessment/analysis, provided water meets the Australian Water Quality Guidelines for Fresh and Marine Waters criteria (ANZECC 2000) for the disposal site;
  - contain and treat water on site, and
  - remove water off site.

Acid Sulphate Soils

Measures to reduce the risk and environmental impacts associated with excavation and exposure of acid sulphate soils include:

- Undertaking desktop assessment for potential acid sulphate soils (PASS);
- Undertaking field screening to determine presence of acid sulphate soils if excavating in a risk area in accordance with the South Australian Environment Protection Authority (SA EPA) Site Contamination – acid sulphate soil materials (November 2007) guideline; and
- Placing any intercepted soils identified as PASS in a isolated bunded stockpile area; and
- Treating any identified acid sulphate soils with agricultural lime in accordance with the EPA guideline prior to backfill.

It should be noted that while the EPA guideline states that where the excavation volumes are below 100m^3 (as most if not all SEA Gas excavations are), it is possible to assume that acid sulphate material is not present and therefore field screening and detailed sampling and analysis are not required, SEA Gas follows the mitigation protocols described above to meet its duty of care obligations.

5.2 Water Resources

5.2.1 Surface Water

Existing Environment

Watercourses within the pipeline area range from small, turbulent streams in the steeply graded rocky gullies of the uplands to the broad, meandering rivers of the low hills and plains. Watercourses may be perennial, intermittent or ephemeral streams (which only flow for short periods after heavy rain). The pipeline crosses many watercourses, some of which contain water depending on the time of year.

Lakes, swamps, wetlands and other natural drainage soaks form part of the surface water resources of the pipeline area. The pipeline alignment selectively avoided these areas to minimise impacts.

The following sections outline the relevant hydrological features of each environmental region traversed by the pipeline. The environmental regions are shown in Figure 4-1.

The pipeline traverses one Prescribed Watercourse (the River Murray) and one Prescribed Surface Water Area (Morambro), and three Prescribed Water Resources Areas (Eastern Mount Lofty Ranges, Western Mount Lofty Ranges and Barossa Valley) proclaimed under the Landscape South Australia Act 2019. The taking and use of water in these areas is managed under Water Allocation Plans that are developed by the regional Landscape Boards. The pipeline crosses the Green Adelaide, Hills and Fleurieu, Murraylands and Riverland and Limestone Coast landscape regions.

Wimmera Plains

From the border area through to Naracoorte, substantial swampy depressions, such as Benoch and Groker swamps, and smaller depressions and sinkholes commonly occur. Several intermittent streams also traverse the western section of the plains, and include Mosquito, Yelloch and Naracoorte creeks.

Southern Mallee

Although the South East region of South Australia has many seasonal and permanent swamps and water bodies, it is almost devoid of surface streams. Smaller depressions and water holes occur throughout, with shallow granites, uplifted along the Padthaway Ridge, providing a mechanism for water collection. Morambro Creek represents the only significant watercourse in the Southern Mallee and some artificial drainage channels have also been constructed.

Murraylands

The main drainage feature of the region, and the State, is the River Murray. Numerous streams flow easterly from the Mount Lofty Ranges towards the River Murray. The Murray-Darling river system extends from north of Roma in Queensland to Goolwa in South Australia.

Mount Lofty Ranges

The Mount Lofty Ranges catchment provides the major resource for Adelaide's reticulated water. Surface water throughout the Mount Lofty Ranges has been historically impacted by land use and urbanisation. The River Torrens is a key drainage feature of the northern central region. The Reedy Creek, Long Gully and Milendella Creek catchments are found to the east of the northern Mount Lofty. Intermittent streams such as Harrison and Milendella creeks are dominant features while waterholes

and soakages are also common. Reedy Creek is recognised for its geological significance and the crossing of this watercourse occurs south of Palmer.

The upper catchment of the South Para River comprises a landscape of broad crested ridges and dissected slopes. However, the pipeline intercepts this river in the Northern Adelaide Plains environmental region.

Northern Adelaide Plains

The Northern Adelaide Plains region encompasses the alluvial slopes of the western Mount Lofty Ranges and adjoins the flat, poorly drained landscape of the coastal plains. Outwash swamps that formerly occurred along the slopes have largely been reclaimed through flood mitigation. The North Para River (which lies to the north of the pipeline) is the main source of the recharge to the Barossa Valley Basin. The pipeline crosses the South Para River immediately south of Gawler. The most important drainage features of this region are the Gawler River (and its two main tributaries, the North Para and South Para rivers), the Little Para River and the Dry Creek system.

Intensive surface water use, extensive land clearance, agriculture, industrial and urban development have led to altered stream flows, declining groundwater quality and levels, degradation of surface water quality, and degraded or lost habitat throughout this region.

The final stages of the pipeline alignment traverse an area of reclaimed wetlands adjacent to the Barker Inlet. The pipeline crosses the North Arm of the Port River to Torrens Island, and then crosses the Port River to Pelican Point. Horizontal directional drilling was employed at these crossings to minimise impact to the marine environment.

Potential Impacts

The following activities have the potential to affect surface water:

- earthworks associated with operation (e.g. excavation for pipe or coating repair or replacement);
- earthworks associated with construction (e.g. clear-and-grade operations, trenching, backfilling and reinstatement);
- movement of vehicles along pipeline corridor and access tracks;
- storage and handling of small quantities of fuel and chemicals;
- hydrostatic testing; and
- watercourse crossings.

Potential impacts to surface water resources include:

- increased sediment load and turbidity;
- contamination;
- interruption or modification to surface drainage patterns; and
- disruption to ecology and third party use of surface waters.

These potential impacts are discussed further below. During pipeline operation, potential impacts are generally minor in severity and duration. Further detail on potential impacts and their management for operational activities is also provided in Appendix A.

Increased Sediment Load and Turbidity

A temporary reduction in water quality caused by sediments entering surface water and increasing turbidity is the most likely potential impact to occur during construction or, to a lesser extent, during earthworks associated with operational activities. The major source of sediment is erosion, transported by surface run-off, stream bank collapse and disposal of turbid trench water. The extent of sedimentation is determined by factors such as soil type, slope, run-off volume and velocity and vegetation cover. If sedimentation and increased turbidity occur, they are generally short term and localised, and can be successfully managed by implementation of the erosion and sediment control measures outlined below.

Contamination

The potential exists for construction activities or excavation activities during operations to result in localised surface water contamination. The main potential sources of contamination are:

- minor spills of fuel or chemicals;
- highly saline groundwater pumped out of the trench or bellhole;
- leachate from acid sulphate soils created by exposure (and oxidation) of soils during trenching or excavation; and
- discharged hydrotest water.

Pipeline projects involve relatively small quantities of chemicals and the risks to water resources associated with minor spills are extremely low. Equipment such as graders, bulldozers and side-boom tractors may be refuelled on the right-of-way, typically from a standard fuel truck. These trucks hold up to 16,000 litres, however it is highly unlikely that a storage tank on a fuel truck would be breached and the entire contents be spilt.

The pipeline traverses several areas that contain shallow, highly saline groundwater (notably the area east of the Port River). Inappropriate disposal of saline groundwater for any new construction in these areas (from de-watering of the trench) may cause localised salinity increases in surface waters and controls on de-watering are implemented to avoid this.

As discussed in Section 5.1, the pipeline alignment also traverses a number of risk areas for acid sulphate soils. Adequate planning and management is required to prevent or mitigate localised impacts to surface water (as discussed in Section 5.1.3).

Hydrotest water may contain low levels of corrosion inhibiting chemicals. Inappropriate disposal of this water may result in localised contamination of water resources and controls are implemented to avoid this occurring.

Interruption or Modification to Surface Drainage Patterns

Construction activities (or, to a lesser extent, earthworks associated with operational activities) may result in physical disturbance to defined watercourses and to overland flow. Impacts to surface drainage patterns associated with overland flow away from watercourses are less noticeable. If they occur, impacts are most likely to be short term and localised, and associated with the presence of temporary linear stockpiles of topsoil and trench spoil and modifications to surface contours during earthworks, which may impede or change natural overland flows. Surface drainage patterns are restored following successful reinstatement of the construction right-of-way.

Disruption to Ecology and Third Party Use of Surface Waters

Impacts to watercourses are not limited to the hydrological issues of water quality and quantity, but may also extend to terrestrial and aquatic flora and fauna, domestic water users (private and town supplies), rural water users (stock and crop watering), recreational users (swimming and fishing) and local visual amenity. These issues are discussed further in Sections 5.3 and 5.8.

Watercourse Crossings

Construction of pipelines may require the crossing of watercourses, including rivers, streams, creeks and drainage lines. Potential impacts of watercourse crossings include:

- Open cut crossings:
  - potentially high sediment release, particularly during backfilling if controls are not adequately in place.
- Horizontal directional drilling or boring:
  - drill failure leading to possible additional land requirements;
  - prolonged sediment load and deposition from drill mud seepage;
  - sink holes on right-of-way and under the watercourse;
  - potential third party damage from deviation of drill alignment;
  - short-term visual impacts due to the presence of equipment; and
  - bellhole dewatering potentially causing discharge, erosion and contamination.

However, the likelihood of these impacts occurring during drilling or boring is generally very low and these techniques typically have very low impact on surface water.

Watercourses are promptly reinstated following construction. Construction is timed to avoid high flow periods and if possible is carried out when there is no flow. Flow diversion techniques are employed for open cut crossings if necessary if low flows are present, to avoid flow disruption or siltation downstream. With the application of appropriate avoidance and mitigation strategies, potential short term impacts from watercourse crossings can be reduced to an acceptable level.

Impact Mitigation

Measures to reduce the risk and impact to surface water include:

- locating any new construction to avoid surface water features such as lakes and wetlands as far as practicable;
- undertaking planning and assessment to identify sensitive areas where special management measures are required;
- restricting the level of activity during wet weather;
- remaining vigilant for expected storm or flood warnings during (particularly construction or major operational activities) and developing a contingency plan for such events;
- reinstating surface contours as soon as reasonably practicable;
- restoring surface drainage profiles restored to pre-construction conditions or better;
- installing adequate erosion and sediment controls (e.g. berms or drains on slopes leading to a watercourse or surface water features and silt fences and / or hay bales for interim on-site erosion control). Permanent berms may be installed on slopes where required;
- monitoring and maintaining erosion and sedimentation controls to ensure they remain effective;
- implementing appropriate measures to permanently solve any recurring erosion or sedimentation problems;

- avoiding vehicle refuelling in close proximity to watercourses (e.g. 50 m);
- implementing measures outlined in Section 5.1.3 for fuel, oil and chemical management, spill prevention, response and clean-up, trench dewatering, hydrotest water disposal and management of contaminated water (e.g. leachate from acid sulphate soils);
- obtaining hydrotest water from an appropriate source in consultation with relevant landowners and regulatory bodies, in accordance with statutory requirements; and
- working in close liaison with regulatory agencies and affected landholders regarding the management of surface water issues.

Specific measures to reduce the risk and impact of watercourse crossings include:

- selecting a watercourse crossing point and crossing technique that minimises potential impacts;
- ensuring that all necessary approvals are in place (including Landscape South Australia Act permits for water affecting activities, if required);
- completing watercourse crossings in the shortest time practicable;
- rehabilitating crossing points and banks as soon as possible after works have been completed;
- avoiding watercourse crossing works during periods of flood or heavy rainfall;
- avoiding the stockpiling of materials in watercourses / drainage lines;
- ceasing clear-and-grade activities at least 10 m from banks of flowing watercourses until construction of the crossing is imminent;
- carrying out subsequent grading and trenching immediately prior to pipe laying, that is, after the pipe is welded and watercourse crossing site prepared;
- containing pumps within lined, bunded areas;
- locating HDD drill entry and exit points away from watercourse banks, sensitive vegetation and any heritage sites;
- monitoring HDD mud flow rates to determine whether seepage or other losses may be occurring; and
- disposing of drilling mud and cuttings as per regulatory requirements; and
- should dredging be required, ensuring that it is undertaken in accordance with the EPA Dredging Guideline and licence requirements.

5.2.2 Groundwater

Existing Environment

The pipeline traverses three broad hydrogeological units (see Table 5-1). Within these, shallow groundwater occurs in several regional locations, typically associated with:

- discharge areas, such as Naracoorte interdunal swales and the low-lying areas of Cooke Plains;
- areas that experience significant and prolonged inundation near Naracoorte;
- irrigation areas in proximity to Mount Charles, Keith and the Murray River floodplain;
- surface drainage features (e.g. seepages and springs) associated with fractured rock aquifers in the Mount Lofty Ranges; and
- coastal areas of the Northern Adelaide Plains.

These areas of shallow groundwater are described in Table 5-1.

Groundwater salinity in South Australia (particularly through the South East region), exhibits highly variable salinity ranges, from less than 500 mg/l to salinity levels in excess of seawater quality, at 35,000 mg/l.

The pipeline traverses seven Prescribed Wells Areas or Prescribed Water Resources Areas which are proclaimed under the Landscape South Australia Act 2019. The taking and use of water in these areas is managed under Water Allocation Plans that are developed by the regional Landscape Boards. These prescribed areas include:

- Lower Limestone Coast Prescribed Wells Area;
- Padthaway Prescribed Wells Area;
- Tatiara Prescribed Wells Area;
- Tintinara – Coonalpyn Prescribed Wells Area;
- Peake, Roby and Sherlock Prescribed Wells Area;
- Central Adelaide Prescribed Wells Area;
- Northern Adelaide Plains Prescribed Wells Area;
- Eastern Mount Lofty Ranges Prescribed Water Resources Area;
- Western Mount Lofty Ranges Prescribed Water Resources Area; and
- Barossa Prescribed Water Resources Area.

Table 5-1: Hydrogeological units

Unit	Location	Extent (km)	Unit Description	Shallow Groundwater
Remnant coastal dunes, swales and lowlands, with poorly drained swampy areas.	SA / Vic Border to Tepko	350	Sedimentary clays, sands, marls and limestones that comprise the Murray Basin dominate the terrain. Commonly the surficial geology is of unconsolidated to weakly cemented sands, which exist to depths greater than 2 m interspersed with pockets of hard limestones.	Groundwater is present near surface in several places, including a 20 km section around Naracoorte where the watertable can be exposed during winter. Extensive rainfall can cause localised flooding for prolonged periods.
Aquifers within the Mount Lofty Ranges sequence of rock types.	Tepko to Elizabeth North	50	Well-consolidated meta-sediments. The area is a recharge zone for the Murray Basin, on the Ranges' eastern slopes. Low rainfall limits the recharge rate. Groundwater from the western slopes recharges the North Adelaide Plains.	Springs and salinised portions of the landscape have the potential to produce long-term flows should the pipeline intersect. Potentially long lasting effects on the landscape and integrity of the pipe may result, due to low pH and high salinity of some seepage water. Long-term water logging could also result down gradient of these springs and seepages.
Sedimentary sequences in the rich horticultural areas of the North Adelaide Plains.	Elizabeth North to Pelican Point	20	Quaternary sediments with perched water tables, fed by streams.	High salinity groundwater varying from 18,000 mg/l to as much as 130,000 mg/l is found on the east of the Port River. This groundwater can be found between 0.2 m and 4.0 m from the surface.

Potential Impacts

The following construction and operation activities have the potential to affect shallow groundwater resources:

- construction of the pipeline trench;
- de-watering of the trench or excavations (e.g. bellholes for pipeline inspection);
- the storage and handling of small quantities of fuel and chemicals (which have the potential to be spilt); and
- presence of the back-filled trench during operation.

Potential impacts to shallow groundwater resources (where present) impacts include:

- changes to hydrological conditions;
- contamination of groundwater; and
- disturbance to groundwater infrastructure.

The presence of shallow groundwater may also constrain standard construction activities. Due to the nature of pipeline construction activities, impacts to deep aquifers are not likely to occur.

These potential impacts are mostly relevant to construction activities. During pipeline operation, potential impacts are relatively limited and are generally restricted to those activities involving excavation, or the use of hydrocarbons or chemicals where there is the potential for an uncontrolled spill.

Changes to Hydrological Conditions

The intersection of shallow groundwater by the open trench has the potential to create localised disturbance to flow patterns, particularly in recharge or discharge zones. There is also the potential for infiltration from surrounding waters or stormwater entry. Due to the minor depth of the intrusion (in the order of one metre) and the short period for which the trench is open (several days to several weeks, depending on the project and location), the resultant impact on groundwater resources is considered to be inconsequential. Similarly, no adverse impacts are expected to the values of prescribed areas. The need to protect soils from potential erosion is discussed in Section 5.1.2.

Backfilling the trench after the pipeline has been laid aims to adequately compact returned trench spoil consistent with pre-existing conditions. If the backfilled trench is not compacted consistently with the surrounding soils, it may alter the local hydrology, or impede lateral flows of groundwater. Appropriate compaction of the trench in accordance with the mitigation measures discussed will prevent this impact.

Contamination of Groundwater

The potential exists for construction or operations activities to result in localised shallow groundwater contamination. The main potential sources of contamination are:

- minor spills of fuel or chemicals;
- leachate from acid sulphate soils created by exposure (and oxidation) of soils during trenching or excavation; and
- discharged hydrotest water.

Pipeline projects involve relatively small quantities of chemicals and the risks to groundwater associated with minor spills are extremely low. Pipeline construction equipment (such as graders,

bulldozers and side-boom tractors) may be refuelled on the right-of-way from a standard fuel truck. Management measures are implemented as discussed below, including spill prevention and immediate clean-up measures, which ensure that the level of risk is low.

As discussed in Section 5.1.2, the pipeline traverses a number of risk areas for encountering acid sulphate soils. Without adequate planning and management, localised impacts to shallow groundwater could potentially occur. Site-specific management measures are implemented when working in such risk areas to avoid this occurring.

Hydrotest water may contain low levels of corrosion inhibiting chemicals. Inappropriate disposal of this water may result in localised contamination of shallow groundwater. This impact is mitigated through the implementation of measures described below.

Disturbance to Groundwater Infrastructure

Groundwater infrastructure such as extraction wells, observation wells (managed by DEW) and drainage channels that form part of the South East drainage network can potentially be impacted if they are not avoided or appropriately managed, particularly during construction.

Constraints to Standard Construction Activities

Saturated clays and sands may constrain construction at many of the identified shallow groundwater zones during winter (see Table 5-1). Likewise, unconsolidated sediments coupled with shallow groundwater conditions, such as in the Cooke Plains region, may constrain construction (due to possible collapse of the trench during construction and excessive water seepage).

In groundwater discharge areas, substantial outflow is likely to result in waterlogged trenches at some times of year. High shallow aquifer yields (in sections of the Murray Basin) may also be problematic during construction, where trench de-watering rates will have little effect on local groundwater seepage. If they are not avoided, springs and seepages (e.g. in the Mount Lofty Ranges) can also result in flows of water into the trench.

These constraints can be managed by avoidance where possible and use of specific construction techniques such wet trench methods where required.

Impact Mitigation

Measures to reduce the risk and impact to groundwater include:

- undertaking planning and assessment to identify constraints and areas where special management measures are required;
- including the locations of shallow groundwater, groundwater discharge, acid sulphate soils and groundwater infrastructure on Alignment Sheets;
- where practicable, selecting a pipeline alignment to avoid direct impact to groundwater discharge areas;
- scheduling construction during times of low water tables where practicable;
- compacting the trench to a level consistent with surrounding soils;
- installing trench plugs to prevent longitudinal water flow within the trench;
- implementing measures outlined in Section 5.1.3 for fuel, oil and chemical management, spill prevention, response and clean-up, trench dewatering, hydrotest water disposal and management of contaminated water (e.g. leachate from acid sulphate soils);
- Dewatering in accordance with the EPA's dewatering guideline;

- Discharging of water under an earthworks drainage licence from the EPA, where required, (this will depend on the volume and turbidity of the water); and
- where required, liaising with Landscape Boards, DEW, EPA, DEM and affected landholders regarding the management of groundwater issues.

5.3 Flora and Fauna

5.3.1 Existing Environment

The area traversed by the pipeline has largely been cleared of native vegetation and is primarily used for agriculture. The patches of remnant vegetation that do remain in the area are restricted to conservation parks, forest reserves, riparian corridors, road reserves and small stands of vegetation and isolated trees on private property. The pipeline alignment was selected to avoid native vegetation wherever possible and, as a consequence, it passes through a very limited amount of native vegetation.

Native vegetation and fauna in the area traversed by the pipeline are discussed further below, in the context of the environmental regions along the pipeline route. Information from ecological assessments undertaken during preparation of the original EER / EIR (SEA Gas 2001) and in pre-construction surveys has been incorporated where relevant (Brett Lane and Associates (2001), Ecology Australia (2001a, 2001b, 2001c, 2002), Ecos (2001, 2002a, 2002b), O'Connor (2001, 2002a, 2002b), RPS (2013), SEA Gas (2004a, 2004b)).

Wimmera Plains

The Wimmera environmental region comprises extensive sandy plains and aeolian dune landforms. In South Australia it extends from the border to approximately 10 km north of Naracoorte. Extensive populations of old growth Red Gum (remnants of former grassy woodlands) occur on the plain, and heathy woodlands occur in the dune systems. The streams support contiguous but highly degraded woodland vegetation.

Flora

Major vegetation communities recorded in the vicinity of the pipeline in this environmental region include:

- *Eucalyptus camaldulensis* Woodland; and
- *Eucalyptus arenacea/baxteri Woodland.*

The Seasonal Herbaceous Wetlands threatened ecological community (which was listed as Critically Endangered under the EPBC Act in 2012) occurs in the Wimmera Plains environmental region and the southern part of the Southern Mallee and could be present within the vicinity of the pipeline.

No rare or threatened plant species were recorded in the pipeline corridor during ecological inspections. Nationally significant species recorded in databases near the pipeline route include Clover Glycine (*Glycine latrobeana*) (Vulnerable).

Fauna

Red Gum grassy woodlands and Brown Stringybark woodlands can support diverse avian communities. Key habitat areas include riparian corridors and road reserve vegetation, in addition to isolated eucalypt stands. The Wimmera environmental region (particularly in Victoria) provides an important

feeding, breeding and nesting habitat for the nationally Endangered Red-tailed Black Cockatoo. Numerous trees that provide potential nesting habitat for Red-tailed Black Cockatoo are present along the pipeline alignment, however no nesting birds were detected in the vicinity of the pipeline during pre-construction surveys in December 2002. SEA Gas has funded the planting of 5,000 Buloke (*Allocasuarina luehmannii*), Grey Box (*Eucalyptus microcarpa*) and Inland Blue Gum (*Eucalytpus leucoxylon ssp.pruinosa*) trees at Tea Trick Reserve along the Pooginagoric Tea Trick Road, near Bordertown, to assist with Red-tailed Black Cockatoo recovery.

The Striped Legless Lizard (nationally Vulnerable) has been recorded in scattered locations in the region, associated with native and exotic grasslands. The Southern Bell Frog (*Litoria raniformis*) (nationally Vulnerable) has also been recorded in the region and is typically associated with water bodies with emergent vegetation such as creeks, lagoons, swamps, lakes and farm dams. Mosquito Creek (which is crossed at the SA – Victoria border) contains permanent pools several kilometres downstream which support threatened native fish species including Yarra Pygmy Perch and Dwarf Galaxias (both listed as nationally Vulnerable).

Southern Mallee

The pipeline alignment traverses remnant beach ridges, dunes and plains, characteristic of the Naracoorte Coastal Plain. Much of the former dominant Mallee and South Australian Blue Gum (*Eucalyptus leucoxylon*) Woodland communities from Naracoorte to Tailem Bend have been cleared. At a landscape scale, remnants are patchily distributed, and isolated, with connecting links restricted predominantly to roadsides. Roadside remnants are often broad (20 m or more), contiguous and of moderate to good quality, representing habitat links in an otherwise denuded landscape. Most roadsides are dominated by mallee Eucalypt species, but South Australian Blue Gum Woodland with scattered or co-dominant Rough Barked Manna Gum and/or Pink Gum also occurs.

The pipeline passes through two regions designated as 'Threatened Habitat Areas' (Croft *et al.* 1999, SE NRM Board 2010) – the Binnum-Hynam-Kybybolite Districts and the Keith-Willalooka Districts. The habitats in these areas have been extensively cleared and are highly fragmented, poorly conserved, and remnants contain many species and plant communities of conservation significance.

Flora

Major vegetation communities recorded on or near the pipeline in this environmental region include:

- *Eucalyptus fasciculosa* ± *E. leucoxylon* Woodland (Vulnerable in SA (DEH (2009));
- *Eucalyptus arenacea* Woodland on deep leached sands;
- *Eucalyptus diversifolia* ± *E. incrassata* Mallee;
- *Eucalyptus socialis* ± *E. phenax* ± *E. gracilis* Mallee; and
- *Tecticornia pergranulata ± T. halocnemoides ± Melaleuca halmaturorum Saline Shrubland.*

As noted above, the EPBC-listed ecological community Seasonal Herbaceous Wetlands could occur in the vicinity of the pipeline in this environmental region.

Four plant species listed as Rare in SA were recorded in roadside mallee during ecological assessments (*Grevillea aquifolium, Leionema microphyllum, Melaleuca wilsonii* and *Eucalyptus behriana*) and *Eucalyptus fasciculosa* has been listed as Rare since the pipeline was constructed. These species were generally avoided by the final pipeline alignment. Threatened species recorded on databases within 1-5 km of the pipeline include the nationally endangered *Acacia enterocarpa*, *Thelymitra epipactoides*,

Prostanthera eurybioides and *Caladenia colorata* and the nationally vulnerable *Olearia pannosa* var. *pannosa* and a number of State-listed species.

Fauna

Significant or potential fauna habitat in the region includes:

- Red Gum / South Australian Blue Gum Grassy Woodlands associated with Morambro Creek and road reserves;
- isolated Pink Gums and South Australian Blue Gums scattered in pastures;
- healthy Mallee remnants along roadsides and remnant patches of old growth Mallee; and
- *Tecticornia* spp. Saline shrubland wetlands.

Fauna listed as threatened at national or State level that have been recorded in the region and could potentially utilise the habitats present in the vicinity of the pipeline include Red-tailed Black-Cockatoo, Swift Parrot, Little Lorikeet, Yellow-tailed Black-Cockatoo, Western Whipbird, Malleefowl and Blue-winged Parrot. A number of mammal species listed as Rare in South Australia could also potentially occur in the vicinity of the pipeline, including Red-necked Wallaby, Sugar Glider and Common Wombat.

Murraylands

The River Murray is the most significant feature of this environmental region. The river corridor has high biological significance and has been subject to extensive human impact (Kahrimanis *et al*. 2001). The pipeline crossing of the River Murray was completed by horizontal directional drilling from highly modified sites distant from the river channel. The plains adjoining the river and the eastern slopes of the Mount Lofty Ranges are extensively cleared and the pipeline corridor intersects few remnants, which are generally restricted to roadsides and creeklines.

Flora

The major vegetation communities occurring along the pipeline route in this environmental region are:

- *Eucalyptus porosa* Open Mallee;
- *Eucalyptus incrassata* +/- *E. socialis* Mallee (on dune ridges);
- *Tecticornia* Saline Shrubland;
- *Callitris* Woodland, which is severely depleted in this environmental region; and
- *Eucalyptus camaldulensis* var. *camaldulensis Woodland,* considered threatened in the region and recorded on Reedy Creek.

Areas of degraded grassland containing Scented Iron-grass *Lomandra effusa* are also present near the pipeline north of Reedy Creek. This vegetation could fall within the definition of Iron-grass Natural Temperate Grassland of South Australia, which was listed as Critically Endangered under the EPBC Act in 2007.

One Rare species (*Eucalyptus behriana*) was recorded near the pipeline alignment in field surveys. Other rare and threatened species recorded on databases within 5 km of the pipeline include the nationally Endangered *Prostanthera eurybioides*, and the state Rare *Brachyscome basaltica gracilis*, *Ceratophyllum demersum* and *Hydrilla verticillata*.

Fauna

Potential habitat for significant fauna species in the vicinity of the pipeline is relatively limited and restricted to habitats such as those associated with Mallee and *Callitris* Woodlands, the Reedy Creek area or the River Murray. Mixed Mallee eucalypt communities could potentially support threatened bird species such as the Striped Honeyeater (Rare in SA). The Australasian Bittern (nationally Endangered) has been recorded in the Reedy Creek system east of the pipeline crossing. The Reedy Creek system was identified in the original EER / EIR (SEA Gas 2001) as having some potential to support threatened fish species and the nationally Vulnerable Southern Bell Frog, however poor water quality, grazing pressure and low summer flows could preclude the presence of these species near the pipeline. Southern Bell Frogs were not detected by surveys undertaken at the pipeline crossing of Reedy Creek prior to construction. Murray Hardyhead (nationally Endangered) has been recorded in Preamimma Creek downstream of the pipeline (although suitable habitat is not present at or near the pipeline crossing point). The River Murray itself supports many significant fish species and Red Gum Woodland associated with the lower Murray also provides important habitat for threatened birds such as the Regent Parrot (SAMDB NRM Board 2014).

Mount Lofty Ranges

The steeply dissected granite terrain of the eastern Mount Lofty Ranges has been extensively cleared. Vegetation remnants along the pipeline (including mature and old growth eucalypts) are few and the most common remnants are associated with ephemeral and weakly incised drainage lines. Drainage line vegetation is generally secondary and almost invariably occurs as sedgeland. The western section of the route through the Mount Lofty Ranges supports some remnants, albeit fragmented and degraded. Most native vegetation in the vicinity of the pipeline is restricted to roadsides or scattered trees in paddocks, and larger patches of remnant vegetation are associated predominantly with Mount Crawford Forests.

Due to the higher rainfall and more intensive land use of the Mount Lofty Ranges, there is an elevated potential for spread of weed species or pathogens such as Phytophthora in this region.

Flora

Many plant communities within the Mount Lofty Ranges are considered threatened (AMLR NRM Board 2013). Vegetation communities in the vicinity of the pipeline route include:

- *Eucalyptus fasciculosa* ± *E. viminalis* ssp. *cygnetensis* Woodland;
- *Enneapogon – Austrostipa – Setaria* Grassland (most likely a former Grassy Woodland formation);
- *Carex bichenoviana* / *Cyperus gymnocaulos* Sedgeland;
- *Eucalyptus camaldulensis* ssp. *camaldulensis* Woodland;
- *Eucalyptus leucoxylon* Woodland; and
- *Eucalyptus porosa Woodland (threatened in the region (AMLR NRM Board 2013)).*

No plants listed as rare or threatened at state or national level were recorded on the pipeline alignment. The nationally Endangered *Prostanthera eurybioides* is known from granite outcrops in the region but is not present on the pipeline alignment. A number of other threatened species are known from within areas of intact vegetation in the region, including the nationally Endangered *Caladenia behrii*, *Caladenia rigida* and *Pterostylis* sp. Hale, the nationally Vulnerable *Prasophyllum pallidum*, *Corybas dentatus* and *Glycine latrobeana* and numerous State-listed species.

Fauna

A number of State-listed species are likely to occur in association with remnant vegetation in the vicinity of the pipeline. These include the Red-necked Wallaby, Yellow-tailed Black-Cockatoo, Diamond Firetail and Black-chinned Honeyeater and a number of other bird species listed as Rare. Records of State-listed waterbird species in the region, including the Rare Great Crested Grebe, Australasian Shoveler and Musk Duck, are primarily associated with either the Barossa or Warren Reservoirs (approximately 3 km from the pipeline).

Northern Adelaide Plains

This environmental region is highly urbanised in comparison to the previous ecological and rural regions. Grassy Woodlands were once extensive on the Northern Adelaide Plains, however these have been cleared to allow grazing and agriculture and more recently, urbanisation. *Eucalyptus porosa* was a former dominant of these woodlands, intermixed with areas of *E. camaldulensis* and *E. largiflorens* on streamsides or poorly drained sites.

Near the coastline adjacent to Barker Inlet, the pipeline crosses a zone of reclaimed wetlands and salt evaporation ponds. Barker Inlet, including the eastern section of Torrens Island, supports extensive Mangrove and Samphire communities. The pipeline crosses marine habitats south and west of Torrens Island in Barker Inlet and the Port River, where it was installed by horizontal directional drilling (i.e. the marine environment was not impacted).

Flora

The vegetation communities recorded along the pipeline route in this environmental region include:

- *Eucalyptus porosa* Grassy Woodland;
- *E. camaldulensis* Grassy Woodland;
- *E. largiflorens* Grassy Woodland;
- *Austrostipa* spp. Grassland;
- Wetland mosaic associated with constructed wetlands;
- *Sarcocornia – Tecticornia* Samphire Shrubland;
- *Acacia longifolia* ssp*. sophorae* Shrubland; and
- *Avicennia marina ssp. Marina Mangrove Woodland.*

The Subtropical and Temperate Coastal Saltmarsh ecological community (which was listed as Vulnerable under the EPBC Act in 2013) is present in coastal areas in the region. The pipeline traverses the edge of an area of intertidal samphire shrubland on Torrens Island (for approximately 750 m) that is likely to fall within the definition of this community.

One threatened species, Black Cotton-bush (*Maireana decalvans*) (Endangered in SA) was identified in the pipeline corridor near the Cavan Meter Station. Other rare or threatened species listed on databases from within the vicinity of the pipeline include the nationally Vulnerable *Tecticornia flabelliformis* on Torrens Island (which was not detected on the pipeline alignment during targeted surveys), the state-Endangered *Crassula sieberiana* (Endangered) and state-Rare species *Eragrostis infecunda*, *Rytidosperma tenuius* and *Austrostipa multispiculis*.

Fauna

Key fauna locations in the region include the Saltfields, Greenfield / Barker Inlet Wetlands and the coastal foreshore of Torrens Island. These areas are inhabited by a number of bird species during

summer, and are utilised by international migratory waders / shorebirds listed under the CAMBA / JAMBA migratory bird agreements. Tidal mudflats at the Port River Mouth and Saltfields have been identified as areas of importance for wading or shorebirds, particularly for Red-necked Stint and Sharptailed Sandpiper (AMLR NRM Board 2013). Threatened bird species recorded in association with estuaries and saltmarshes in the region include Curlew Sandpiper (nationally Critically Endangered), Australian Painted-snipe and Australasian Bittern (both nationally Endangered) and Fairy Tern (nationally Vulnerable).

The coastal samphire shrublands of the region were once visited by the critically endangered Orange-bellied Parrot which winters along the South Australian coastline. This species has not been recently observed in the region, however it is possible that they may still visit the area (AMLR NRM Board 2013).

The Barker Inlet-Port River estuary is a nursery area for a number of significant commercial and recreational fishing species and supports a permanent dolphin colony. It forms part of the Adelaide Dolphin Sanctuary.

5.3.2 Potential Impacts

Operation

Flora

Daily pipeline operation activities have little impact on native vegetation, however irregular or unscheduled maintenance activities may require the clearance of native vegetation on the pipeline easement. The movement of vehicles along the easement and welding operations also have some potential to result in fire.

Activities which may adversely impact on native vegetation include:

- Excavation activities ('dig-ups') undertaken to expose a section of pipe or pipe coating requiring repair or replacement. Removal of vegetation is generally confined to the easement and limited to the area of excavation and 5 – 10 m beyond for storage and stockpile area.
- Vegetation control, trimming and removal along the easement is undertaken to ensure that the line of sight for pipeline markers is maintained. Trees retained on the easement during construction are not removed, however it is necessary to trim or remove trees that regenerate within 2-3 m of the pipeline at the small number of sites with remnant native vegetation, as they pose a threat to pipeline integrity. Understorey species are not removed and are actively encouraged to revegetate across the easement. Regular trimming of native trees and shrubs planted close to the pipeline is undertaken along a section of the Port River Expressway, under an agreement with the Department of Transport, Energy and Infrastructure.

As the majority of the pipeline is on cleared land with little or no ecological value, impacts to native vegetation as a result of these activities are likely to be very limited. Any impact to native vegetation as a result of these activities is likely to be short-term and restricted to the existing easements that have previously been used for pipeline construction and maintenance activities.

Excavations which must be initiated in areas of significant native vegetation are subject to pre-start environmental assessment. Any removal of native vegetation as a result of excavation activities is mitigated by reinstatement / rehabilitation and, where required, active revegetation. Because the degree of success is dependent on seasonal conditions and rainfall events and other external factors such as land use and grazing, rehabilitation or revegetation may take several years.

Movement of maintenance vehicles and equipment has the potential to result in the spread of weeds or pathogens, such as Phytophthora through the transport of plant material or soil on vehicles. The spread of weeds or pathogens into areas of native vegetation can potentially result in longer term impacts. Movements of vehicles and equipment into or between areas of native vegetation are generally very limited as these areas are few in number and are avoided during routine activities. A range of control measures are implemented to ensure that this risk is minimised.

Targeted weed control may also be undertaken in compounds or on the easement if excessive weed growth is observed during routine surveillance activities. If this is required, it would be likely to be confined to small areas along the easement. Any weed management in the limited areas of native vegetation along the pipeline easement is undertaken by a specialist contractor to minimise the potential for incidental damage to native species.

A major pipeline failure resulting in release of gas at high velocity or an ignited gas release could result in localised vegetation damage if it occurred in or near an area of native vegetation. Such an incident is considered to be a very rare event, and extensive mitigation measures are in place to manage this risk, as discussed in Section 5.8.4.

Fauna

Daily pipeline operation and maintenance activities have little impact on fauna. Irregular or unscheduled maintenance activities, such as excavations, have some potential to impact foraging and breeding habitat if they are required to be conducted in the limited areas of such habitat present along the pipeline route. The impact of such disturbances is likely to be short-term and restricted to existing easements that have previously been used for pipeline construction activities. There is also the potential for entrapment of fauna at excavation sites, although the duration of excavation work is generally in the order of three days (but may be longer for major repair work).

Short-term and localised disturbance to fauna could also occur as a result of noise, vehicle traffic and human activity on the easement and at facilities. This is unlikely to be significant, however may require specific mitigation measures if longer term disturbance (e.g. major repair work) is required to be undertaken in sensitive areas (e.g. in suitable habitat of threatened species such as the Red-tailed Black-cockatoo during breeding season).

The pipeline also traverses land used for the grazing of livestock. The daily operation of the pipeline has little impact upon livestock.

Construction

Construction activities that have the potential to affect native flora and fauna include:

- creation of construction access;
- clear-and-grade operations (creation of the construction right-of-way);
- trenching (including blasting); and
- earthworks associated with creation of associated stockpiles, laydown or work areas and construction depots (if required).

Appropriate management is required to prevent a range of potential impacts to the ecological values of the region. Such impacts include:

- removal of remnant vegetation;

- fauna mortality;
- damage to or fragmentation of fauna habitats;
- disruption to critical fauna lifecycle stages;
- spread of environmental weeds; and
- spread of pathogens.

As the vast majority of the region in which the pipeline is located is cleared land with introduced pasture or crops, significant impacts to flora and fauna as a result of construction activities can almost invariably be avoided by appropriate planning and careful route and site selection and implementation of site-specific management or mitigation measures in locations where some level of impact is unavoidable.

Potential impacts of construction activities and mitigation measures are discussed further below.

Removal of Remnant Vegetation

Clearing for construction has the potential to result in removal of remnant vegetation.

Pipeline construction corridors are selected to avoid areas of remnant vegetation as far as possible. In cleared landscapes such as those found along the pipeline, this means that significant patches of vegetation can generally be avoided, although it is not always possible to avoid intersecting some remnant vegetation such as linear remnants in road reserves or creek lines. In such locations, the alignment is selected to utilise gaps or degraded areas of vegetation and the construction right-of-way width is reduced where feasible. Alternate crossing methods (e.g. boring or horizontal directional drilling) can potentially be used to minimise impacts to more significant vegetation on roadsides, however the use of these techniques may be limited by factors such as technical feasibility and availability of alternative access past the vegetation for construction vehicles and equipment.

Scattered trees in paddocks can also generally be avoided by alignment selection and can be retained on the right-of-way if there is adequate space to construct the pipeline safely. Trimming of branches is also undertaken where possible in preference to removal of trees. Trenching close to the base of trees can also adversely impact tree roots and tree health and the pipeline alignment is selected to avoid trenching close to the base of trees as far as possible.

Fires as a result of construction activities such as welding also have the potential to damage or destroy vegetation and habitat.

The amount of remnant vegetation required to be cleared for any future construction project in the region crossed by the SEA Gas pipeline is likely to be very limited. The original pipeline construction impacted less than 1 km of substantially intact native vegetation along its entire 689 km length (i.e. less than 0.1% of its length) in Victoria and South Australia.

Revegetation is typically undertaken at significant vegetation sites to mitigate the impacts of construction. Seventeen native vegetation sites on or adjacent to the pipeline were actively revegetated following the original pipeline construction and follow-up management was undertaken over a period of several years, until the revegetation was judged to be successful. Regular monitoring of revegetation sites and the success of the revegetation works undertaken are detailed in the *SEA Gas South Australian Easement Revegetation and Management Plan* (SEA Gas 2015). Revegetation and other work (e.g. weed control) has also been undertaken or funded by SEA Gas at several additional

sites to offset vegetation clearance (including the South Para Woodland conservation reserve, the Pooginagoric – Teatrick road reserve and Mosquito Creek in Naracoorte Caves National Park) and funding was also provided towards the acquisition of the Stone Reserve adjacent to Mount Monster Conservation Park.

Plate 5-1 and Plate 5-2 show examples of revegetation sites on the SEA Gas pipeline following construction and after revegetation had been undertaken.

Plate 5-1: Site 10 Yumali Road – Left: post construction (2005) / Right: after revegetation (2015)

Plate 5-2: Site 11 Frost Road – Left: post construction (2005) / Right: after revegetation (2015)

Fauna Mortality

Due to the disturbed nature of the area and the resultant low density of native fauna, the risks associated with mortality due to machinery operation or collision with vehicles are likely to be low. However, some species of frogs, reptiles or small mammals could be encountered in trenching or grading operations in areas of native vegetation.

The open trench provides a temporary barrier to fauna movement and there is potential for ground-dwelling fauna to fall into the trench and become trapped and exposed to overheating, dehydration, predation and / or drowning. There is also potential for livestock to fall into the trench and become trapped or injured. Measures are implemented to minimise the potential for fauna mortality due to the open trench or excavations, including provision of escape ramps and use of dedicated fauna monitors in areas of particular sensitivity if required. Due to the disturbed nature of the area, the risk to native fauna presented by the open trench or excavations is likely to be low.

Fauna Habitats

Habitat destruction is largely related to vegetation removal (see above). Due to the extent of historical clearing and the pipeline corridor selection process, any damage to remnant fauna habitats for future construction projects is likely to be (at most) minor and restricted to a local scale.

A number of fauna species are dependent on remnant trees as nesting, breeding and foraging habitat, particularly old growth Red Gum, South Australian Blue Gum and Brown Stringy Bark remnants. In the area near Naracoorte old growth Eucalypts provide important habitats for the Red-tailed Black-Cockatoo, which utilise tree hollows in living and dead trees. Large remnant Eucalypt trees in this area were not cleared for construction of the existing pipeline and would not be cleared for any future construction projects.

At watercourse crossings, direct impact to aquatic and riparian habitats may result from physical damage during earthworks. Indirect impacts may occur to downstream habitats as a result of the mobilisation of sediments and the subsequent increase in turbidity and sedimentation. Mitigation measures are implemented at watercourse crossings (in particular crossing in dry conditions where possible) to ensure that significant impacts are avoided. Future pipeline construction alignments would be selected to avoid direct impacts to significant wetland habitats.

Similarly, direct or indirect impacts could occur to marine habitats as a result of physical damage or mobilisation of sediments. Measures would be put in place to minimise this risk if working in the vicinity of marine areas, such as establishment of buffer zones and installation of sediment and erosion controls.

Habitat fragmentation is a potential issue inherent in all linear construction projects. Pipeline alignment selection can generally avoid patches of remnant vegetation such as woodland or grassland (or utilise existing cleared easements) and therefore avoid fragmentation. However, intersection of some areas of habitat such as linear vegetation corridors associated with road reserves and watercourses may not be avoidable. These features may provide valuable links between larger habitat areas and pathways for the movement of fauna. The potential exists to fragment these corridors during pipeline construction and measures to minimise vegetation clearance and revegetate the corridor are employed to avoid significant impacts.

The fragmentation of habitats may also increase access by introduced predators such as the Red Fox and Feral Cat.

Disruption to Critical Fauna Lifecycle Stages

The presence and activity of construction equipment and personnel may impact critical lifecycle stages of some species. For example, prolonged or unusual noise or activity may discourage the use of local habitats for breeding. Species of conservation significance such as the nationally Endangered Red-tailed Black Cockatoo have the potential to be disrupted by construction activities in this manner.

Specific management protocols were implemented when the existing pipeline was constructed in areas of potential nesting habitat near Padthaway and Naracoorte during Red-tailed Black Cockatoo breeding season. These included identification of potential nest trees and surveying for nesting birds immediately prior to construction, to determine whether a buffer zone (which was set at 500 m in consultation with the Red-tailed Black Cockatoo recovery team and the Commonwealth Department of the Environment) needed to be implemented. Appropriate management protocols would be implemented for major work or new construction projects where there is potential to impact species such as the Red-tailed Black Cockatoo to ensure that significant impacts are avoided.

Spread of Environmental Weeds

This discussion focuses on environmental weeds, which are introduced plant species that are invasive in remnant vegetation. Agricultural weeds are discussed in Section 5.7.

Introduction and spread of weeds can occur through soil disturbance and the movement of weed material or seeds on earthmoving equipment and vehicles. Imported padding material can potentially introduce weed species, though this is unlikely as material is obtained from weed-free sources and the padding is buried at depth in the trench. Other imported material (e.g. stored pipes, used fencing material) may also result in weed introduction if it is not clean before arrival.

A number of declared environmental weed species have been recorded in the vicinity of the pipeline, including African Boxthorn, Horehound, Olive, Bridal Creeper, Wild Artichoke, Gorse. Other non-declared environmental weed species, such as Veldt Grass and other grassy weeds, are also present in or adjacent to areas of native vegetation along the pipeline in most regions.

SEA Gas has actively removed wild olive trees along sections of road verge near Williamstown and Gawler to assist with regeneration of native species.

The spread of environmental weeds can potentially inhibit the regeneration of indigenous species on the disturbed construction sites, forming a longer term, perhaps permanent, weed cover, and can result in the invasion of adjoining, non-disturbed vegetation, particularly by species not currently present. Weed hygiene protocols are implemented during construction activities to minimise the risk of weed spread and ongoing weed management is undertaken where required.

Spread of Pathogens

Two plant diseases are of particular environmental importance in the area: Phytophthora and Mundulla Yellows.

Phytophthora cinnamomi is a soil-borne organism that causes root rot of exotic and native plants. Infection often results in the death of the plant, with early symptoms including wilting, yellowing and

retention of dried foliage, and darkening of young feeder roots and occasionally the larger roots. Phytophthora spores are easily transported in run-off water, in contaminated soil and on earthmoving equipment, tools, footwear and vehicles.

Most of the environmental regions along the pipeline route are considered as moderate potential threat areas for Phytophthora (DPTI 2017). The Mount Lofty Ranges are regarded as a high potential threat area and the Murraylands low potential threat. A pre-construction survey for Phytophthora symptoms undertaken in the Mount Lofty Ranges in September 2002 did not identify any signs of infection along the pipeline alignment.

Mundulla Yellows is a fatal disease that affects eucalypts and other native plants. It was first observed in the vicinity of Mundulla, South Australia in the 1970's and has now been identified in all States, including Tasmania. It is characterised by progressive yellowing and dieback of foliage. Trees exhibiting these symptoms have never been observed to recover full health, and often die. It is not clear whether Mundulla Yellows is caused by living agent(s), or environmental factor(s), or a combination of both (DoE 2015). Scattered trees with Mundulla Yellows symptoms are present in the vicinity of the pipeline on some roadsides in the Southern Mallee environmental region.

The spread of diseases into non-contaminated areas has the potential to cause damage to remnant native vegetation. Protocols to minimise this risk, similar to those implemented for the existing pipeline construction and included in the Environmental Line List, would be implemented for any future construction projects, including pre-construction surveys, restrictions on vehicle movements from suspected infected areas and disinfection of vehicles and equipment where appropriate.

5.3.3 Impact Mitigation

Operation

Measures to reduce the risk and impact to flora and fauna include:

- avoiding traversing areas of native vegetation when accessing or patrolling the easement where possible;
- restricting line of sight clearance to the minimum necessary for safe pipeline operation;
- undertaking pre-start environmental assessment for excavations in areas of significant flora or fauna (as identified in the Environmental Line List) and implementing appropriate management measures identified by the assessment;
- restricting any vegetation clearance required for excavations to the easement and limiting it to the minimum necessary;
- trimming vegetation rather than clearing where possible;
- where practical, removing vegetation without disturbing the soil to preserve root and seed-stock along the easement;
- planning excavations to ensure that the period of time that the trench is open is minimised;
- provision of means of fauna escape in open trenches and regular inspection of open trenches for trapped fauna, particularly in areas of high ecological sensitivity;
- ensuring that measures are implemented (e.g. buffer zones, sediment and erosion controls) to prevent any significant impact to the Adelaide Dolphin Sanctuary;
- minimising the time between clearing and rehabilitation when excavations are required;
- respreading cleared vegetation over the easement and undertaking active revegetation where required;

- implementing control measures to minimise the risk of weed and pathogen spread as outlined in the Environmental Line List and SEA Gas procedures; and
- implementing targeted weed control programs where required.

Control measures are in place regarding the restriction of potential ignition sources and welding activities and the likelihood of a fire resulting from these activities is considered remote.

Construction

Measures to reduce the risk and impact to flora and fauna include:

Remnant Vegetation

- undertaking planning and site and route selection to avoid remnant vegetation as far as practicable;
- conducting on-ground survey work in areas of remnant vegetation to identify significant vegetation or fauna habitats for avoidance, provide input into final site and alignment selection and develop management or mitigation strategies;
- where practicable, using existing easements, cleared or degraded areas or gaps in vegetation to minimise clearance;
- restricting disturbance to the construction right-of-way and approved access;
- trimming vegetation rather than clearing where possible;
- retaining trees on the right-of-way where possible;
- reducing the right-of-way width in areas of higher ecological significance and using alternate crossing methods (e.g. boring or drilling) under significant linear vegetation where practicable;
- consulting with relevant bodies (e.g. DEW, Landscape Board, DIT) regarding management of native vegetation;
- developing and implementing site specific rehabilitation or revegetation measures for any sites of native vegetation that are impacted; and
- offsetting loss of native vegetation by carrying out suitable revegetation or other works to obtain a 'significant environmental benefit', in accordance with Native Vegetation Act requirements.

Fauna Mortality

- constructing the trench in shorter sections in areas of higher ecological sensitivity, with ramps (or slopes) at each end to facilitate fauna escape;
- minimising the period that the trench is open; and
- regularly inspecting the trench to release trapped fauna. Utilise dedicated fauna monitors if required (e.g. in areas of higher sensitivity).

Fauna Habitats

- avoiding or minimise impacts to potential fauna habitat by implementing measures outlined under 'Remnant vegetation' above;
- selecting a site or alignment that avoids or minimises impacts associated with fragmentation;
- avoiding clearing hollow bearing or old growth trees, particularly Eucalypts (including dead trees) as far as practicable;
- identifying and flagging significant fauna habitats that require management or avoidance during construction;
- if watercourse crossings are required, utilising crossing methods that minimise impacts to in-stream habitats and implement appropriate site specific management strategies, which may

include controls on timing, duration and flow conditions and the use of sediment fencing, geotextile fabric and silt curtains;
- ensuring that measures are implemented (e.g. buffer zones, sediment and erosion controls) to prevent any significant impact to the Adelaide Dolphin Sanctuary; and
- developing and implementing site specific rehabilitation measures and undertaking revegetation where appropriate as outlined under "Remnant vegetation" above.

Critical Fauna Lifecycle Stages

- in areas of higher ecological significance, avoiding construction during breeding periods for significant species where practicable and/or implementing management protocols (e.g. buffer zones) to minimise impacts.

Spread of Weeds and Pathogens

- undertaking detailed investigations to identify the presence of weeds and pathogens on the construction corridor, including surveys where appropriate; and
- developing comprehensive weed and pathogen management procedures that detail site specific requirements for pre-construction controls (such as spraying), quarantine requirements, machinery, vehicle and personnel hygiene measures, wash down of construction machinery where required, monitoring and post-construction control.

5.4 Cultural Heritage

5.4.1 Existing Environment

Indigenous archaeological sites within the vicinity of the pipeline have been impacted through widespread land clearance, a prolonged history of agricultural land practices and rural and urban development. Despite this, a broad range and a large number of sites have been recorded throughout the broader region traversed by the pipeline. The types of sites present include earthen mound sites, quarries, scarred trees, burials, isolated artefacts, stone fish traps, stone artefact scatters and campsites, stone arrangements, middens and art sites.

Small rural townships represented the focus of early non-Indigenous land use and history, and the majority of recorded non-Indigenous heritage sites in the region lie within township boundaries (and subsequently are avoided by the pipeline). At a regional level, historical heritage sites include those associated with early settlement, pastoral expansion, road and rail, gold, timber and soldier settlement and may involve items or features such as homesteads, bridges, wells, stone walls and graves.

Indigenous and historical heritage of the area traversed by the pipeline are discussed further below, in the context of the environmental regions along the pipeline route. Information presented has been derived from the original EER / EIR (SEA Gas 2001) and the reports on the extensive cultural heritage survey work that was undertaken prior to pipeline construction in conjunction with the relevant Aboriginal cultural heritage groups (the Tattyara Aboriginal Heritage Consultancy, Ngarrindjeri Heritage Committee, Mannum Aboriginal Community Association and the Kaurna Meyunna Association) (Wood 2002a, Wood 2002b, Wood 2002c, and Wood 2003). The original EER / EIR and subsequent cultural heritage assessment reports utilised a combination of available literature, heritage databases, project specific consultation with government agencies and local Aboriginal organisations, predictive modelling and field surveys.

Cultural heritage assessment for any new construction projects would be carried out in consultation with the appropriate Aboriginal cultural heritage organisation(s). The organisations relevant for the pipeline at the time of preparation of this EIR include:

- South East Aboriginal Focus Group;
- Ngarrindjeri Heritage Committee;
- Peramangk Heritage Association; and
- Kaurna Nation Cultural Heritage Association.

Wimmera Plains

The Wimmera Plains environmental region comprises an expansive area of gently undulating landscape. The Frances Plateau is traversed by the alignment in this environmental region and represents an elevated and older land surface than the prograding beach ridge landscape to the west. Indigenous heritage sites in this region are found near water sources, both permanent and intermittent (swamps, rivers, creek lines) and particularly on dune or lunette surfaces. Wood (2003) identified no Indigenous heritage sites in proximity to the alignment. Monitoring of construction works in several locations was undertaken as recommended by Wood (2003).

Non-Indigenous heritage sites in this region relate mainly to the theme of early pastoralism. Several previously recorded sites occur in proximity to the pipeline, however none were intersected or directly impacted through construction of the pipeline. One new site (the disused Wolsley – Mount Gambier rail line) was recorded by the survey, however no specific management requirements other than reinstatement of the embankment were required.

Southern Mallee

The pipeline traverses the traditional territories of three groups within this region, the Marditjali, Potarwutj and Ngarkat (Tindale 1974). The Marditjali inhabited the western Wimmera Plains, the Potaruwutj, the open plains and ridge country between Naracoorte and Keith, and the Ngarkat occupied the mallee scrublands belt east of the Murray River to the Victorian border and as far south as Keith. Surveys, literature reviews and predictive assessments undertaken by Wood (2001, 2003) for the Southern Mallee region found that archaeological sensitivity was generally low, but increased around a number of water points, lagoons and swamp margins. Areas of high sensitivity include Morambro Creek and the edges of permanent lagoons and swamps. Areas of moderate archaeological sensitivity include several locations near the eastern edge of the Naracoorte Range (Wood 2001).

No Indigenous heritage sites were recorded in proximity to the pipeline alignment. Monitoring of construction works was undertaken at a location of archaeological sensitivity near Morambro Creek.

Similarly, to the Wimmera Plains region, recorded non-Indigenous heritage sites primarily relate to early pastoralism. No sites were intersected or directly impacted through construction of the pipeline.

Murraylands

The fertile habitats of the Lower Murray, Lakes District and Coorong are thought to have supported one of Australia's largest temperate semi-sedentary populations. The alignment traverses the traditional territories of what is now known as the Ngarrindjeri. Settlement patterns reflected the seasonal availability of food resources. In spring and summer, Aboriginal people occupied semi-permanent settlements near the river and the availability of water allowed the Ngarrindjeri to venture inland from permanent water sources. However, winter conditions encouraged semi-sedentism in

areas near the lakes at the mouth of the Murray River. Fire-softened river red gum bark was commonly used for canoes, and many trees exhibit scars (Berndt 1941, Boehm 1948).

The archaeological sensitivity of the Murray River is considered to be extremely high. Based on extrapolation of previous studies (Wood 2001), archaeological sensitivity of the western region is generally low. The predominant land use is dairy farming and the irrigated land is highly disturbed.

No Indigenous heritage sites were recorded in proximity to the pipeline in the targeted areas that were surveyed prior to construction. The entire pipeline alignment between KP 432 and 560 was monitored during construction by the Ngarrindjeri. The horizontal directional drilling crossing location was distant from the river bank and did not impact any heritage sites.

Non-Indigenous heritage in the region covers a range of settlement activities such as overlanders, pastoralists, mission settlements, riverboat trade, early irrigation schemes, the various village settlement schemes and other agricultural and horticultural developments. The majority of recorded non-Indigenous heritage sites are located adjacent to the River Murray, often within township boundaries. No non-Indigenous sites were recorded in proximity to the pipeline alignment during surveys.

Mount Lofty Ranges

The Peramangk group are thought to have occupied the eastern Mount Lofty Ranges to approximately Strathalbyn and Kanmantoo (Tindale 1974). Their territory was well-watered and fertile resulting in little movement to the mallee-covered limestone flatlands east of the Ranges. There was some trade between the Ngarrindjeri and the Peramangk, trading items such as red gum bark (canoe-making) and whip-stick mallee spears (Tindale 1974).

Six previously recorded Indigenous heritage sites are present in general proximity to the pipeline alignment (Wood 2001), with one site at Mount Crawford located immediate to the alignment. Three newly recorded Indigenous sites were located during the pre-construction surveys (Wood 2002b and 2002c). None of these sites are directly impacted by the pipeline alignment, and measures were implemented (including presence of monitors in some areas) to ensure there was no inadvertent damage. Monitoring was also undertaken for some other areas along the alignment as recommended by Wood (2002b and 2002c).

A large number of non-Indigenous heritage sites have also been recorded in the region, particularly heritage associated with mining activities in the Scott Hill and Barossa areas. These sites are primarily contained within township boundaries. Four previously recorded non-Indigenous sites and nine newly recorded sites were identified in close proximity to the pipeline, however none were directly impacted by the alignment (Wood 2002b and 2002c).

Northern Adelaide Plains

At the time of European settlement, the Aborigines of the Kaurna language group inhabited the Adelaide area, comprising the coastal plains from Port Wakefield to Cape Jervis and to the western edge of the Mount Lofty Ranges (Gill 1909, Tindale 1974). The territory of the Kaurna comprised estuarine wetlands, beach fronts, plains and ranges, all of which provided a variety of environments and resources.

The alluvial plains, coastal fringe and estuary zones of this environmental region, like the Murray River and coastal areas of the South East, is a resource-rich ecological zone thought to have supported large numbers of Aboriginal people. The general region is archaeologically sensitive with numerous recorded Aboriginal sites. Sites common to this area include 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 pipeline alignment has been subject to a generally high level of disturbance and no Indigenous sites were identified during the survey (Wood 2002c). Monitoring was undertaken in several locations.

A number of previously recorded non-Indigenous heritage sites are located in the vicinity of the pipeline, covering the various historical themes of the area including early agricultural settlement (farmhouses, cemeteries) and industrial development. Site specific recommendations were provided to avoid damage to sites in close proximity to the alignment, the Smithfield Explosives Magazine and Edinburgh Airfield (Wood 2002c).

Port River Estuary

The Port River Estuary area incorporates Torrens Island, Le Fevre Peninsula and the supratidal marshlands fringing the estuary. The estuary region has been shown to represent Indigenous archaeological sensitivity, as a reflection of the varied resources used by Indigenous people in the area. Large numbers of earthen mound sites, stone artefact scatters / campsites, isolated artefacts and burials have been located in the broader region (Wood 2002c). Seven previously recorded sites were identified as being in close proximity (less than 300 m) to the pipeline alignment. Though several sites had been previously destroyed, the archaeological sensitivity of these locations needs to be considered. Additional monitoring during construction was undertaken in a number of areas.

Many of the non-Indigenous heritage listed items in this area relate to industrial development and include ship-wrecks, buildings, rail yards and other structures. Three previously recorded non-Indigenous sites have been identified in proximity to the pipeline:

- the North Arm – St. Kilda levee;
- the Dry Creek Explosives Magazine Reserve, and
- the Torrens Island Quarantine Station.

Although in proximity to the alignment, none of these sites are directly impacted.

5.4.2 Potential Impacts

The following activities have the potential to affect cultural heritage values:

- operational excavation activities;
- creation of construction access;
- clear-and-grade operations;
- trenching; and
- horizontal directional drilling.

If these activities are not appropriately planned and managed, they could potentially result in the following impacts:

- **Damage to shallow artefact scatters**. Earthworks associated with construction activities have the potential to disturb or damage shallow artefact scatters. These earthworks may be associated with either mainline pipeline construction or with incidental or related activities such as topsoil removal, trenching, the creation of access tracks, work areas, stockpiles, drill pads and installation of pipeline infrastructure (e.g. cathodic protection equipment).
- **Damage to subsurface material**. Trenching operations have the potential to damage previously unrecorded sites.
- **Damage to significant vegetation (e.g. scarred trees).** Clearing operations, particularly associated with watercourse crossings, have the potential to damage significant vegetation, such as scarred trees.

Mitigation measures discussed in Section 5.4.3, including planning, alignment / site selection, cultural heritage assessment and monitoring where required are implemented in order to prevent or successfully mitigate these potential adverse impacts.

Provisions under the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* and the South Australian *Aboriginal Heritage Act 1988* make it an offence to damage, disturb or interfere with an Aboriginal object, site or remains without the prior approval of the relevant State regulatory authority, local Aboriginal community or relevant Federal Minister.

Items of historical heritage significance are protected under the South Australian *Heritage Places Act 1993*. The majority of items of historical heritage significance are readily identifiable sites such as buildings, structures and cemeteries. As such, unintentional damage is less likely than for indigenous heritage items.

5.4.3 Impact Mitigation

Measures to reduce the risk and impact to cultural heritage include:

- reviewing site specific considerations (e.g. the Environmental Line List) before undertaking operational activities that are likely to result in site disturbance;
- undertaking cultural heritage surveys prior to construction activities in areas that have not been previously surveyed;
- where practicable, selecting a site or alignment that avoids cultural heritage sites and all standing buildings and structures;
- installing flagging, protective fencing or erosion control measures to protect sites near the easement which will not be directly affected by construction;
- implementing management measures (e.g. restriction of the right-of-way, boring beneath sites) to avoid impacts to sites on the pipeline alignment where practicable;
- undertaking on-site monitoring by representatives from the relevant Aboriginal community in areas of high sensitivity;
- obtaining appropriate authorisation for unavoidable site disturbances necessary to permit the construction of the pipeline;
- implementing protocols for accidental discovery of cultural heritage material during construction;

- working in close liaison with relevant government departments, local Aboriginal community organisations and native title claimants regarding the management of cultural heritage issues; and
- ensuring all personnel are aware of the required cultural heritage management procedures.

5.5 Noise

5.5.1 Existing Environment

The majority of the pipeline area is not densely settled and the pipeline principally traverses agricultural land. The alignment has intentionally avoided densely populated areas. However, in some circumstances, the pipeline is situated in closer proximity to residences (e.g. 20 m or less). Above ground facilities were generally located hundreds of metres or more from the nearest residence when the pipeline was constructed, however urban encroachment has resulted in residential development moving closer to facilities. In particular, development in the areas of Gawler East and Munno Para are expected to move closer to the mainline valves in these areas and management of potential noise impacts from pipeline venting is required by SEA Gas and planning authorities, as required by other legislation.

The existing noise environment in the region is dominated by incidental traffic and agricultural noise such as general landholder and resident activities (e.g. vehicle and farm equipment movements). Anomalies include larger rural townships located along the alignment such as Murray Bridge and Mount Pleasant, where there is an increase in traffic, residential and small industrial based noise.

Between Gawler and Pelican Point the representative landscape and land uses change from rural-residential to urban-industrial. Traffic from major arterials, airport movements, heavy industry, and to a lesser extent local traffic vehicle noise, contribute significantly to the ambient noise environment.

5.5.2 Potential Impacts

The following activities have the potential to generate adverse noise impacts:

- operation of vehicles and equipment;
- directional drilling;
- blasting of rock areas (if required for construction);
- operation of the pipeline and associated infrastructure; and
- operation of the compressor stations.

These are discussed further below. Further detail on potential impacts and their management for operational activities is also provided in Appendix A and B.

Operation of Vehicles and Equipment

Pipeline construction activities and operational activities such as excavations or repairs can result in a temporary increase in ambient noise levels within the immediate vicinity, associated with the operation of vehicles and equipment such as excavators, graders, bulldozers and boring equipment. However, this impact is generally expected to be of short duration and intensity at any given location.

The *Environment Protection (Noise) Policy 2007* includes provisions that regulate working hours for noisy construction activities. Although these particular provisions do not apply to construction of

public infrastructure or activities where Development Act authorisation is not required (such as pipeline construction activities authorised under the Petroleum and Geothermal Energy Act), they provide useful guidance on normal working hours. Under these provisions, construction activity is permitted between 7 am and 7 pm Monday to Saturday and may occur outside of these hours or on a Sunday or other public holiday (between 9 am and 7 pm) in some circumstances (e.g. to avoid interruption to traffic).

Temporary and minor noise disturbance may be experienced from passing aircraft during aerial inspections of the pipeline. Patrol aircraft generally travel at a height between 300 – 500 feet over the ground to prevent significant noise disturbance.

Noise impacts associated with vehicle access for pipeline inspection and general maintenance activities are very low.

Blasting

Blasting of rock areas may be necessary during new construction activities. Blasting near populated areas, infrastructure or ecologically sensitive areas is unlikely.

Horizontal Directional Drilling

Where required for new construction projects, horizontal direction drilling activities are generally scheduled to minimise the amount of associated time and disturbance. However, construction hours may need to be extended in some instances for short periods of time where it is critical that the drill string be maintained to prevent the hole collapsing. Noise generation from horizontal direction drilling is generally short term and any nearby residences and businesses would be notified prior to commencing drilling operations, to discuss the activity and manage potential third party impacts.

Operation of the Pipeline and Associated Infrastructure

The normal operation of the pipeline is silent along the right-of-way and will not generally involve significant noise impact. Noise impacts associated with access, inspection and general maintenance duties are very low.

Controlled venting of minimal quantities of gas to the atmosphere at purpose designed facilities may also be required during maintenance activities, however, noise emissions are short term. In an emergency, high pressure gas venting may occur at valve sites or at the site of a pipeline rupture. The duration of the venting and the volume of gas vented would be dependent upon the nature of the emergency. High pressure venting during an emergency could result in very high short term noise levels in the immediate vicinity, however this is expected to be a rare occurrence. Large quantities (10-100 TJ) of gas are vented over a relatively short period of time (in the order of 1-6 hours). When venting occurs noise levels are extremely high, with an unattenuated peak sound power level of 160-170 dB(A) at the source and predicted likely noise levels at 100m of 135 L_{Cpeak} dB(A) and 108 $L_{Aeq,8Hr}$ level, dB($A_{)}$. (Note: Noise exposure for persons indoors would be reduced by 10 – 25 dB(A)).

Continuous noise is emitted at facilities such as meter stations as a result of pressure reduction within the pipe work. Resulting noise levels from meter stations are typically less than 30 dB(A) within a few hundred metres of the source. The meter stations are located at sufficient distances from nearby residences to ensure that resultant noise levels meet requirements of the Environment Protection (Noise) Policy.

Compressor Stations

Noise sources associated with the operation of compressor stations include the gas turbine (including the combustion air inlet system, gas turbine engine, exhaust system, lube oil cooler and turbine enclosure cooling ducting), the compressor body, gas aftercooler, process piping and backup generator. Mainline valves are also located at the compressor station site, however these are operated infrequently during testing and maintenance (approximately once per year) and during emergency shutdowns, with negligible noise emissions.

The *Environment Protection (Noise) Policy 2007* indicates that a predicted source noise level (continuous) for a development should not exceed the indicative noise level set by the policy less 5 dB(A). As the indicative noise level for the land use at the compressor station sites (Rural Living) is 40 dB(A)) at night time, this results in a night time noise limit for the compressor station of 35 dB(A) at the nearest residence.

While acceptable daytime noise limits are higher, night time limits are considered here as compressor stations may run 24 hours a day, and so must meet the more stringent requirements.

Noise Modelling

Noise modelling for predicted operational noise from the Yallamurray compressor station was undertaken for the original EER/EIR (SEA Gas 2001). Modelling was undertaken for two potential compressor station locations, immediately north-west and immediately south-east of Yallamurray Road, with the north-west location considered to be the 'worst-case' scenario.

Results for the north-west site indicated that without noise control on the turbine, all except two locations (residences) modelled may experience noise levels in excess of the recommended 35 dB(A). However, with appropriate noise attenuation devices applied, none of the residences modelled exceeded 35 dB(A). Modelling for the south-east site also found that attenuated operation of the compressor would be below the recommended 35 dB(A). Further details regarding modelling techniques, locations and criteria are outlined within the original EER / EIR and Appendices.

Prior to construction of a compressor station at the Yallamurray site, SEA Gas would undertake sensitive receptor mapping to identify any new residences near the site and undertake additional noise modelling to ensure that recommended noise levels are met.

Modelling of operational noise emissions was also undertaken for the Coomandook compressor station EIR (SEA Gas 2002a). Attenuated noise sources were assessed against the limit of 35 dB(A) as for the Yallamurray compressor station. Results indicated that the Coomandook compressor station would not significantly contribute to the noise impacts in the region and would meet EPA requirements at the nearest residences.

5.5.3 Impact Mitigation

Measures to reduce the potential impact of noise emissions include:

- restricting noisy activities (e.g. construction or excavations) to normal working hours where practicable, in accordance with EPA recommendations (EPA 2017);
- consulting with local residents when unavoidable out of hours work is required;
- ensuring that appropriate mufflers are fitted and maintained on equipment and vehicles;

- applying engineering controls to vehicles, plant and equipment where required in order to comply with noise abatement requirements;
- carrying out blasting in accordance with state legislation and not close to any residential areas;
- using drilling equipment with noise ratings suitable for use on public roads;
- locating and designing above ground facilities to meet EPA noise criteria;
- designing compressor stations to meet relevant EPA noise criteria;
- modelling pipeline facility noise emissions for new or modified facilities based on detailed design information and incorporating any new receptors near the site since initial modelling at commissioning;
- implementing noise control measures for the future Yallamurray compressor station where required, which may include inlet and exhaust silencers for the gas turbine, silencers for cooling air ducts, acoustic enclosure for gas turbine drivers and generator, large diameter, low speed fans for gas coolers, vent silencers and acoustic installation provided for critical noise generating piping;
- reducing the risk of noise impacts from pipeline venting to as low as reasonably practicable by reducing inventory through customer draw down (where safe and practicable), community notification, stakeholder consultation and where necessary promoting evacuation;
- where change of land use increases the risk to public health and safety due to noise impacts from emergency pipeline venting, identifying additional controls through further assessment and seeking to ensure they are implemented by the responsible party to ensure the risk remains ALARP; and
- working closely with residents, local government, DEM and EPA regarding the management of noise.

5.6 Air Quality and Greenhouse Gas

5.6.1 Existing Environment

Ambient air quality data are only available for the metropolitan areas of Adelaide (including the Mount Lofty Ranges and Adelaide Plains regions). As such, quantified regional air quality data is not available for the majority of the pipeline alignment. Despite this, good air quality, at both the regional and local scale is expected, due to the lack of heavy industry and population centres and the prevailing moderate to strong winds, which are oceanic in origin. The National Pollutant Inventory database confirms that there are no major industrial emissions between the state border and Murray Bridge (NPI 2020).

Ambient air quality in the Adelaide Plains region is particularly dependent on industrial and transport emissions as well as daily and seasonal climatic conditions such as prevailing winds and atmospheric inversion layers. Industrial emissions of particular note include those from hydrocarbon storages, cement production and power generation.

On a smaller scale, industrial emissions from the regional centre of Murray Bridge include those from the hydrocarbon, plastic and dairy production and meat processing industries.

The air environment of the future Yallamurray compressor station, north-east of Padthaway (see Figure 1-1) is typical of the rural broadacre farming environment within the region. Minor industrial emissions are limited to the small number of wineries in the local region. The air environment of the Coomandook compressor station area is also typical of the rural farming environment, with minor sources of emissions including farm machinery and vehicle emissions from the nearby Dukes Highway.

5.6.2 Potential Impacts

The following activities have the potential to affect the air quality of the area:

- operation of compressor stations;
- operation of the pipeline and associated infrastructure;
- earthworks during construction and operation; and
- operation of vehicles and equipment.

Potential impacts to local air quality include:

- generation of dust from the construction right-of-way, access tracks and work areas;
- minor reduction in air quality resulting from vehicle and equipment emissions; and
- localised reduction in air quality resulting from emissions from the compressor stations and pipeline.

These are discussed further below. Further detail on potential impacts and their management for operational activities is also provided in Appendix A.

Dust Generation

The primary impact on air quality during construction and operational excavation activities is likely to arise from dust generated through earthworks, blasting and vehicle movement. Low rainfall in the summer months may increase the likelihood of dust impacts. However, dust issues associated with these activities are minor and restricted to the short duration of the activity. Significant long-term nuisance to residents or a sustained deterioration in the local air quality as a result of potential dust impacts is unlikely considering:

- the scale of the activities (any new construction activities or excavation would be relatively small scale);
- the temporary nature of the work; and
- the availability of effective dust control measures.

Vehicle and Equipment Emissions

Minor air emissions of nitrous oxides, sulphur oxides and carbon monoxides associated with the exhaust of machinery and support vehicles will occur (EPA 2008). However, these sources are likely to be negligible in the context of existing farming, transport, industrial and residential land uses of the pipeline area. No measurable impact is likely.

Pipeline Operation

The impact on air quality during operations is expected to be negligible. Minor emissions from the pipeline occur at valve stations, scraper stations and pressure regulating and metering facilities during maintenance operations. Minor gas emissions from mainline valves occur during remote valve operation, as gas pressure is used to drive the valve actuators. The valves are only operated in the event of damage or programmed maintenance. Minor emissions from scraper stations occur during loading and removal of a pipeline pig, which would normally occur once every five to seven years. Controlled venting of minimal quantities of gas to the atmosphere at purpose designed pressure regulating and metering facilities may also be required during maintenance activities. Fugitive emissions are extremely low from pipeline operations.

As discussed in Section 5.8.4, the risk of pipeline ruptures or leaks is also extremely low due to the implementation of protection measures and the routine monitoring, inspection and maintenance that is carried out. As such, air emissions associated with such events would be a rare occurrence.

In an emergency, high pressure gas venting may occur at valve sites or at the site of a pipeline rupture. The duration of the venting and the volume of gas vented would be dependent upon the nature of the emergency. In the unlikely event of a hole or rupture in the pipeline, the gas mixture would be released at high velocity and form a lighter-than-air mixture which would rise into the atmosphere. Dispersion modelling studies were undertaken during facility design to ensure that gas is released from vents at a vertical velocity that achieves adequate dispersion and does not present a risk to the public.

Compressor Station Operation – Air Quality Modelling

To assess the potential impacts associated with the operation of the Coomandook compressor station and the future Yallamurray compressor station, air quality modelling assessments were undertaken and presented in the respective EIR documents (SEA Gas 2001 and SEA Gas 2002a). Further details regarding modelling techniques, locations and criteria are outlined within these documents. The assessments predicted ground level concentrations arising from air emissions to determine compliance with EPA requirements.

The dispersion modelling used the AUSPLUME (version 5.1) model and results were assessed against the National Environment Protection Measure (NEPM, 1998) ambient air criteria. NEPM standards are regional levels and are not primarily designed for assessing impact issues arising from specific sources. However, the adoption of such standards was based on advice from the South Australian EPA at the time of modelling, due to the context of the proposed compressor station – that is there are no other significant sources of the pollutants of interest in the local airshed surrounding the compressor station sites. NEPM standards applicable to likely air compressor pollutants and the emission modelling results are shown in Table 5.2.

The *South Australian Environment Protection (Air Quality) Policy 2016* (EPA 2016) also specifies allowable ground level concentrations (GLCs). To comply, the ground-level concentrations predicted by dispersion modelling must be lower than the allowable GLCs at all locations at all times. The limits specified by this policy (which was not in place when the modelling was undertaken in 2001) are also shown in Table 5-2.

Table 5-2: Air emission modelling results

Emission	Emission duration	Location description	Predicted 'Max.' GLC (µg/m³)		NEPM Standard (µg/m³)	EPA (2016) GLC (µg/m³)
			Coomandook	Yallamurray		
Nitrogen Dioxide (NO_2)	Predicted 1-hour Average 'Maximum'	Maximum (occurs inside site boundary)	60.1	150	250	250
		Worst-affected Residential Property	11.6	5.0		
	Predicted Annual Average 'Maximum'	Maximum (occurs inside site boundary)	3.0	5.6	60	60
		Worst-affected Residential Property	0.5	0.2		
Carbon Monoxide (CO)	Predicted 8-hour Average 'Maximum'	Maximum (occurs inside site boundary)	26.2	4.5	11,250	11,250
		Worst-affected Residential Property	3.5	0.1		
	Predicted 1-hour Average 'Maximum'	*1-hour duration not reported in 2001 modelling*	-	-	-	31,240

The results of emissions modelling from the Coomandook compressor station and future Yallamurray compressor station shown in Table 5-2 indicate that the predicted ground level concentrations for NO_2 and CO comply with relevant the NEPM standard and EPA allowable GLCs.

Stack source emissions of NO_2 (Coomandook 0.2 g/m^3, Yallamurray 0.3 g/m^3) and CO (Coomandook and Yallamurray 0.1 g/m^3) for both sites also comply with the maximum allowable levels of 0.35 g/m^3 for NO_2 and 1 g/m^3 for CO for fuel-burning equipment prescribed in the *South Australian Environment Protection (Air Quality) Policy 2016*.

Prior to construction of a compressor station at the Yallamurray site, SEA Gas would undertake sensitive receptor mapping to identify any new residences near the site and undertake additional air quality modelling to ensure that air quality limits are met.

As noted in Section 2.2.1, SEA Gas holds an EPA licence for fuel burning at the Coomandook compressor station. It is expected that this licence would be modified (or a new licence issued) if the Yallamurray compressor station was constructed.

5.6.3 Impact Mitigation

Measures to reduce the potential impacts to air quality include:

- minimising the extent and period of exposed surfaces during construction and ground-disturbing operational activities;
- designing and operating the compressor station to comply with EPA air quality criteria;
- modelling compressor station air emissions based on detailed compressor design and incorporating any new receptors near the site since initial modelling;
- implementing dust suppression measures, such as water carts, as required during activities;
- rehabilitating exposed surfaces as rapidly as practicable;

- laying aggregate in above ground facilities where appropriate to reduce dust;
- keeping all vehicles and equipment well maintained and in compliance with vehicle emission standards;
- driving vehicles at low speed to minimise generation of dust;
- monitoring operations to ensure compliance with design requirements;
- carrying out regular monitoring, inspection and maintenance during operations to prevent pipeline rupture and reduce the occurrence of minor leaks from pipeline infrastructure;
- minimising gas venting activities and undertaking emissions tracking for greenhouse gas abatement and reporting purposes;
- complying with EPA licence requirements for compressor station operations; and
- working closely with DEM and EPA regarding management of compressor station air emissions.

5.6.4 Greenhouse Gas

Greenhouse gases emitted during pipeline operations would predominantly arise from small amounts of natural gas (namely methane) vented during routine maintenance and from combustion products emitted during compressor station operation. High pressure venting during an emergency could result in the release of large quantities of gas, however this is expected to be a rare occurrence. During pipeline construction greenhouse gases are emitted by transport (namely light vehicles and pipeline trucks) and the use of construction machinery and equipment.

SEA Gas provides annual emissions reports to the Clean Energy Regulator through the National Greenhouse and Energy Reporting scheme, as well as National Pollutant Inventory (NPI) reports through the EPA to ensure legislative compliance and to assist in measuring ongoing key performance criteria.

Although natural gas is a fossil fuel, with associated greenhouse gas emissions, net-positive greenhouse gas outcomes can be achieved depending on the intended use. The SEA Gas pipeline contributes to a reduction in greenhouse gas by increasing the market penetration of gas, displacing more greenhouse gas intensive (kg of CO_2e/GJ) fuels such as coal and petroleum products, and displacing more greenhouse gas intensive fuels in electricity generation.

5.7 Land Use

Minimising disruptions to the wide ranging land uses occurring across the Pipeline System is an important objective of SEA Gas activities. It is recognised that appropriate management will mitigate:

- any adverse effects to agricultural productivity or other primary production activities in both short term and long term;
- disruption to important land use periods (that is, calving, lambing, breeding, sowing, harvesting or recreation);
- spread of noxious weeds, pests and diseases; and
- disruption to conservation, recreational, industrial or other third party land use activities.

5.7.1 Existing Environment

The Pipeline System predominantly traverses pastoral and agricultural properties. Land uses within the vicinity of the pipeline include:

- agriculture (including irrigated pasture / cropping, dairy, dryland cropping, stock grazing, other livestock and viticulture);
- forestry;
- conservation (including forestry reserves);
- water storage and treatment;
- mining;
- light industry with some heavy industry;
- recreational; and
- rural living and residential

Table 5-3 illustrates broad land uses representative of each environmental region and further information is provided in the discussion following the table.

Table 5-3: Representative land uses within each environmental region

Environmental Region	Representative Land Uses
Wimmera Plains	▪ Cattle and sheep farming and cereal cropping ▪ Plantations ▪ Viticulture
Southern Mallee	▪ Cattle and sheep farming and cereal cropping ▪ Plantations ▪ Viticulture
Murraylands	▪ Cattle and sheep farming ▪ Recreational (associated with Murray River) ▪ Irrigation Dairy
Mt Lofty Ranges	▪ Cattle and sheep farming ▪ Plantations ▪ Viticulture ▪ Hobby farming ▪ Forestry (Mt Crawford)
Northern Adelaide Plains	▪ Industrial/Commercial ▪ Residential ▪ Horticulture ▪ Hobby farming

Agriculture

South Australia's agricultural industry is dominated by the broadacre industries including grain growing, sheep and cattle farming and grape growing (ABARES 2016). The extent of the pipeline route traverses most agricultural practices and land uses.

Dairy Farming

The dairy industry in the South East of the state, including part of the Southern Mallee, is predominantly supported by summer irrigated pastures and produces approximately 59% of the state's milk (Dairy Australia 2019). The Murraylands region has experienced drought and severe water

restrictions in recent years, resulting in a reduction in the number of dairy farms in the region. Intensive dairy farming along the pipeline route in South Australia is limited to a strip of the Murray River floodplain near Jervois. Some medium to high intensity dairy farming occurs in the South East around Naracoorte.

Other Livestock

Cattle and sheep farming occurs along most of the pipeline route. Sheep and cattle are primarily farmed for human meat consumption. Alternate livestock activities such as pig farming are also undertaken in the region.

Agriculture

Wheat and barley are the main crops grown in South Australia. Grain legume or pulse production is also undertaken. Olive plantations are also present along some sections of the pipeline, particularly on the northern Adelaide plains.

A number of declared weeds of significance to agricultural land use have been recorded in the vicinity of the pipeline, including African Boxthorn, Horehound, Silver-leaf Nightshade, African Love Grass, Bathurst Burr, Skeleton Weed, Wild Artichoke, Khaki Weed, Coolatai Grass and Cape Tulip. Of particular note is the weed species Branched Broomrape (*Orobanche* spp.) which is a parasitic weed of broadleaf crop species such as oilseeds, field peas, vegetables and lupins. The pipeline alignment was selected to avoid a Branched Broomrape quarantine area that was previously located east of Murray Bridge. Quarantine restrictions have been reduced and management of Branched Broomrape nationally is transitioning from a focus on eradication to containment and ongoing management.

Viticulture

Viticulture is an important land use in the Mount Lofty Ranges and Padthaway region. The pipeline skirts the southern edge of the Barossa Valley, one of Australia's premiere viticultural regions.

A pest of concern to the grape growing industry is the insect Phylloxera. It can be spread between vineyards in a range of ways, including movement of soil and machinery. South Australia is currently free of Phylloxera, and is designated a Phylloxera Exclusion Zone.

Forestry

The majority of plantations are located in the South East of the state, with approximately 166,800 ha across South Australia during 2018-2019 (ABARES 2020). The Mount Lofty Ranges contains approximately 20,502 ha of proclaimed Forest Reserve and 3,996 ha of native forests (Forestry SA 2019). These areas are used for a combination of forestry, recreation and conservation purposes. The pipeline traverses two sections of pine plantation in the Mt Crawford Forest area utilising existing firebreaks and tracks.

Conservation Areas

Twelve areas of designated conservation importance are located within 5 km of the pipeline (see Table 5-4).

Table 5-4: Conservation areas within five kilometres of the pipeline alignment

Park Name	Distance from pipeline
Grass Tree Conservation Park	2 km
Padthaway Conservation Park	350 m
Desert Camp Conservation Park	3 km
Christmas Rocks Conservation Park	250 m
Poonthie Ruwe Conservation Park	75 m
Mowantjie Willauwar Conservation Park	1.2 km
Long Island Recreation Park	4.7 km
Hale Conservation Park	2 km
Warren Conservation Park	4 km
Sandy Creek Conservation Park	1.3 km
Para Wirra Recreation Park	2.3 km
Torrens Island Conservation Park	Traversed

The pipeline crosses a small section of the western portion of Torrens Island Conservation Park, which was added to the park after the pipeline was approved. It does not intersect any other parks or reserves declared under the *National Parks and Wildlife Act*.

The pipeline crosses the Reedy Creek area which is listed on the Register of the National Estate (which is no longer a statutory register) for its geological representation of the relationship between the metamorphics of the Kanmantoo Group and the intrusive Reedy Creek granodiorite. The area contains waterfalls, rockpools and areas of remnant vegetation and is of recreational importance, with developed bushwalking and picnic facilities. The pipeline crosses Reedy Creek some 1.5 km upstream of the principal values associated with the listing through an area used for grazing and cropping.

The pipeline alignment intersects the Adelaide Dolphin Sanctuary on Torrens Island and the adjacent North Arm and Port River.

Mutton Cove near Pelican Point on Le Fevre Peninsula is a conservation and recreation area under the care of DEW, and also forms part of the Adelaide Dolphin Sanctuary. The pipeline skirts the south and west boundaries of Mutton Cove before reaching the Pelican Point Power Station.

Recreation

The pipeline route was selected to avoid most areas used for recreation. Areas in close proximity to the route with some recreational land use include the Heysen Trail, near Mount Crawford and Barker Inlet and Mutton Cove.

Mining and Other Industry

A number of mining operations are located in the vicinity of the pipeline route particularly in the area south of Gawler, however, there are no operational mines immediately adjacent to the pipeline. One private sand-mining operation south of Palmer is located close to the pipeline alignment and a quarry operated by the Naracoorte Lucindale Council is located approximately 600 m from the Naracoorte Lateral. The salt evaporation ponds in the Bolivar area are in the process of being closed and are flagged for residential development in the *30 Year Plan for Greater Adelaide* (DPTI 2017).

The Murray Bridge region and the Northern Adelaide Plains support a range of light and heavy industries, including manufacturing, assembly and storage industries and power generation on Torrens Island and Pelican Point. The area near Pelican Point at the northern end of Le Fevre Peninsula has undergone significant industrial development since the construction of the pipeline.

Away from these areas, the limited industrial activity includes meat processing at Naracoorte and dairy processing at Jervois.

Rural Living and Residential

The pipeline generally avoids all areas of closely settled residential development, but does traverse areas of rural properties and medium sized rural living areas on town fringes, in the Adelaide Hills and on the Northern Adelaide Plains. The pipeline also passes close to Mobilong Prison near Murray Bridge. Some urban development has occurred immediately adjacent to the pipeline in the Northern Adelaide Plains since construction of the pipeline, particularly in the Gawler East and Munno Para areas. Further development is planned in these areas, requiring ongoing management by SEA Gas through consultation with Planning Authorities to ensure the continued safe operation of the pipeline.

5.7.2 Potential Impacts

The following activities have the potential to affect land use:

- earthworks associated with operation (e.g. excavation for pipe repair or replacement);
- earthworks associated with construction (e.g. clear-and-grade operations, trenching, backfilling and reinstatement);
- movement of vehicles along pipeline corridor and access tracks;
- pipeline venting in areas where urban encroachment has occurred in the vicinity of pipeline vents; and
- the storage and handling of small quantities of fuel and chemicals.

Operation

The operation of the pipeline has very limited impact on existing land use, as the pipeline is buried and the construction corridor rehabilitated to as near as practicable to the pre-construction state. Existing land use activities are generally not restricted in the vicinity of the pipeline except for those that will potentially cause harm to the pipeline or the public (e.g. water bore installation, blasting, fence post installation, deep ripping in areas where it has not been specifically approved and planned for and planting of deep rooted plants such as blue gums or pines). Future plantings of vineyards will need to consult SEA Gas and take into account the location of the pipeline. Development over the pipeline (e.g. sheds or houses) is generally not allowed.

Minor and localised impacts to land use may occur and are typically restricted to:

- occasional short-term disruption during excavations; and
- access through properties to access the easement.

Impacts to land use for excavations on the pipeline easement are relatively infrequent and are generally restricted to the short duration of the activity. Close liaison with landholders is maintained to ensure that any disturbance is minimised.

Access to the pipeline over cleared paddocks only occurs when access to a particular pipeline section is required (e.g. for maintenance) and not on a continuous basis. Scheduled patrols are generally restricted to road crossings on public land.

Impacts to conservation values are associated with the potential disturbance to flora, fauna or items of cultural heritage. Generally, as the impact is contained within the existing, previously disturbed easement, there is minimal disturbance to existing land uses as a result of pipeline operations.

Construction

The potential impacts on land use as a result of pipeline construction activity include:

- temporary loss of land utilisation for cropping / grazing;
- reduction in long-term productivity on the easement due to soil compaction, inversion, contamination or erosion;
- introduction, spread or colonisation of weeds, pathogens and / or agricultural diseases;
- restriction in stock movement and possible stress to livestock;
- impeded property access; and
- wildfire from welding activities.

These impacts can be successfully managed to avoid significant impact. Aside from the construction of above ground infrastructure, such as metering stations, these impacts are generally temporary in nature and cease once the construction phase has been completed and the easement has been rehabilitated. However, poor soil management or the introduction of weeds and diseases can impair long-term productivity. Provided that appropriate management measures for soil (see Section 5.1) and weeds and diseases (see Section 5.7.3 below) are implemented, pipeline construction activities should not unduly contribute to losses of productivity post construction.

Under the *Petroleum and Geothermal Energy Act*, landowners are entitled to compensation to cover deprivation or impairment of the use and enjoyment of the land, damage to the land (excluding damage that has been made good), damage or disturbance to business or other activity conducted on the land and consequential loss. Formal easement agreements are typically entered into prior to construction that outline the legal responsibilities of both parties.

5.7.3 Impact Mitigation.

Measures to reduce the potential impact to land use include:

- considering current land use practices and future infrastructure extensions during planning and design of future construction projects;
- working closely with landowners and managers to minimise conflict with existing land use activities;

- entering into formal easement agreements outlining the legal responsibilities of both SEA Gas and the landowner;
- avoiding construction activities or major operational projects during key periods (e.g. peak lambing periods) or, if not practicable, consulting with landholders to coordinate activities such as lambing beyond proposed construction paddocks;
- implementing appropriate weed, pest and disease control and management protocols and quarantine measures (if required) during construction and operations, in consultation with landholders and relevant management authorities. These may include:
  - washdown / decontamination of vehicles, machinery or footwear before commencement
  - decontamination and certification of any machinery at risk of Phylloxera transfer (i.e. if operated in a vineyard within two weeks prior to Project commencement);
  - screening of imported material (e.g. padding) or extraction sites for weeds and pathogens
  - not grading topsoil over property boundaries
  - implementing hygiene procedures (e.g. washdown) at property boundaries if required
  - post-construction weed control if required
- rehabilitating the construction right-of-way in consultation with landholders;
- implementing appropriate erosion and sediment control measures;
- implementing appropriate traffic management procedures for construction activities or major operational projects to minimise impacts in residential areas; and
- monitoring activities in close proximity to the easement to ensure the integrity of the pipeline is maintained and that no potential land use conflicts arise.

5.8 Other Issues

5.8.1 Socio-economic

Larger regional towns in proximity to the pipeline alignment include Naracoorte, Keith, Tailem Bend and Murray Bridge. Gawler town centre is situated 2 km north-west of the pipeline alignment as it traverses the Northern Adelaide Plains Region towards the outer northern suburbs of Adelaide. Population statistics for these centres are shown in Table 5-5.

The pipeline alignment traverses 10 local council areas:

- Naracoorte Lucindale Council
- Tatiara District Council
- The Coorong District Council
- The Rural City of Murray Bridge
- Mid Murray Council
- The Barossa Council
- Town of Gawler
- City of Playford
- City of Salisbury
- City of Port Adelaide Enfield.

Table 5-5: Population centre statistics from the 2016 Census

Population Centre	Local Government Area	Population (2011 Census)
Naracoorte	Naracoorte Lucindale Council	5,960
Keith	Tatiara District Council	1,355
Tailem Bend	The Coorong District Council	1,665
Murray Bridge	The Rural City of Murray Bridge	14,560
Gawler[1]	Town of Gawler	26,472
Adelaide[2]	Adelaide Metropolitan region (17 local councils)	1,165,632
[1] Urban Centre/Locality *[2] Greater Capital City Statistical Areas – inclusive of Gawler population statistics*		

Source: ABS (2016)

Potential adverse impacts on the community as a result of pipeline activities are likely to be short-term and minimal. The broader community can benefit both directly and indirectly due to local expenditure during construction activities. The construction workforce is typically housed in local motels or caravan parks if possible, although it may be necessary to establish a construction camp for construction projects if sufficient accommodation is not available.

Local employment opportunities can arise during both construction and operation of the pipeline, while in broader terms the SEA Gas pipeline enhances security of gas supply to Adelaide and regional areas of South Australia and provides significant capacity for growth in local gas demand.

Operation of the pipeline results in no significant adverse social impacts.

5.8.2 Visual Amenity

Buried pipelines, by their very nature, have a low level of impact on visual amenity. Generally, this is restricted to short term disturbances associated with construction earthworks and localised impacts associated with the presence of above ground facilities. With the application of appropriate design and mitigation strategies, significant long term impacts to the visual amenity are not likely to occur.

Existing Environment

The majority of the pipeline route is considered to have low visual sensitivity as it is removed from general viewing, or already has been significantly modified by development (such as vegetation clearing, plantation forestry and infrastructure and roads).

Potential Impacts

Potential impacts to visual amenity are generally described as a visual or aesthetic disturbance to landholders, residents and tourists, where the project activities may be perceived to contrast significantly with existing landscape settings and aesthetic values.

The following activities have the potential to affect the visual attributes of the pipeline area:

- vegetation clearing and earthworks during construction;
- the success of easement reinstatement and rehabilitation works; and
- the presence of above ground facilities.

Pipeline construction activities can result in minor and short term disturbance to the visual amenity of the local environment. Key issues include the potential to create new breaks in vegetation corridors, line-of-sight along the linear easement and the presence of construction vehicles, equipment and stockpiles. As outlined below, all such issues can be avoided or successfully mitigated.

The bare appearance of the easement after construction and prior to revegetation can create local short term reduction to visual amenity in areas accessible to the public. However, this is temporary and considered to be of low potential impact. In areas where the route follows cleared firebreaks it will be consistent with the current appearance of these firebreaks. There will be no substantial, significant or long-term change to the aesthetic appearance of the natural environs due to rehabilitation measures post construction.

During operations, cleared gaps in trees and shrubs may be maintained to allow access for pipeline inspection and maintenance. Pipeline construction corridors are selected to minimise vegetation and fragmentation of vegetation corridors, therefore the potential impacts will be minimal.

Above ground facilities such as meter stations and marker signs impact local amenity in a more permanent manner. Mitigation measures, such as site selection and screening are employed to reduce the impact to an acceptable level. Pipeline markers, which are designed to be seen, do not result in a significant visual impact.

Mitigation Measures

Measures to reduce the potential visual impacts include:

- selecting the site or alignment to:
  - avoid areas of high visual impact

  - reduce the line of sight clearances along the easement in areas of high sensitivity
  - minimise the extent of vegetation clearing
- stockpiling material and equipment in areas away from general public view, where practicable;
- maintaining all working areas in a neat and orderly manner;
- adopting appropriate waste management practices;
- restoring, reinstating and rehabilitating the easement as soon as practicable following backfill;
- planting screening vegetation around above ground infrastructure, where necessary;
- using suitable paint colours on above ground facilities where appropriate; and
- planting of screening strips where appropriate.

5.8.3 Third-party Infrastructure

Impacts to third party infrastructure can be readily mitigated by careful pre-construction planning and appropriate consultation with relevant regulatory authorities, public utility service companies and landholders. With adequate management, pipeline activities can prevent impacts such as:

- disruption or damage to road and other transport infrastructure or networks;
- disruption or damage to utility services; and
- disruption or damage to private third party property.

Existing Environment

Transport Networks

The pipeline crosses numerous roads, including major roads such as:

- Riddoch Highway
- South Eastern Freeway
- Sturt Highway (Main North Road)
- Port Wakefield Road
- Port River Expressway

A series of secondary, minor and local roads, and farm access tracks are also crossed by the pipeline.

The existing road network is used wherever practicable as access to the pipeline during operations and construction activities and for moving equipment and personnel in the local area.

During pipeline construction, unsealed secondary roads are typically crossed using standard open cut construction techniques, dependent on usage and other considerations such as environmental, geological or safety. Pipeline construction crossings of main highways are typically installed using horizontal directional drilling or boring.

The pipeline crosses two railroads, the Adelaide to Melbourne Railway west of Murray Bridge, and the Adelaide to Darwin Railway at Direk. The Australian Rail Track Corporation is the responsible authority for the both of these Railways. Rail crossings are also typically installed using horizontal directional drilling or boring.

Public Utilities

Gas Pipelines

The pipeline crosses two other transmission pipelines:

- the Angaston–Murray Bridge Pipeline (Australian Gas Networks) near Murray Bridge
- the Moomba–Adelaide Pipeline (including the Wasleys Loop) (Epic Energy) near Bolivar, Dry Creek and Torrens Island.

Telecommunications

In addition to regular private residential housing cables and infrastructure, the pipeline alignment is in close proximity to a number of major fibre optic telecommunication cables and crosses these cables in some locations.

Water Utilities

The SEA Gas pipeline crosses numerous industrial and residential water pipes adjoining the properties to mains supply. However, of particular importance during construction activities is the identification of important mains and township supply pipes and irrigation systems.

The pipeline crosses or runs parallel to a number of above ground water pipelines, including the Murray Bridge–Onkaparinga pipeline, the Mannum-Adelaide pipeline, the Tailem Bend–Keith pipeline and the Barossa–Adelaide water pipeline.

Power

The pipeline crosses numerous power lines that form part of the South Australian electricity distribution network and is in the vicinity of several major high-voltage lines, including those at Pelican Point and Torrens Island.

Private Property

A variety of private infrastructure is present along the pipeline alignment. Common examples include gates and fences belonging to landowners.

Potential Impacts

With adequate management, the following potential impacts to private infrastructure can be avoided or appropriately mitigated:

- disruption or damage to roads and other transport infrastructure or networks;
- disruption or damage to utility services; and
- disruption or damage to private infrastructure.

Transport Networks

The following activities may disrupt or damage transport networks:

- use of roads during construction by extendable semi-trailers delivering stockpiles of pipe to worksites;
- use of roads by low loaders mobilising construction equipment between worksites;
- transporting of construction personnel to worksites;
- open cut crossings of unsealed roads; and
- pipeline surveillance and maintenance activities.

With adequate management the following potential impacts to the transport network can be avoided or adequately managed:

- loss of road integrity;
- localised traffic congestion or disruptions.

Impacts to roads or traffic conditions during pipeline operations are considered negligible due to the low frequency and short term duration of vehicle use associated with easement patrols and inspections.

Potential impacts of pipe and equipment transportation during construction include slow moving traffic on roads and subsequent disturbance to local traffic and motorists. Levels of disturbance are generally greater in small rural communities and associated local roads where the entire road breadth may be needed by the semi-trailers. Road crossings can result in localised traffic disruptions; as typically standard open cut road-crossings can take up to six hours. Consultation takes place with potentially affected parties and a traffic management plan is prepared by a certified party and approved by the appropriate road authority where required. Agreed traffic management measures such as a traffic management plan, are put in place to minimise potential disruptions and manage public safety.

Heavy vehicle and equipment movement may result in localised damage to the integrity of the road pavement or surface (that is through wear-and-tear). Boring beneath sealed roads will not cause damage to road integrity.

Public Utilities

Pipeline activities will not result in significant impacts to public utility services. Utilities will be identified prior to construction and incorporated into construction line lists and appropriately flagged, earthed, protected and avoided during construction. Should construction activities perforate, rupture or incise cables, pipes or other utility infrastructure, short term disruptions to services such as electricity, water and telecommunication networks may occur.

Utility infrastructure may also pose safety risks to personnel during construction, in particular induced current and direct contact with 'live' wires arising from placement and movement of construction equipment and large metal objects in parallel and close proximity to power lines. Arcing between transmission lines and construction plant equipment and vehicles may also occur if required separation distances are violated.

Private Property

Impacts to private property may be required as part of the construction process, but will occur with the prior knowledge and approval of the landholder. Such impacts include cutting fences and installing temporary gates, and modifications to existing gates or driveways. Inadvertent damage is avoided where practicable and rectified if it occurs.

Mitigation Measures

Mitigation measures to reduce the effects of transport network disturbances include:

- planning equipment and material transport routes and storage areas in consultation with local and state authorities to minimise disruption to residents and industry;
- delivering equipment during daylight hours, where practicable;

- implementing a traffic safety management plan;
- boring or horizontal directional drilling sealed road crossings to minimise disruptions;
- planning road crossings to take place outside peak periods where practicable;
- reinstating open cut roads to the satisfaction of the local authorities;
- reinstating DIT roads, pavement, structures, shoulder, infrastructure and road reserves to the satisfaction of DIT, where works or damage occurs. Note: where DIT's roads and road reserves are impacted, SEA Gas will comply with relevant parts of the DIT Master Specifications (and any other requirements further advised by DIT) – refer link: https://www.dit.sa.gov.au/contractor_documents/masterspecifications/Roads
- Engaging with DIT for any works that may interface with a bridge/culvert and other road infrastructure and any future public road crossings or works or any requirement for DIT property easements/licences.
- Notifying DITs Traffic Management Centre (Ph. 1800 018 313) prior to undertaking any road works that would impact the arterial road network and ensuring contractor(s) complete a 'Notification of Works' form via the following link: https://www.dpti.sa.gov.au/contractor_documents/works_on_roads_by_other_organisations
- ensuring that where Restricted Access Vehicles (including over-size and over-mass vehicles and components) are proposed to be utilised in association with the pipeline, all necessary approvals/ permits are obtained from the National Heavy Vehicle Regulator. Refer link: www.nhvr.gov.au
- ensuring that project related traffic drives at slow speeds near residences;
- addressing any damage caused to roads by construction or associated activities; and
- erecting temporary gates across easements at all roads to reduce illegal entry.

Mitigation measures to reduce the effects of public utilities disturbances include:

- maintaining close liaison with utility companies to identify existing overhead and buried cables, lines, pipes, water mains;
- obtaining standard clearance from services from various authorities;
- incorporating services onto 'line lists' (see Section 6);
- using preventative flagging to mark the location of services and infrastructure; and
- appropriate earthing of equipment and pipe at established intervals.

Mitigation measures to reduce impacts to private property include:

- maintaining close liaison with all affected landowners;
- obtaining pre-construction agreement of the type and extent of impact to occur;
- appropriately noting agreed impacts or modifications on the Environmental Line List; and
- obtaining pre-construction agreement regarding strategies and responsibilities for rectification of, or compensation for, damage.

5.8.4 Public Safety and Risk

Pipelines are recognised as a safe and efficient means of transporting natural gas. However, all pipeline developments present some level of risk. SEA Gas manages risk using the qualitative Safety Management Study methodology described in AS 2885.6. A Safety Management Study was undertaken for the Pipeline System in accordance with AS 2885 during design and construction and the Safety Management Study is reviewed as part of pipeline operations.

Threat Identification, Risk Assessment and Controls

The Safety Management Study process involves the identification of threats to the Pipeline System along the entire length of the pipeline (non-location specific threats) and threats at particular locations (location specific threats).

For each credible threat, effective physical and procedural or design controls are identified and applied. Physical External Interference Protection measures (as defined in AS 2885) are given preference over design or procedural measures, as they are more effective at eliminating a threat (e.g. separation by burial to a depth that equipment used to perform an activity on the pipeline easement cannot reach).

Key External Interference Protection measures adopted for the Pipeline System are:

Physical

Penetration Resistance	Use of heavier wall pipe in a standard design or where a location specific threat required
Vertical Separation	Depth of Burial exceeds the minimum requirements of AS 2885 (In R1/R2 locations the minimum is 900mm and generally exceeds 1000mm, in T1 locations the minimum is 1200mm)
Barrier to penetration	Use of concrete slabs
Horizontal Separation	In areas of parallel underground services, or when crossing or parallel to overhead power lines
Exclusion	Secure fencing around above ground facilities.

Procedural

Landowner Liaison	Landowner Liaison programs
Pipeline Awareness	Pipeline awareness sessions for contractors, council planners and emergency services.
Planning Notification Arrangements	Agreement in place to ensure formal notification of any changes of ownership on land titles in which SEA Gas has an interest.

Work Procedures and Work Permits	Procedures are in place to govern how excavation is undertaken on the pipeline right of way.
Participation in a One Call Service	Dial Before You Dig
Easement Agreements	Easements have conditions that prevent landowners from carrying out work that may interfere with the safety of the pipeline.
Regulatory Processes	These apply stringent controls to construction of some assets (e.g. pipelines and flowlines).
Pipeline Patrols	Pipeline patrol and surveillance activities conducted in accordance with procedures, established patrol frequencies and patrolling requirements, related to specific risks on the Pipeline System.
Signage	Increased use of marker signs and use of marker tape where required.

The applied controls were considered effective when the risk of pipeline failure was no longer considered credible. Where a residual risk of pipeline failure was assessed, the mode of failure was determined and a risk assessment was undertaken in accordance with AS 2885.

Risks to Public Safety

The main threat to public safety resulting from the operation and maintenance of the Pipeline System has been determined to be third party damage causing an ignited gas release from a pipeline leak, or a full bore rupture, which in the worst case could potentially impact public safety within a radius of several hundred metres. A pipeline failure would also result in a short term impact of high noise levels and a release of gas at high velocity which would rise into the atmosphere. Any type of pipeline failure impacting public safety is considered to be a very rare event. There has not been a fatality from a pipeline failure in Australia in the history of pipeline operations.

For the South Australian section of the Pipeline System the events that have been identified as having the potential to cause a pipeline failure that impacts public safety are either lightning damage or damage to the pipeline from third party interference caused by:

- Water bore drilling in rural areas
- Horizontal Directional drilling associated with Major Projects in R1/R2 Areas
- Horizontal Directional drilling in the Gawler East area
- Cable ploughing for communication cables
- Large excavators in Northern Adelaide residential or industrial areas
- Vertical Bores for Major Projects in Northern Adelaide residential or industrial Areas
- Terrorism or Malicious Damage

Key Risk Mitigation Measures

Risks posed by third party interference during pipeline operation are managed by a pipeline safety education and surveillance program outlined in the SEA Gas Third Party Contact & Consultation Procedure.

Based on Safety Management Study outcomes, the key on-going operator risk mitigation measures are:

- Pipeline safety awareness programs targeted to educate contractors in the potential impact of unauthorised third party work on the safe operation of the Pipeline System. Higher risk third party activities include installation of other utilities using directional boring technologies and agricultural activities such as deep ripping and installation of fencing.
- Development and maintenance of a close working relationship with utilities and asset operators (e.g. SA Water, SA Power Networks, Australian Gas Infrastructure Group, Renewal SA, Councils, road and rail authorities, Telstra and other telecommunication providers) to ensure interference risks are managed for those sections of the Pipeline System in close proximity to other assets.
- Management of changed land use and assessment of impact upon Pipeline System operations (e.g. Tree Plantations, expanded sub-divisions, road construction).
- Landholder liaison programs to promote awareness of pipeline safety requirements and provide education on the requirement to consult with SEA Gas prior to commencing any activity along the Pipeline System easement which may compromise the safe operation of Pipeline System.
- Subscription to the Dial Before You Dig (DBYD) one-call asset referral service and provision of a timely response to enquiries and in-field requests for specific pipeline location and activity supervision services.
- Maintenance in accordance with SEA Gas Pipeline Integrity Management Plan, to actively manage integrity issues, both above and below ground, and to track parameters relevant to the pipeline physical condition such as Cathodic Protection measurements, coating condition, stress corrosion cracking and pressure cycles.
- Monitoring of terrorism threats, through notification procedures for parties operating critical infrastructure.
- Pipeline patrols (aerial and road) to monitor suspicious activity on the pipeline.

Monitoring and Review of the Safety Management Study

In accordance with *AS 2885.3 Pipelines-Gas and Liquid Petroleum: Operations and Maintenance*, the Safety Management Study and location classes along the Pipeline System are reviewed every five years, or when significant events occur. The original Safety Management Study provides the basis of these Safety Management Study reviews.

The Safety Management Study is regarded as a live document, and is reviewed when new or changed threats are identified and when patrol reports or other information indicate that the location classes along the Pipeline System or facilities may have changed. If necessary, new or additional mitigation

measures are specified and implemented, or location classes changed and mitigation measures subsequently reviewed.

The following processes are used to identify changes to existing, or emerging threats:

- Scheduled Safety Management Study Review;
- Pipeline system patrol reports;
- Engineering design changes;
- Operating condition changes;
- Third party activities (i.e. crossings, development or changed land use; maintenance of infrastructure, co-location of other assets within the easement);
- SEA Gas Operational Activities (i.e. pigging, subsidence or erosion repair, coating assessment & repairs, emergency/incident response);
- Pipeline Incident reports;
- Internal or external audits; and
- Corrosion and coating defect surveys.

Emergency Management

SEA Gas has an Emergency Response Manual that describes procedures in place to manage a pipeline emergency.

Main Line Valve facilities are located along the pipeline system to enable the pipeline inventory to be isolated and vented if required for either planned maintenance or in the event of an emergency. Each Main Line Valve consists of a buried valve, with an actuator and DN 150 above ground bypass pipework and valves. Two pipeline vents are also located above ground level.

In the unlikely event of a pipeline emergency, the venting facility enables rapid depressurisation of the pipeline, to ensure the safety of the public in the vicinity of the pipeline. This may be required to eliminate the hazard of a potential pipeline failure if the pipeline has been damaged, to eliminate the hazard of potential gas ignition and explosion if there is a gas escape, or to eliminate the fuel supply should there be an ignited gas escape and jet fire.

Once an emergency situation has ceased and access to the area is available, remediation measures would be put in place to restore the environment in accordance with post incident recovery strategies.

Construction

A detailed Safety Management Study would be carried out prior to construction of any new pipelines or facilities in accordance with the requirements of AS 2885.1 and AS 2885.6 and would result in the application of a combination of physical and procedural measures to ensure that the pipeline design, construction, operation, maintenance and management achieved appropriate safety standards.

The Safety Management Study process would involve the identification of all credible threats to the pipeline at all locations along its length. A location analysis would consider land use related activities (e.g. irrigated grazing, forestry, heavy industrial, vineyards and recreation) and crossing segments (e.g. main sealed roads, rail crossings, utilities and waterways).

All identified threats presenting an unacceptable level of risk would be mitigated through the adoption of design requirements under AS2885.1. Mitigation considers threats due to external interference (deliberate and accidental) as well as threats due to unsatisfactory design, construction, materials and operations. Threats due to natural events such as erosion and lightning are also considered.

During construction, a range of measures would be implemented to protect the public from potential hazards involved with construction activities, including signage and fencing to prevent public access to construction areas, fencing of excavations in locations near public roads or houses, implementation of fire prevention measures and implementation of traffic management at road crossings or entry points to the right-of-way.

5.8.5 Security of Supply

Natural gas delivered via the Port Campbell to Adelaide Pipeline (PCA) is used for residential, commercial and industrial purposes and predominantly used in South Australia as a fuel for electricity generation. Demand for gas-fired electricity is impacted by the extent of utilisation of alternative fuels such as renewable energy.

The PCA was developed to provide an alternative source of gas to South Australia to the Moomba-to Adelaide Pipeline (MAP) and to increase the security of supply. Supply from the PCA prevented critical gas shortages in South Australia when the Moomba gas plant was shut down due to a fire in 2004.

In 2015 a connection was completed to the MAP at Pelican Point which allows gas to be delivered from the PCA into the MAP increasing the security of supply to communities and industrial customers in the Riverland, Port Pirie and Whyalla and potentially increasing the security of gas supply to other delivery points that receive gas from the Moomba Gas Plant.

Gas pipeline facilities are designed to have high reliability by utilising a Hazard and Operability Study (HAZOP) to assess each design. Facilities are also remotely monitored using SCADA systems to monitor performance. The reliability of the compressors on the PCA plays a major part in the efficient, effective and reliable delivery of gas. SEA Gas has maintenance programmes and a remote monitoring system in place to track performance and ensure the reliable operation of compressor stations.

There is the potential for gas supply to be interrupted, however the potential impact to industry and the community would be alleviated by the alternative supply from the MAP for most customers. The Katnook Gas Plant in Mount Gambier recently recommenced operation increasing the security of gas supply to Mount Gambier and the south-east region by providing a second source of gas to that supplied by the PCA (via the third-party operated SESA Pipeline and South-east pipeline system).

Potential Causes of Security of Supply Incidents / Disruptions

Potential causes of an interruption to gas supply include the following:

- An equipment failure within a facility that prevents delivery or receipt of gas at a particular point. This is likely to be a short term interruption due to redundancy built into designs.
- A compressor failure that reduces the operating capacity of the pipeline. This would be managed by a reduction in shipper entitlements and would be unlikely to impact the general public.

- A gas quality incident, where gas received is not suitable for domestic supply. This is likely to be a short term impact and would be managed in accordance with SEA Gas procedures for handling off-specification gas.
- A pipeline integrity issue that requires the maximum allowable operating pressure of the pipeline to be reduced and therefore the capacity of the pipeline to decrease. This is likely to be a short term impact, as repair strategies would be enacted.
- A pipeline failure event, as discussed in Section 5.8.4.

A significant incident such as a pipeline rupture could take 1-2 weeks to repair. However, as discussed in Section 5.8.4, a rupture is a very unlikely event, particularly in a well constructed pipeline managed in accordance with AS 2885.

Key Risk Mitigation Measures

SEA Gas has an Integrity Management Plan in place that incorporates design practices and management systems to reduce the risk of a pipeline failure or a security of supply incident to As Low as Reasonably Practicable. This includes:

- ***Threat Mitigation, Monitoring and Risk Management* –** through undertaking HAZOPs during design and having a Safety Management Study, which identifies threats to the Pipeline System and mitigation measures, that is maintained in accordance with the requirements of *AS 2885*.
- ***Planned Maintenance Inspection and Repair* –** by undertaking routine inspection and maintenance to ensure that equipment continues to be fit for purpose.
- ***Maintenance of Safety Critical Equipment* -** identifying safety critical equipment and ensuring that it is maintained and tested against defined acceptance criteria.
- ***Corrosion Management, Inspection and Monitoring* –** by carrying out activities such as: in-line inspection, protective coating surveys, gas quality measurement, maintaining and monitoring an effective cathodic protection system, above ground corrosion surveys and heater and pressure vessel inspections.
- **Assessing and Repairing Defects** – by utilising approved processes to assess pipeline anomalies and repair pipeline defects.
- ***Management of Changes to Operating Conditions* –** through ensuring that changes to asset design, operating conditions, operating and maintenance procedures or safety critical equipment are managed through a structured change management system.
- ***Utilising Competent Personnel and Providing Training* –** by clearly defining responsibilities and accountabilities for all integrity management activities and ensuring that employees and contractors are competent to carry out the tasks for which they are engaged.
- ***Audit, Verification, Review and Continuous Improvement* –** reporting on the condition of assets and regularly reviewing key performance indicators to measure the effectiveness of the Pipeline Integrity Management Plan. Identifying and implementing opportunities to continuously improve the Pipeline Integrity Management System.

'Line pack' in the pipeline (the compressed gas in the pipeline) can provide gas to essential services for a period of time, so less significant incidents or shutdowns may not affect the community. On detection of an incident or impending incident that may impact the security of gas supplies, SEA Gas would alert gas shippers and take such measures as are within its control to mitigate the severity or consequences of the incident. These may include operating at a reduced pipeline pressure, alerting customers, so they can move to an alternate gas supply or fuel source, where applicable, conserving line pack and following any ministerial direction in relation to curtailment of customers.

5.8.6 Waste Management

Relatively small amounts of domestic and industrial waste are generated during pipeline operation and construction. The types of wastes generated as a result of pipeline operation and construction, along with options for disposal are detailed in Table 5-6.

Table 5-6: Typical wastes and disposal options

Waste Type	Disposal
Construction	
Packaging – ropes, cardboard	Licensed landfill / recycled
Used chemicals and oils – e.g. lube oil, spent x-ray film developer chemicals, used tins from solvents, rust proofing agents or primer	Licensed disposal facility
Scrap – welding rods	Recycle if practicable
Campsite wastes – putrescibles, paper, timber and plastic piping	Reuse or licensed landfill as applicable
HDD cuttings	Licensed landfill
Operation	
Filters (non-oily)	Licensed landfill
Filters (oily)	Licensed disposal facility
Sludge (pigging)	Licensed disposal facility
Packaging (maintenance)	Recycle if practicable, e.g. timber pallets

Camps (if established) require the provision of systems for the management of sewage wastes. These must be managed in accordance with the *South Australian Public Health (Wastewater) Regulations 2013* and the method of disposal for wastewater must comply with the South Australian On-site Wastewater Systems Code 2013. Where possible, camps would connect to the existing sewerage network, or may utilise septic tanks which would be regularly emptied by a licensed waste contractor. Packaged aerobic sewage treatment units that meet the Code may be utilised where practical and appropriate, and treated effluent may be irrigated to land, subject to the necessary approvals being in place.

Specific mitigation and procedural measures adopted for waste management include:

- developing specific waste management strategies for each waste stream prior to the commencement of any waste producing activities, based on the waste management hierarchy (Avoid, Reduce, Reuse, Recycle, Recover, Treat, Dispose);
- informing site personnel of the required waste management procedures and practices during the workforce induction program;

- covering of bins to prevent access by fauna and the spread of rubbish by wind;
- managing hazardous wastes, such as solvents, rust proofing agents and primer, in accordance with the requirements of relevant legislation and industry standards;
- implementing appropriate treatment and disposal of sewage wastes in accordance with the *South Australian Public Health (Wastewater) Regulations 2013* and the *South Australian On-site Wastewater Systems Code 2013;*
- implementing appropriate measures for hydrotest water disposal as discussed in Section 5.1.3;
- placing a high emphasis on housekeeping and cleanliness at the site and maintaining all work areas in a neat and orderly manner;
- collecting hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations;
- storing and handling chemicals in accordance with Section 5.8.7; and
- removing all waste material from the worksite on completion.

5.8.7 Hazardous Storage, Spill and Emergency Response

A variety of chemicals may be required on-site during pipeline maintenance and construction activities and will be managed in accordance with the SEA Gas Chemical Management Procedure. These include fuel, lube oils, solvents, rust proofing agents and primer. Potential impacts include contamination to soils and water resources and other environmentally sensitive values. Such impacts have been discussed in Sections 5.1, 5.2 and 5.3 respectively.

Mitigation Measures

Mitigation measures to reduce the effects of hazardous substances and spill events to the environment and third parties include:

- developing standard operating procedures for correct use of equipment to minimise the potential for spills;
- ensuring hazardous material is not stored or drained onto the ground or into watercourses or floodplains;
- storing all fuels and hazardous materials used on-site appropriately (e.g. storage in bunded areas in accordance with AS1940 and EPA guidelines for Bunding and Spill Management);
- avoiding vehicle refuelling in close proximity to watercourses (e.g. within 50 m);
- ensuring that materials and equipment required to respond to a hazardous spill are readily available;
- appropriately implementing clean-up / spill response procedures in the event of a spill;
- keeping material Safety Data Sheets for each chemical used on-site at a location that is easily accessible 24 hrs per day; and
- instructing all personnel in prevention, safety and response practices as a component of the environmental induction process.

6 Environmental Management

6.1 Pipeline Management System

The objective of SEA Gas Pipeline Management System is to ensure the safety and health of the public and persons engaged in the operation and maintenance of the Pipeline System, to protect the environment and to ensure security of gas supply. The pipeline management system is underpinned by policies, standards, plans, procedures and work instructions designed to mitigate risk to as low as reasonably practicable and to demonstrate compliance with the requirements of legislation and AS 2885.

SEA Gas' operating principle is to either meet or exceed the expectations of all stakeholders and to progress towards best practice through audit, review and continuous improvement processes. Setting and monitoring performance targets and key performance indicators and using them to drive improvement is an integral part of the SEA Gas business.

The key components of the pipeline safety management system are described by Figure 4.1.

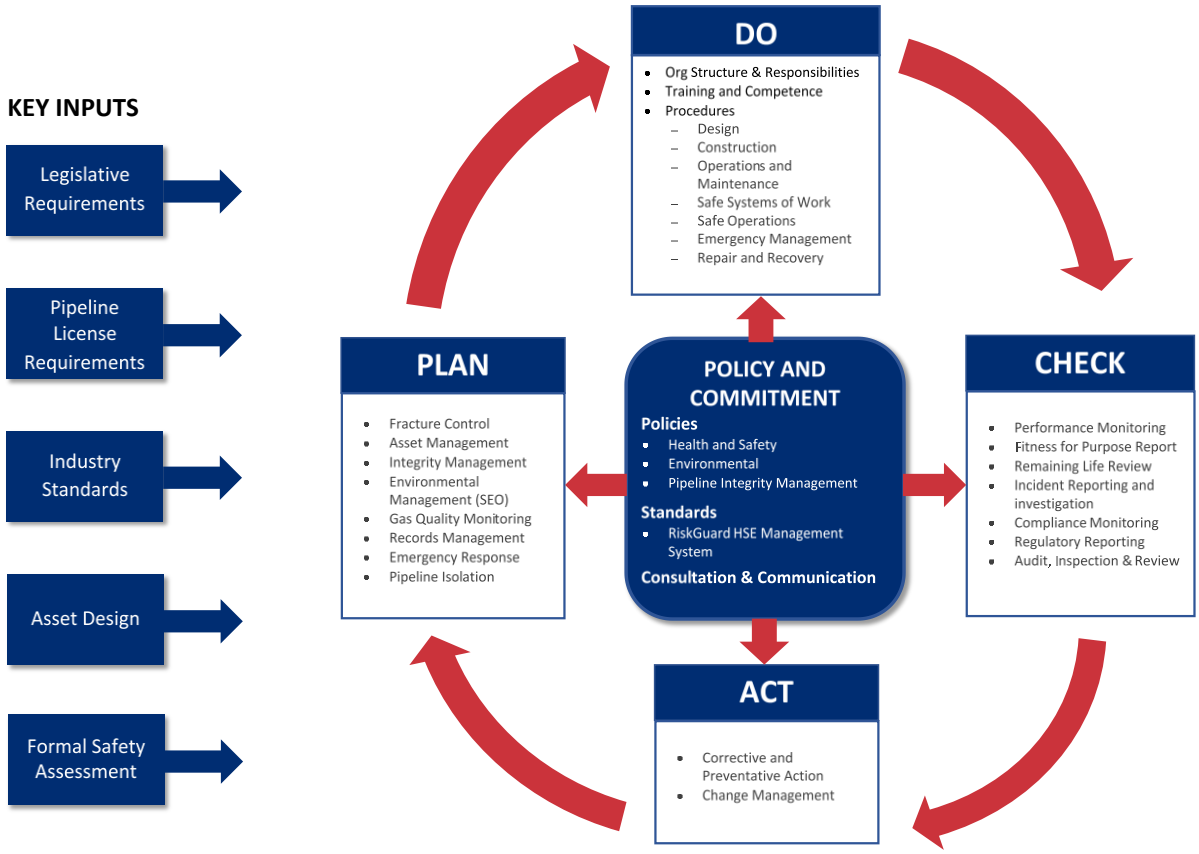

Figure 6-1: Components of the Pipeline Management System

6.1.1 Environmental Commitment and Policy

At SEA Gas the commitment to the environment has been established by the management team and demonstrated through the *SEA Gas Environmental Policy (OHSE-PO-002).*

SEA Gas Environmental Policy

At SEA Gas we value sustainability and operate our business with environmental responsibility.

We monitor the impact of our operations and are committed to achieving our environmental commitments. We seek to continuously improve our environmental performance and work respectfully with our stakeholders and host communities.

We believe that environmental stewardship is both a management obligation and the responsibility of every individual.

SEA Gas achieves its environmental objectives by:

- *Developing and implementing rigorous Environmental Management Plans;*
- *Promoting environmental awareness and responsibility amongst the workforce;*
- *Adopting a systematic and risk-based approach to environmental management (RISKGuard) to effectively manage hazards that could result in environmental harm;*
- *Monitoring its operations and ensuring compliance with environmental laws in the jurisdictions in which we operate;*
- *Reporting environmental hazards, near misses and incidents for learning and improvement; and*
- *Assessing new projects and investments for environmental benefit and contribution to sustainability.*

6.1.2 Responsibilities

SEA Gas is responsible for all aspects of environmental management of the Pipeline System. This includes conducting environmental audits of operational activities to ensure compliance with stated objectives.

SEA Gas has clearly defined roles and responsibilities for each member of the management team. Specific responsibilities and accountabilities for environmental, health, safety and risk management have been established for each position and form an integral part of the position.

The SEA Gas Responsible Officer ensures that the Pipeline System is safely operated and maintained, complies with legislative and pipeline licence conditions and provides reliable gas supply. The Responsible Officer is responsible for the Safety Case and implementation of the safety and environmental policy for the Pipeline System. This role has been assigned to the Chief Executive Officer. Review, and continual improvement of the Pipeline System Safety Case, Statement of Environmental Objectives and Environmental Management Plan has been assigned to the Head of Asset Management.

6.1.3 Environmental Management Plan

The SEA Gas Environmental Management Plan (EMP) details the operational activities connected with the Pipeline System, the risks to the environment arising from those operational activities and the processes that are adopted to eliminate or minimise those environmental risks by SEA Gas in relation to PL 13. The EMP meets the requirements for an Environmental Management Plan in Section 4.7 of AS 2885.3-2012, and also meets the requirements of an EMP under the Victorian *Pipelines Act 2005* for the Victorian section of the pipeline.

The principles of the EMP apply to all activities associated with the operation of the Pipeline System, including direct inspections, alterations or future decommissioning activities on the existing Pipeline System. Any significant future development of the Pipeline System (e.g. lateral pipelines) is outside the scope of the EMP and will be addressed by a separate Construction Safety Environmental Management Plan (CSEMP) as discussed in Section 6.1.11, which will include site specific requirements and be subject to separate approval.

6.1.4 Health, Safety and Environment Management Standards

The SEA Gas Health, Safety and Environmental Management System (RiskGuard) was introduced to the SEA Gas business in 2018 and is progressively being rolled out to provide a framework to ensure that SEA Gas meets its legislative obligations.

RiskGuard includes six environmental standards:

- HS 09 Chemicals, Biohazards & Dangerous Goods Management
- HS 13 Biodiversity and Land Disturbance
- HS 14 Waste
- HS 15 Pests, Plants and Animals
- HS 16 Cultural Heritage
- HS 17 Noise Emissions

6.1.5 Standard Operating Procedures

Comprehensive safety, environmental, operating and maintenance procedures have been developed by SEA Gas to enable safe operation of the Pipeline System. Procedures relevant to environmental management of the Pipeline System include:

- Incident and Hazard Management Procedure;
- Vegetation Clearance Procedure;
- Chemical Management Procedure;
- Washdown Procedure;
- Spill Response Procedure;
- Fire Prevention Procedure;
- Environmental Reinstatement Procedure;
- Pipeline Loss of Cover Repair Procedure
- Environmental Line List;
- Cultural Heritage Management Procedure;
- Revegetation Procedure;

- Abrasive Blasting and Painting Management Procedure;
- Contractor Pre-Qualification Procedure;
- Third Party Contact and Consultation Procedure; and
- Contractor Management Procedure.

These procedures and other documents are detailed in the EMP. Administrative reviews, workplace inspections, audits, hazard reporting and incident investigations, enable continuous improvements of these procedures.

SEA Gas also maintains an Environmental Line List for the Pipeline System, which details specific environmentally sensitive sites and environmental aspects which must be managed during operational activities.

6.1.6 Training and Induction

SEA Gas employees are required to be competent to manage the tasks to which they are assigned in the course of conducting routine work, non-routine activities and in the event of any unplanned or emergency situations. Performance reviews are undertaken and ongoing professional development activities are agreed with employees. Company, specialist and vendor training are provided, as appropriate for individual roles and responsibilities. Each employee has their own development plan and SEA Gas retains records of all training undertaken.

SEA Gas manages contractors in accordance with the Contractor Management Procedure. Prior to engaging any contractor, SEA Gas conducts an assessment of the contractor's safety and environmental management systems, competency and safety performance in accordance with the SEA Gas Contractor Pre-Qualification Procedure.

All new employees and contractors undergo a formal induction. During the course of all inductions, SEA Gas outlines its health, safety, environmental and regulatory compliance expectations and supporting policies and procedures. Project or job specific technical standards, guidelines or compliance requirements may be outlined to individuals or workgroups during the induction phase or during the course of job specific training.

6.1.7 Permit to Work System

A Permit to Work Procedure is in place to manage operational activities along the Pipeline System. All service providers, contractors and staff are required to request an appropriate permit to work based on the type of activity which they will be conducting on the Pipeline System.

6.1.8 Inspection, Monitoring and Auditing

SEA Gas measures and reports, on a monthly basis, the effectiveness of the company's safety, environmental and operational performance in accordance with Key Performance Indicators (KPIs), which include:

- Incidents, hazards and near misses;
- Overdue corrective actions;
- Permit to work exceptions;
- Driving exceptions;
- Planned and completed audits and workplace inspections; and

- Progress of procedure reviews.

Internal and external audits are conducted to assess and confirm legislative compliance with applicable Acts and Regulations, and conformance with the SEA Gas Safety Case. A report is produced for each audit and reviewed by management.

During construction, activities are regularly inspected and reported upon to ensure compliance with the CSEMP and other environmental requirements. SEA Gas will generally have a representative on site who would oversee implementation of environmental requirements as a component of their role. The construction contractor will also be required to implement, inspect and report on compliance with environmental requirements.

6.1.9 Records and Reporting

Pipeline System records are stored in accordance with the SEA Gas Records Management Plan and comply with the requirements of AS 2885 and the South Australian work health and safety regulations. Records include operations and maintenance reports that demonstrate compliance with the requirements of the Environmental Management Plan and associated legislation, policies and standards. A register is maintained of all Pipeline System design and construction documentation. SEA Gas records are backed up daily.

The following documentation is maintained to ensure legislative compliance and to assist in measuring ongoing key performance criteria:

- inspection and audit reports;
- environmental incident reports;
- reports of environmental incident investigations;
- land liaison and community consultation records;
- training records and competency assessments;
- contractor pre-qualification records;
- workplace health, safety and environmental statistics and performance records;
- records of any emissions and discharges of natural gas from the pipeline; and
- Greenhouse Gas and National Pollutant Inventory (NPI) reports.

The following information is reported to regulatory bodies as required by legislation:

- quarterly incident reports are submitted to the Energy Resources Group of DEM within one month after the end of each quarter, in accordance with Regulation 32(5) the *Petroleum and Geothermal Energy Regulations 2013;*
- serious incidents are reported as soon as practicable, in accordance with Section 85(1) of the *Petroleum and Geothermal Energy Act 2000;*
- an annual report on regulatory compliance and compliance with the Statement of Environmental Objectives is submitted to DEM, in accordance with Regulation 33 (1) of the *Petroleum and Geothermal Energy Regulations 2013;*
- two emergency response drills which practise the SEA Gas emergency response procedures are conducted and a report is submitted at intervals not exceeding two years, in accordance with Regulation 31 of the *Petroleum and Geothermal Energy Regulations 2000*; and
- a Fitness for Purpose Assessment is conducted every five years, in accordance with Regulation 30 of the Petroleum and Geothermal Energy Regulations 2013.

6.1.10 Preventative and Corrective Action

The purpose of the Environmental Management Framework is to identify and manage environmental risks and impacts. This is achieved through the elements described above. If unforeseen events or system failures occur, the EMP will provide for prompt identification, review and response, to minimise impacts and prevent reoccurrence. Formal reporting and corrective action include the use of non-conformance reports and corrective action requests.

6.1.11 Construction Safety and Environmental Management Plan

A project specific Construction Safety and Environmental Management Plan (CSEMP) will be produced for any new construction projects to provide information on the key control measures that will be implemented during the construction phase of the project to meet environmental objectives.

The CSEMP will be consistent with the APGA Code of Environmental Practice and will provide guidance on the environmental aspects and management of the environmental impacts of the construction activity. It will also provide a summary of legal and community requirements and the responsibilities of all levels of personnel involved in the activity.

The CSEMP may include the following information:

- Project overview;
- Environmental commitment;
- Statutory requirements and environmental legislation;
- Environmental aspects and impacts;
- Environmental objectives;
- Environmental responsibilities;
- Training requirements;
- Reporting;
- Auditing;
- Environmental Work Procedures; and
- Environmental Line List.

6.2 Environmental Objectives

The Statement of Environmental Objectives (SEO) described in Section 1.2 outlines the environmental objectives with which operational, construction and decommissioning activities must conform, and the measurable performance criteria upon which achievement of these objectives will be assessed. SEA Gas is committed to achieving its stated environmental objectives in regard to potential environmental or safety hazards.

7 Consultation

SEA Gas is committed to maintaining effective communication and good relations with all stakeholders.

Key stakeholders identified as having an interest in the environmental aspects the Pipeline System include:

- regulatory authorities and other relevant government agencies (State and Commonwealth);
- politicians / Ministers (State and Commonwealth);
- planning authorities;
- water crossing authorities;
- property owners / occupiers;
- local government;
- utilities operators and contractors;
- community groups;
- Aboriginal heritage groups and Native Title claimant groups;
- emergency services; and
- General public and media.

7.1 Consultation on 2001 EER / EIR

SEA Gas sought extensive stakeholder input into the planning and environmental assessment process for construction and operation of the SEA Gas pipeline. This involved active engagement with key stakeholders through a range of techniques including individual consultation, meetings, site visits, letters, facsimiles, information brochures, press releases and the Project Website. Consultation with stakeholders during the planning phase of the project allowed for early assessment of potential impacts and avoidance of sensitive areas.

A detailed summary of the consultation that was undertaken is provided in the original EER / EIR (SEA Gas 2001).

Following submission of the original EER / EIR (SEA Gas 2001) and accompanying SEO to the regulator, the level of impact of the proposed activities was assessed as ‘medium’. This classification required public consultation on the original EER / EIR and proposed SEO for a period from 27 October to 7 December 2001. Public comment and input from stakeholders was sought during this period.

A total of 21 submissions were received from South Australian stakeholders. A Supplement to the Environmental Impact Report and Statement of Environmental Objectives (SEA Gas 2001a) was then prepared in response these submissions.

Following project approval, all documentation was entered onto a public register (the DEM website) to ensure readily available public access.

Targeted consultation was also undertaken for the Pelican Point Extension, Coomandook compressor station, Naracoorte Lateral, Jervois Lateral and Bolivar Lateral. Stakeholders consulted included landholders, local councils, relevant government agencies, Aboriginal heritage groups and utilities operators. Further detail is provided in the relevant EIRs (SEA Gas 2002a, SEA Gas 2002b, SEA Gas 2004a, SEA Gas 2004b, RPS 2013).

7.2 Consultation on 2015 EIR Update

The EIR, as revised in 2015 (SEA Gas 2016), was submitted to the Department of State Development, Energy Resources Division and consultation was sought from relevant government agencies. After submission of this revision of the EIR and accompanying SEO to the regulator, the level of impact of the proposed activities was assessed as 'low'.

Through EIR consultation, comments were received from:

- Department for Health and Ageing;
- Department of Environment, Water and Natural Resources;
- SafeWork SA;
- Department of Planning, Transport and Infrastructure;
- Aboriginal Affairs and Reconciliation; and
- Environment Protection Authority.

A summary of the consultation comments received, and the SEA Gas response is provided in Appendix B.

7.3 Consultation on 2020 EIR Update

The EIR, as revised in 2020, was submitted to the Department for Energy and Mining, Energy Resources Division and consultation was sought from relevant government agencies. The level of impact of the proposed activities was again assessed as 'low'.

Through EIR consultation, comments were received from:

- Department for Infrastructure and Transport;
- Department for Environment and Water; and
- The Environment Protection Authority.

A summary of the consultation comments received, and the SEA Gas response is provided in Appendix C.

7.4 Ongoing Consultation

SEA Gas maintains regular contact with landholders and other directly affected stakeholders in accordance with the SEA Gas External Interference Management Plan and Third Party Contact and Consultation Procedure. Consultation for the Pipeline System is an ongoing process, and SEA Gas will continue to facilitate discussion with all stakeholders for the lifetime of the pipeline. The outcomes of consultation with landowners have been considered in this update to the EIR.

SEA Gas maintains up to date records of all landholders along the pipeline route. A list of landholders has been previously provided to DEM, and updates are provided as requested.

Stakeholders that are engaged with on a regular basis include landholders, local councils, planning authorities and property developers, utility operators, emergency services, utility operators and contractors. The ongoing consultation undertaken is summarised in Table 7-1.

Table 7-1: Ongoing consultation for pipeline operation

Stakeholder	Consultation
Regulatory agencies (DEM, EPA)	Regular contact regarding pipeline activities. Notification of any major work. Compliance meetings, incident reporting, annual reporting.
Planning authorities and property developers	Annual contact with Renewal SA, the Department of Infrastructure and Transport and the Department of Planning and local Government. Presentations detailing requirements for planning and development around pipelines are provided on a 2-5 year basis depending on the level of development activity, or when requested.
Water Crossing Authorities	Five yearly, or as required communication.
Property owners / occupiers	Direct contact at least once per year. Owners pack provided to new landholders (includes welcome letter, Pipeline Awareness brochure, landowner datasheet and SEA Gas contact information). Notification of access to the easement (7 days for routine maintenance, 21 days for major repair work).
Local government	2-3 yearly pipeline awareness presentations.
Utilities operators	Two yearly contact with utility operators that may impact on the pipeline easement via email, telephone, mail outs and / or pipeline awareness presentations.
Contractors	Three yearly contact with Tier 1 and 2 contractors that use equipment capable of impacting the pipeline via pipeline awareness presentations. On site communication with other contractors prior to commencing work.
Emergency services	Two yearly Incident awareness training.

7.5 Consultation for New Construction or Major Operational Projects

SEA Gas will actively seek input from stakeholders for any new construction or major operational projects throughout the planning and approval process.

The level of consultation required and the stakeholders involved will depend upon the nature and scale of the proposed activity. For small projects (e.g. a short lateral to a single end user) consultation would typically be limited to those stakeholders that are potentially directly impacted (e.g. landholder, local council, regulatory agencies, Aboriginal heritage groups).

Table 7-2 provides an overview of typical consultation that would be undertaken for a new construction or major operational project.

Table 7-2: Typical consultation for a new construction or major operational project

Stakeholder	Typical consultation for a new construction or major operational project
Landholders	Provision of information regarding potential activities and impacts Easement negotiations Provision of notices of entry as required Managing / minimising disturbance

Stakeholder	Typical consultation for a new construction or major operational project
Local council	Overview of project and potential impacts Crossings of roads and council land Specific issues as required
Local community	Provision of project information and contact details (e.g. via local newspaper) Direct consultation (e.g. community presentation) where appropriate
Regulatory agencies (e.g. DEM, EPA)	Discussion / notification of potential activities Preliminary survey licence application where required Licence variations and approvals Regulatory notifications / approvals as required
Other government agencies (e.g. DEW, Landscape Boards)	Issue by issue as required (e.g. native vegetation or watercourse crossings if present)
Aboriginal heritage groups and native title groups	Presence of sites / places of significance Cultural heritage survey where required (e.g. previously unsurveyed areas)
Utilities operators	Location of services Management of intersecting easements / infrastructure Disturbance management
Emergency services	Awareness of project Management of specific issues (e.g. traffic management) Incident preparedness
Other	As required dependent on scope and scale of project

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9 Abbreviations

AMLR	Adelaide and Mount Lofty Ranges
ALARP	As Low as Reasonably Practicable
ANZECC	Australia and New Zealand Environment and Conservation Council
APGA	Australian Pipelines and Gas Association (previously APIA)
API	American Petroleum Institute
APIA	Australian Pipeline Industry Association (now APGA)
AS 1940	The Storage and Handling of Flammable and Combustible Liquids
AS 2885	Australian Standard AS 2885: Pipelines - Gas and Liquid Petroleum
CAMBA	China-Australia Migratory Bird Agreement
CSEMP	Construction Safety and Environmental Management Plan
DEH	Department for Environment and Heritage
DoE	Department of the Environment (Commonwealth)
DEM	Department for Energy and Mining
DEW	Department for Environment and Water
DGLC	Design Ground Level Concentrations
DN	Nominal Diameter of pipe (e.g. a DN350 pipe has a nominal diameter of 350 mm)
DIT	Department for Infrastructure and Transport
DPTI	Department of Planning, Transport and Infrastructure (In 2020 became Department for Infrastructure and Transport and Department for Planning and Local Government)
DSD	Department of State Development
EER	Environment Effects Report
EIR	Environmental Impact Report prepared in accordance with Section 97 of the *Petroleum and Geothermal Energy Act 2000* and Regulation 10
ELL	Environmental Line List
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERW	Electric Resistance Welded
FBE	Fusion Bonded Epoxy
GLC	ground level concentration
ha	hectare
HDD	Horizontal directional drilling
HDPE	High Density Polyethylene
HSEMS	Health, Safety and Environmental Management System
hydrotest	hydrostatic testing
ISO	International Standards Organisation

JAMBA	Japan-Australia Migratory Bird Agreement
km	kilometre
KPag	kilopascal Gauge
m	Metre
MD	measured distance
mg/L	milligrams per litre
MLV	Mainline valves
mm	millimetre
MPa	Megapascal
NEPM	National Environment Protection Measure
NGER	*National Greenhouse and Energy Reporting Act 2007* (Cth)
NPI	National Pollutant Inventory
NRM	Natural Resource Management
NVC	Native Vegetation Council
PCA	Port Campbell to Adelaide High Pressure Natural Gas Pipeline
PL	Pipeline Licence
PRMS	Pressure Reducing Metering Station
RAAF	Royal Australian Air Force
SAMDB	South Australian Murray Darling Basin
SCADA	Supervisory Control and Data Acquisition
SCC	System Control Centre
SEA Gas	South East Australia Gas
SEB	Significant environmental benefit
SEO	Statement of Environmental Objectives prepared in accordance with the *Petroleum and Geothermal Energy Act 2000*
TJ	Terajoule

10 Glossary

bellhole	An enlarged area of trench
berms	Banks of soil placed on slopes to prevent erosion.
bund	An earth, rock or concrete wall constructed to prevent the inflow or outflow of liquids.
cathodic protection system	Application of an electrical current to the pipeline exterior to prevent the electrochemical process of corrosion occurring.
clear-and-grade	The preparation of the right-of-way for vehicular movement, trenching and other construction activities, involving clearing vegetation and other obstacles from the right-of-way, grading topsoil to the edge of the right-of-way, and creating a safe working surface (and slope) for construction.
compressor station	Facility where gas is compressed and reinjected into the pipeline.
easement	A right held by the proponent to make use of the land for the installation and operation of a pipeline. Also referred to as a right-of-way.
Environmental Line List	A list of sites along the easement that details site-specific environmental issues and/or site-specific environmental management measures that must be implemented.
fugitive emissions	Substances that escape to air from a source not associated with a particular process, such as leaks from equipment.
grading	Levelling of the right-of-way using graders, backhoes and bulldozers.
ground level concentration	Measured or estimated concentration of a pollutant at ground level.
horizontal directional drilling	One method by which a pipeline trench is drilled at a shallow angle under a crossing (i.e. a stream bed, major road, some geological features) through which the pipe is threaded.
hydrostatic testing (or hydrotesting)	A means to check the pipeline for strength and leaks prior to operation in which the pipeline is filled with water and the pressure increased and monitored under controlled conditions.
lateral	Lateral pipelines are pipelines which branch off the main pipeline, and are usually smaller in diameter than the main pipeline.
lunette	A crescent-shaped dune formed on the shoreline of a lake or playa (ephemeral lake) by the interaction of wind, waves and currents.
mainline valves	Valves located in the pipeline at intervals along its length.
meter stations	Facility where the flow of gas is measured, particularly where gas is to be reticulated or transferred to local gas users.
padding	Fine grained soil placed in the trench to protect the pipeline coating from rock damage.
pig	A tool which is inserted into the pipeline and carried by the gas flow to clean the pipe wall, separate the gas, or inspect the pipeline.
pigging	use of pipeline inspection gauges or 'pigs' to perform various maintenance operations on a pipeline, including cleaning and inspecting the pipeline.
Pipeline System	The Port Campbell to Adelaide Pipeline associated laterals as described in PL 13 (SA).
pipeline alignment	The exact position of the pipeline (or easement) within the corridor.
regulated activity	Defined by Section 10 of the Petroleum and Geothermal Energy Act 2000 and includes operation of a transmission pipeline for carrying petroleum or another regulated substance, and operations and activities reasonably necessary for, or incidental to that activity.

right-of-way	A cleared area approximately 25 metres wide required to install the pipeline. Also referred to as an easement.
scraper station	An above ground facility used to launch and receive pigs which have been inserted into the pipeline system.
stringing	Laying the pipe adjacent the pipeline trench.
trench spoil	Soil from the pipeline trench.
turbidity	Interference with the passage of light through water caused by suspended matter.

Appendix A – Environmental Impacts Assessment

The following table is taken from the SEA Gas Pipeline System Environment Management Plan. It provides a summary of potential environmental impacts and mitigation strategies for pipeline operational activities. Additional detail on mitigation strategies is provided in the relevant section of the EIR.

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
Easement Maintenance												
1	Weed Control	Environmental weeds are mechanically removed or sprayed with herbicide in and around compounds to reduce fire risk and to ensure that line of sight is maintained in accordance with the requirements of AS 2885. Herbicide application is restricted and only applied by trained and certified operators. High risk environmental sites are restricted to mechanical removal.	If required, likely to be confined to small areas along the easement. Conducted at CP test posts and where pipeline marker signs are visually compromised.	Occurs as required, primarily to preserve line of sight and to reduce accumulation of fire fuel loads.	NIL	Possible contamination of shallow groundwater or surface water is not likely due to use of non-residual herbicides. Residual herbicide use restricted to hardstand areas and herbicide selection restricts off-site migration. Spraying is consistent with ongoing agriculture and forestry practices. Spraying in wet conditions is avoided.	Destruction of target weed species. Minor impact to non-target species within the immediate vicinity is avoided by use of "bush care" techniques.	NIL	Minor air and noise emissions from vehicles are limited to the immediate vicinity of the activity.	Residual herbicide is only used after consultation with landholders/land users prior to use.	NIL	NIL
2	Line-of-sight clearance	Vegetation trimming and removal along the easement to maintain line-of-sight is restricted to regrowth species in predominantly cleared agricultural or forestry land. Trees retained on the easement during construction will not be removed, however it may be necessary to trim or remove trees that regenerate within 2m of the pipeline as they pose a threat to pipeline integrity.	If required, likely to be very small areas (e.g. isolated road crossings).	May be required every 2 - 5 years.	Understorey growth is permitted to revegetate across the easement to minimise impacts of erosion.	NIL	Permanent removal of any regenerating trees within 2m of the pipeline centreline at the small number of sites with remnant native vegetation. Understorey growth is permitted to revegetate across the easement.	NIL	Minor air and noise emissions from vehicles. Noise also associated with machinery used to clear vegetation (e.g. chainsaws). Impacts are minor and temporary and only occur during the site specific activity.	Short term access to land required which may cause minor temporary impact to landholders and land use within the immediate area of the activity.	May be undertaken on roadsides, but unlikely to impact public risk & safety	NIL
3	Pipeline patrols, coating surveys, easement inspections and easement access	Travelling along easement, on private/public roads or over cleared paddocks. Involves access to private property and use of private tracks. Scheduled patrols are generally restricted to road crossings on public land. DCVG survey involves walking the length of the pipeline.	Entire length of pipeline easement.	Easement inspections can be carried out on a weekly to 3 monthly basis. Access to the pipeline over cleared paddocks only occurs when access to a particular pipeline section is required (e.g. for maintenance or monitoring) and not on a continuous basis. Coating surveys are carried out every five years.	Soil compaction is not generally considered an issue as formed tracks are used for vehicle access. May be an issue for survey off road vehicle access. Vehicles are not parked under trees for extended periods.	NIL	Patrolling, easement access and coating surveys have the potential to spread weeds, pathogens and diseases. SEA Gas has implement control measures to ensure that this risk is minimised. (Refer Washdown Procedure (OHSE-PR-008). Vehicle collision with native fauna.	NIL	Temporary minor impacts from dust generation, vehicle emissions and noise. These are limited to the immediate area of the activity. Vehicles will be driven at low speed to minimise generation of fugitive dust emissions.	Temporary disturbance while personnel traverse properties.	Access and patrolling the easement does not impact on public safety. Public roads will be used but these vehicles create no greater risk than other vehicles on the roads.	NIL

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
4	Aerial inspection of easement	Aerial inspections of pipeline easement. No rotary wing (helicopter) landings along the easement unless immediate safety concerns are observed.	Entire length of pipeline easement	Aerial inspections carried out monthly (fixed wing). Additional helicopter survey may be required after extreme weather event.	NIL	NIL	NIL	NIL	Temporary and minor noise disturbance from passing aircraft.	Potential for temporary disturbance of stock. Aircraft travel at a safe height to prevent significant disturbance.	NIL	NIL
5	Erosion and subsidence repairs	Following major rainfall events water courses or run-off areas along the easement may experience soil erosion. Repairs effected following erosion events include the replacement of similar materials and re-profiling (e.g. installation of berms or additional vegetation) to minimise further impact.	If erosion occurs, likely to be restricted to isolated sections of the easement near creek lines or on sloping terrain.	Unlikely to occur once easement is fully stabilised by vegetation, particularly as the terrain is relatively flat.	Erosion events may result in the loss of topsoil and exposure of subsoil in the impacted area. SEA Gas will undertake easement inspections following significant rainfall events to ensure that erosion events are detected and repaired.	Erosion events have the potential to increase sediment load of adjacent watercourses.	Potential impact to vegetation may occur in association with erosion and sedimentation. As stated, this risk is minimised through control structures and effective detection and repair.	Erosion events tend to occur on the easement and are therefore unlikely to impact on known cultural heritage sites (these are located off the easement). Erosion events may unearth previously unidentified cultural material which will be managed in accordance with *Cultural Heritage Management Procedure (OHSE-PR-019)*	NIL	NIL	NIL	NIL
Pipeline Operations												
6	Pipeline Incident / Emergency	A pipeline incident or emergency could arise from a threat to public safety or to the security of gas supply. The main threat to public safety during operation and maintenance of the Pipeline System has been determined to be unauthorised third-party damage causing an ignited gas release from a pipeline leak, or full-bore rupture. There may also be circumstances where the pipeline has been damaged, and it becomes necessary to reduce the pipeline Maximum Operating Pressure impacting pipeline capacity. Corrosion is another threat that could result in a pipeline gas escape. SEA Gas has completed a risk assessment in accordance with AS 2885.6 to ensure that	In the worst case a pipeline full bore rupture could potentially impact public safety and the environment within a radius of approximately 585m of the pipeline. However, in many sections of the pipeline there are no threats capable of causing a full bore rupture There is also the potential for a pipeline incident or emergency to impact the security of gas supply.	Any type of pipeline failure impacting public safety is considered to be a very rare event. There has not been a fatality from a pipeline failure in Australia in the history of pipeline operations. The actual impact of a pipeline failure incident would be dependent on the nature and scale of the incident.	A major pipeline failure during operation that involved pipeline rupture would result in localised soil disturbance during the incident and would require subsequent rehabilitation.	A major pipeline failure that occurred in the vicinity of a waterway or an area of high water table would result in short term sediment discharge, modification of surface drainage and potentially impact third party use of surface water and may require subsequent remediation.	A major pipeline failure resulting in release of gas at high velocity or an ignited gas release could result in localised vegetation damage if it occurred in or near an area of native vegetation. Noise and emissions from a gas escape would result in disturbance to local fauna. In the event of ignition of a pipeline gas escape the impact on local fauna (including livestock) would be similar to that of a bushfire for a distance up to several hundred meters from the pipeline failure and could include loss of habitat.	Cultural Heritage impacts would only apply to the sections of the pipeline route where cultural heritage sites have been identified. As the actual pipeline route avoided the identified sites it is very unlikely that the sites would be impacted by a pipeline failure. The resultant impacts from radiant heat are likely to be low.	A pipeline failure would result in a short term impact of high noise levels and a release of gas at high velocity which would rise into the atmosphere.	Damage to infrastructure and short term interruption to third party use of land is possible in the event of a pipeline failure and is likely to require remediation.	The main threats to public safety from pipeline operation and maintenance are fire, explosion or heat radiation exposure as a result of pipeline rupture. Emergency venting facilities were located away from residential areas in the initial design to reduce noise impacts. Where change of land use increases the risk to public health and safety due to noise impacts from pipeline venting, additional controls are identified through further	A pipeline incident could result in gas shortfalls for up to 7 days impacting a number of customers. All major customers other than those supplied directly via the SESA Pipeline in Mount Gambier have access to an alternate gas supply.

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
		the pipeline design has reduced risks associated with a pipeline failure to As Low As Reasonably Practicable (ALARP). SEA Gas has an Emergency Response Manual (TECH-MAN-011) that describes procedures in place to manage a pipeline emergency. Once an emergency situation has ceased and access to the area is available, remediation measures would be put in place to restore the area in accordance with post incident recovery strategies.									assessment and implemented by the responsible party to ensure the risk remains ALARP. Emergency venting or pipeline gas escape will result in very high noise levels. Venting facilities were located away from populated areas to reduce noise impacts.	
Pipeline Maintenance												
7	Cathodic Protection (CP) Surveys	Travelling easement, stopping to inspect Cathodic Protection test points (above-ground post) on foot. May involve repairs – see activity #10	Cathodic Protection test posts are located along the entire length of pipeline easement, usually on fence lines to reduce impact to land use.	Six monthly inspection between Williamstown and Pelican Point. Annual inspection of the full pipeline.	As per Activity 3 Patrolling.	NIL	As per Activity 3 Patrolling	NIL	As per Activity 3 Patrolling.	As per Activity 3 Patrolling	As per Activity 3 Patrolling.	NIL
8	Excavations - coating / pipeline inspection or refurbishment - installation and / or maintenance of anode beds - new tie-ins	Vegetation (typically introduced pasture grasses) is cleared. Topsoil is stockpiled. Excavation performed and spoil stockpiled separately from topsoil. Pipeline maintenance performed (may include welding, painting, and abrasive blasting). Backfill of trench spoil. Topsoil replaced. Surface re-contoured to original profile. Compacted areas are ripped as required. Respread of vegetation and seeding or planting as required. (Refer *Pipeline Excavation Procedure (TECH-PR-013)*)	Pipeline excavations along the easement are typically 10 metres square (benching is required to comply with WHS requirements to ensure excavation stability) and 2 metres deep, located entirely on the easement. In extreme cases, excavations can be 20 - 50m metres long.	Excavations may be required after construction to rectify pipe or coating defects. It is estimated that there may be approximately 5 - 10 excavations every two years.	Topsoil and subsoil are disturbed by excavation, with a potential for loss of topsoil or soil inversion. Impacts to soil are minimised through the implementation of site specific management measures. Mitigation measures include: Separating topsoil and subsoil during excavation and backfilling soil in the correct horizons. Screening for potential acid sulphate soils (PASS) is undertaken if required (following desktop review) and if confirmed, store PASS in bunded area and treat with lime prior to backfill.	Where required, surface water (minor creeks and drain lines) may be temporarily dammed and diverted to enable excavations to proceed, following consultation with the local Catchment Management Authority (CMA). Primary mitigation is avoiding such areas when wet. Silt barriers to be installed when there is a risk of sedimentation from excavations or during temporary diversions.	Crop / pasture / vegetation clearance is generally confined to the easement and limited to the area of excavation and 5 - 10m beyond for storage and stockpile area. Excavations which must be initiated within areas of significant flora or fauna (Ref. ELL) along the pipeline route shall be subject to pre-start environmental assessment in accordance with *Vegetation Clearance Procedure (OHSE-PR-005)*. The area of disturbance will be limited to that required for the safe conduct of the activity. Cleared vegetation will be respread over the easement during restoration. Regrowth is ultimately dependent on seasonal conditions. Seed and fertiliser (where appropriate)	No impact to known heritage sites due to the implementation of effective management measures. There is limited potential for accidental discovery of previously unknown sites. Heritage material to be managed in accordance with *Cultural Heritage Management Procedure (OHSE-PR-019)*.	Minor transient air and noise emissions from plant and machinery. Impacts are minor and temporary and are restricted to the short duration of the site specific activity.	Impacts to land use are limited to the area of disturbance. In some instances fences are temporarily modified in consultation with landholders to permit site access. Any impacts to landholders and land use are generally restricted to the short duration of the activity.	Only an issue if carried out on or near public roads or near houses. Operational areas will be appropriately fenced (and signed) to isolate any potential hazard (e.g. deep excavation).	NIL

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
							will be spread to assist regrowth. Fauna impacts are primarily associated with vegetation clearance and noise generated during site activities.					
9	Pigging	Pipeline 'pig' inserted into pipeline via a launcher. Pig travels within pipeline before being removed at a downstream pig receiver. Removal of pig from pipeline results in minor venting of gas to atmosphere and collection of any hydrocarbon liquids or solid debris.	Activity confined to pig launcher and receiver facility located within Pressure Reduction & Metering Stations (PRMS).	Intelligent pigging program to include scheduled pigging at maximum intervals of 7-10 years.	Pigs are inserted and removed within a bunded area, enabling collection (for disposal) of hydrocarbon liquids or solid debris. Gas is filtered prior to entering the pipeline resulting in low risk of hydrocarbon liquid entry.	Pigs are inserted and removed within a bunded area, enabling collection (for disposal) of hydrocarbon liquids or solid debris. Gas is filtered prior to entering the pipeline resulting in low risk of hydrocarbon liquid entry.	NIL	NIL	Minor controlled release of methane during removal of the pig. Vented gas data is recorded in Greenhouse Gas Inventory (Ref. *Gas Loss Report (TECH-F-017)*). Refer also to Activity 18 Emissions.	NIL	Activity will be restricted to fenced and secure sites.	NIL
10	Welding	Welding is usually required when undertaking repairs to pipeline infrastructure or during modifications to existing infrastructure. Pipeline welding usually occurs above ground or following the excavation of the pipeline.	Within existing (or new) above ground facilities or on excavated pipeline sections. Excavated pipeline sections are dependent upon length of pipeline under repair or specific location.	Undertaken only as required on an infrequent basis.	NIL	NIL	The risk of bushfire as a result of welding is minimised through the implementation of strict management measures as described in the *Fire Prevention Procedure (OHSE-PR-011)* Welding will not be initiated during a Total Fire Ban.	NIL	NIL	Welding activities will occur following consultation with landholders or land users.	Welding screens will be erected to prevent UV exposure in accordance with WHS compliance requirements.	NIL
11	Pipeline coating repairs	Affected areas are abrasive blasted to remove corrosion and to prepare surface prior to coating or tape wrap application. Sleeves, tape or chemical coverings are expected to be used to repair the pipeline protective coating or at weld margins along the pipeline or at above ground facilities. Epoxy enamel paint coatings may be applied (sprayed) at above ground facilities to ensure protective coating integrity.	Dependent upon length of pipeline under repair. Above ground facilities, within controlled areas.	Completed as required, activity duration does not typically exceed two days.	Refer 12 for Abrasive Blasting. Potential for minor contamination from cleaning agents (and overspray if epoxy paint used).	Potential for minor contamination from cleaning agents (and overspray if epoxy paint used)	NIL	NIL	Minor noise emissions associated with operation of plant and equipment within existing operational areas at above ground facilities and along restricted sections of the pipeline easement.	NIL	NIL	NIL
12	Abrasive Blasting	High-pressure abrasive surface blasting of pipe work prior to painting. Undertaken for pipeline inspection or for pipeline coating systems	Area of exposed pipe	Abrasive blasting completed as required, activity duration is less than 2 hours.	Abrasive blasting is carried out in accordance with SEA Gas *Abrasive Blasting and Painting Procedure (OHSE-PR-022)* Abrasive blasting media is silica free. Minor contamination from abrasive media, the	Minor contamination from abrasive media, the majority of which is usually captured for subsequent disposal.	NIL	NIL	Short duration dust generation from blasting activity. Minor noise emissions associated with blasting, restricted to the short duration of the activity.	NIL	NIL	NIL

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
					majority of which is usually captured for subsequent disposal.							
13	Replacement of pipeline section	For planned replacement, a hot tap and stopple could be utilised to maintain gas supply. For emergency replacement, a section of the pipeline is isolated and a controlled release of gas is vented from the affected section. The affected area is then excavated, old pipeline removed and replaced (includes welding, abrasive blasting, and coating). The excavation is then reinstated.	Generally, less than 100m section of pipe excavated.	This is a very rare activity that would only normally be initiated in response to unauthorised third party damage. Activity usually lasts for approximately 2 weeks.	Refer to Activity 8, 11 and 12 Excavations, Pipeline Coating Repairs and Abrasive Blasting.	Refer to Activity 8, 11 and 12 Excavations, Pipeline Coating Repairs and Abrasive Blasting.	Refer to Activity 8 and 10 Excavations and Welding.	Refer to Activity 8 Excavations	Controlled release of methane to atmosphere occurs upon isolation of the pipeline section. Large quantities (10-100 TJ) of gas are vented over a relatively short period of time (in the order of 1-6 hours). When venting occurs noise levels are extremely high, with an unattenuated peak sound power level of 160-170 dB(A) at the source and predicted likely noise levels at 100m of 135 L_{Cpeak} dB(A) and 108 $L_{Aeq,8Hr}$ level, dB(A_l). Vented gas data is recorded in Greenhouse Gas Inventory (Ref. Gas Loss Report (TECH-F-017)). Refer also to Activity 18 Emissions.	Refer to Activity 8 and 10 Excavations and Welding	Refer to Activity 8 and 10 Excavations and Welding	Refer to Activity 6
Facility Operation and Maintenance												
14	Station Maintenance	The Pipeline has Pressure Reducing and Metering Stations, Main Line Valve facilities and Scraper Stations. Stations may contain station limit valves, filters, metering and gas analysis equipment, gas heaters and pressure reduction / flow control equipment, pig launcher / receiver facilities or MLV facilities.	Stations are contained within fenced compounds that vary in size, but are typically no larger than 150m x 150m.	Continuous operation.	Minor hydrocarbon spills associated with gas over oil actuators at MLVs, valve maintenance or breaking pipework. These minor spills are cleaned up immediately and contained within fenced facilities. Gas is filtered prior to entering the pipeline resulting in low risk of	NIL	NIL	NIL	Minor noise emissions associated with pressure reduction in pipe work. Major sites adjoin surrounding production or power generation facilities.	NIL	NIL	Unplanned maintenance could impact on gas supply to a single customer. Planned outages required for maintenance are

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					hydrocarbon liquid entry into pipework. Potential for heater overflow of water containing corrosion inhibitor.							coordinated with customers to minimise impact.
15	Weed Management	Environmental weeds are mechanically removed or sprayed with herbicide in and around compounds to reduce fire risk and to ensure that line of sight is maintained in accordance with the requirements of AS 2885.	Conducted within PRMS facilities.	Weed control typically occurs twice per year (additional control as required) and is applied during still conditions to prevent off site drift.	Herbicide application is restricted and only applied by trained and certified operators. High risk environmental sites are restricted to mechanical removal.	Not conducted in close proximity to water courses. High risk environmental sites are restricted to mechanical removal.	Weed species are targeted. Minor temporary impact to non-target species may occur within the immediate vicinity.	NIL	Refer to Activity 1 Weed Control.	Use of residual herbicides is carried out after consultation with landholders.	Activity ensures enhanced public safety.	NIL
16	Production of Hazardous Waste	Waste hydrocarbons generated from maintenance or pigging operations, liquids and heavy metals (e.g. mercury) are not expected in the waste stream, but if present would be trapped in coalescing / dust filters. Contaminated filters from maintenance change-overs are bagged and stored on site within a bunded area prior to offsite recycling and disposal by EPA certified waste contractor. Filters and other waste material is recycled by waste removal contractor.	Minor amounts, typically filter elements. No (inconsequential) liquid hydrocarbon 'drop-out' is expected due to the composition of gas which is injected into the pipeline.	Waste stream is infrequent. Solid and liquid wastes are stored on site prior to collection for off-site recycling or disposal.	None - pig receiver and gas delivery station designed to prevent spill of hydrocarbon wastes to ground. Oily water separator at compressor stations is designed to capture hydrocarbons.	NIL	NIL	NIL	NIL	NIL	NIL	NIL
17	Waste disposal	Waste collected on site and collected by EPA certified contractor to licensed facility.	Minor amounts, typically filter elements. No (inconsequential) liquid hydrocarbon 'drop-out' is expected due to the composition of gas which is injected into the pipeline.	Waste stream is infrequent. Solid and liquid wastes are stored on site prior to collection for off-site recycling or disposal.	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
18	Gas release during station operation and maintenance	Methane gas is released to atmosphere as a result of pipeline and facility operations (i.e. facility venting, valve actuation).	Some process valves are designed to have a continuous minor bleed during normal operations, or to vent on actuation. As a consequence of venting activities small volumes of gas are also released annually.	Occurs for the duration of operational life of the pipeline system.	NIL	NIL	NIL	NIL	Controlled release of small volumes of gas annually during PRMS venting for maintenance purposes. Noise associated with venting/release of gas. Vented gas data is recorded in Greenhouse Gas	NIL	NIL	NIL

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
			Vented gas data is recorded in greenhouse gas inventory.						Inventory (Ref. Gas Loss Report (TECH-F-017))			
19	Pressure Safety Valve venting	Pressure Safety Valve venting as a result of equipment failure (e.g. - regulator failure or safety activation of pressure relief valves).	Venting may occur at any pressure reducing meter station. Refer to Activity 18 Emissions	Dependent upon type and duration of failure. Based on operating history likely to occur less than once per year across the pipeline system	NIL	NIL	NIL	NIL	Release of gas to atmosphere. Short duration noise associated with release of gas. Vented gas data is recorded in Greenhouse Gas Inventory (Ref. TECH-F-017 Gas Loss Report). Refer also to Activity 18 Emissions.	NIL	Activity is solely confined to facilities along the Pipeline System which are not accessible by the public. Facilities were located away from populated areas to reduce noise impacts. Where change of land use increases the risk to public health and safety due to noise impacts from a facility, additional controls are identified through further assessment and implemented by the responsible party to ensure the risk remains ALARP. Risk to public safety is considered As Low as Reasonable Practicable (ALARP).	NIL
20	Testing & Inspection of Relief Valves	Controlled venting of minimal quantities of gas to atmosphere.	Relief valves are installed within operational facilities along the Pipeline System.	Relief valves are generally tested off site. For on-site testing air and noise emissions are limited to short duration events which generally do not exceed 30 seconds.	NIL	NIL	Facilities are not situated at sites which have been identified as having likely impacts to fauna.	NIL	Release of gas to atmosphere. Short duration noise associated with release of gas. Minor gas volume of methane released when each valve is tested. Vented gas data is recorded in Greenhouse Gas Inventory (Ref. TECH-F-017 Gas Loss Report). Refer also to Activity 18 Emissions.	Landholder consultation occurs prior to venting.	Activity is solely confined to facilities along the Pipeline System which are not accessible by the public. Facilities were located away from populated areas to reduce noise impacts. Risk to public safety is considered As Low as Reasonable Practicable (ALARP).	NIL

ACTIVITY DESCRIPTION					LIKELY ENVIRONMENTAL IMPACTS							
#	ACTIVITY	WHAT IS DONE	SIZE	FREQUENCY / DURATION	SOILS & TERRAIN	WATER RESOURCES	FLORA & FAUNA	CULTURAL HERITAGE	EMISSIONS (Air, Land & Water)	LANDUSE / LANDHOLDERS	PUBLIC HEALTH & SAFETY	SECURITY OF GAS SUPPLY
21	Abrasive Blasting and Painting	High-pressure abrasive surface blasting of pipe work followed by painting carried out in accordance with SEA Gas *Abrasive Blasting and Painting Procedure (OHSE-PR-022)* Undertaking repairs to coating systems within SEA Gas compounds.	Area of exposed pipe	Abrasive blasting and painting is completed as required, activity duration is usually less than 2 hours.	Abrasive blasting media is silica free. Minor contamination from abrasive media, the majority of which is usually captured for subsequent disposal.	NIL	NIL	NIL	Short duration dust generation from blasting activity. Minor noise emissions associated with blasting, restricted to the short duration of the activity.	NIL	NIL	NIL
Preparation for Decommissioning												
22	Preparation for Decommissioning	Cleaning Pigging, purging with a non-flammable fluid, management of ground subsidence. Filling with inert gas (if potentially required for future use). Removal of above ground facilities, including fences and buildings and cutting transition pipes to minimum 750mm below grade, site remediation.	Decommissioning preparation activities are likely to be concentrated at above ground facilities.	Pipeline decommissioning is very unlikely to occur within a 20-year timeframe.	The pipeline will be cleaned prior to decommissioning to remove any potential for contamination. The CP system is likely to be maintained, otherwise alternate strategies will be adopted to mitigate subsidence in high risk areas should the pipeline corrode.	The pipeline will be cleaned and purged prior to decommissioning to remove any potential for water contamination.	NIL	NIL	Gas inventory will be drawn down by customers to the extent possible. The remaining inventory will need to be vented resulting in short term gas release and noise emissions. Vented gas data is recorded in Greenhouse Gas Inventory.	Easements will be relinquished if no longer required for pipeline operation.	Refer 19	NIL

Appendix B – Comments from Government Consultation 2015

No.	Date Received	Document	Department	Comment	SEA Gas Response
1	20/11/2015	SEO/EIR	Department for Health & Ageing	On-site Wastewater Systems Code, April 2013, to be referenced for the collection, treatment and disposal of wastewater.	The On-site Wastewater Systems Code was already referenced in Section 5.8.6 of the EIR and an additional reference has now been added. Additional reference added to the SEO objective 3.4 and 13.4.
2	20/11/2015	SEO	Department of Environment, Water and Natural Resources	Impacts to shallow groundwater resources are not acknowledged in the SEO document in neither the construction nor operations sections, yet potential impacts are acknowledged in the EIR (pg 59).	Potential impacts to shallow groundwater resources are acknowledged in objective 2.4, 3 and 13. An additional point has been added in Objective 2.4 regarding groundwater flows.
3	20/11/2015	EIR	Department of Environment, Water and Natural Resources	The 2001 EIR lists ecological impact mitigations objectives including: • 'to appropriately rehabilitate the easement to pre-construction condition, as reasonably practical' during construction; and • 'to appropriately monitor rehabilitation of the easement' during operation. The current (2015) 5-year EIR however provides very little reflection, and no analysis or presentation of any data, of any systematic ecological rehabilitation monitoring, nor assessment of the actual impact resulting from the construction phase.	The alignment of the existing SEA Gas pipeline system was selected to avoid native vegetation as far as practicable and very little native vegetation was impacted. Consequently, there were only a few areas of revegetation required (as noted in the EIR). Offset revegetation projects are noted in the EIR in Sections 2.2.3 and Section 5.3.2. The details of each revegetation site are contained in the SEA Gas South Australian Easement Revegetation and Management Plan (OHSE-INS-004). A reference to this document and monitoring of revegetation success has been added to Section 5.3.2 and Section 8 of the EIR.
4	20/11/2015	EIR	Department of Environment, Water and Natural Resources	There does not appear to be any monitoring plan to accompany listed environmental objectives or assessment criteria, for which to assess compliance against or to determine its appropriateness for the given objectives.	Measurement and Evaluation is addressed in the SEA Gas Environment Management Plan and Safety Case. This information has now been added to the SEO in Section 3.

No.	Date Received	Document	Department	Comment	SEA Gas Response
5	20/11/2015	EIR	Department of Environment, Water and Natural Resources	Section 5.3 - The section does not appear to have been substantially updated or modified since the original 2001 EIR. There are a number of EPBC matters not identified or discussed that could be relevant to any further works along the alignment. Suggest section 5.3 is updated to reflect current knowledge and policy and any amendments to the Potential Impacts (5.3.2) section be made. Some obvious omissions are listed below: **Wimmera Plains & Southern Mallee** • EPBC Critically endangered Seasonal Herbaceous Wetlands (https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=97 listed 27th March 2012) potentially occurs within the proximity of the alignment within the Wimmera Plains and Southern Mallee regions. Several seasonal wetlands (identified as 'no data') within the alignment boundaries could potentially be Seasonal Herbaceous Wetland communities. • Striped Legless Lizard (*Delmar impar*) (EPBC Vulnerable) also occurs within the Wimmera Plains and Southern Mallee regions in the vicinity of the alignments. No mention of these species in the EIR, nor any mention of any surveying designed to detect them. • Dwarf Galaxias (EPBC Vulnerable) and Yarra Pygmy Perch (EPBC Vulnerable) occur within Mosquito Creek, which is crossed by the alignment (including minor tributaries) 3 times upstream of permanent pools which are refugia for several species of native fish (including Dwarf Galaxias and Yarra Pygmy Perch). There is no indication of water quality monitoring, nor strategies to mitigate habitat disturbance of the creek, neither during or post construction. **Murraylands** • Preamimma creek area and other smaller tributaries support recently recorded (2004 - 2012) populations of Murry Hardyhead (EPBC Endangered). There is no indication of water quality monitoring, nor strategies to mitigate habitat disturbance of the creek, neither during or post construction. • Australasian Bittern (EPBC Endangered) records for Reedy Creek nearby the alignment **Northern Adelaide Plains** • EPBC Vulnerable Subtropical and Temperate Coastal Saltmarsh ecological community (https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=118 listed 10 Aug 2013) may be present along the alignment nearby Penrice Saltfields, Greenfield / Barker Inlet Wetlands and the coastal foreshore of Torrens Island. • Numerous threatened and migratory fauna are associated with the estuaries and saltmarshes in this area, including Curlew Sandpiper (EPBC Critically Endangered), Fairy Tern (EPBC Vulnerable), Australian Painted-snipe (EPBC Endangered), and Australian Bittern (EPBC Endangered)	Reference to the noted species and communities have been added to the EIR. Prior to any new construction activities, an environmental assessment (including on-ground ecological survey where appropriate) would be undertaken before obtaining a licence variation, in accordance with the Petroleum and Geothermal Energy Act 2000. This would identify the likely presence of these types of issues, and identify management (or approval) actions required.

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6	20/11/2015	EIR	Department of Environment, Water and Natural Resources	General comment – It appears that knowledge gained from activities and subsequent monitoring undertaken under the current EIR and SEO is not reflected in this document. • Knowledge of shallow groundwater resources – was any shallow groundwater encountered during the construction of the existing pipelines? If Y, where was groundwater encountered, what was the water quality, was dewatering required, how was this managed, disposal, what is the potential for acid sulphate conditions if permanently dewatered. • Has the installation of the pipeline thorough saturated sediments provided a conduit for groundwater to drain away? Are trench plugs effective? What monitoring is undertaken to inform their performance? • Sections 5 of the document has not been significantly updated since the 2001 EIR. What problems / issues occurred during the construction of the pipeline, how were these managed?	Knowledge gained during pipeline construction and subsequent decade of operation has been included in the EIR where relevant to the requirements of the EIR (as defined by the Petroleum and Geothermal Energy Act). It is not the intention (or a requirement) of the EIR to review the pipeline's construction, but to provide sufficient information on the environment, potential impacts and management measures in regard to ongoing operation and construction of small laterals and above-ground facilities. Shallow groundwater was encountered in a limited number of locations, which were consistent with those described in Section 5.2.2. Where dewatering was required it was generally irrigated to land, consistent with the descriptions in Section 5.1.2. Acid sulphate soil encounters were not reported during construction (see Section 5.1.2). Permanent dewatering is not carried out, so its potential to create acid sulphate conditions is not an issue. The pipeline did not intersect any saturated sediments where the landform and/or hydraulic gradient would allow groundwater to 'drain away'. Ongoing monitoring of the easement at the surface provides an indication as to whether undesirable subsurface conditions are occurring (e.g. groundwater flow along the trench resulting in tunnel erosion or obvious seepage). This has not been an issue in South Australia and several minor issues (near creeks) were rectified early in the pipeline's operation in Victoria. Section 5 was reviewed and updated where relevant. Issues and their management have been covered where relevant to the purpose of the EIR. In general, the information provided in the original EIR was sound and did not require extensive modification.
7	20/11/2015	EIR	Department of Environment, Water and Natural Resources	Page 18 – reference to Department of Environment and Heritage needs to be replaced by Department of Environment, Water and Natural Resources.	Reference amended.
8	20/11/2015	EIR	Department of Environment, Water and Natural Resources	Page 18, section 2.2.4 – What are the water supply options for construction or operational activities? If groundwater or surface water are to be used then a water licence may be required and a well construction permit if a well is to be drilled.	Options for water supply will vary depending on the location of the works, however if there is not a readily available water supply and noting that the SEO is only to be used for small laterals the water may be trucked in. A reference to the NRM Act regulation of taking and use of water has been added to page 18 with a cross-reference to the existing discussion in Section 5.2.2. Compliance with the Natural Resources Management Act 2004 would be addressed in a Construction Safety and Environmental Management Plan.
9	20/11/2015	EIR	Department of Environment, Water and Natural Resources	Section 5.5.2 – The various prescribed areas that the pipeline traverses are listed in the document, but the different NRM regions should also be listed as water affecting activities may have different conditions per region.	The NRM regions are listed in Section 2.2.4 of the EIR.

No.	Date Received	Document	Department	Comment	SEA Gas Response
10	20/11/2015	EIR	Department of Environment, Water and Natural Resources	Page 60 – Impact mitigation: it is stated that pipeline alignment is to avoid recharge and discharge areas. Have groundwater discharge areas been mapped and how are such areas determined? Recommend removing the reference to avoiding recharge areas as recharge conceivably occurs everywhere and there are no specific protected recharge areas.	Groundwater discharge areas have not been mapped but are typically identified in route selection and subsequent detailed studies for new pipeline projects, predominantly on the basis of soil (e.g. saturation), vegetation and landform. Groundwater discharge areas would be identified in a pre-construction Environmental Assessment Report for any new construction project. The reference has been removed to recharge on page 60 of the EIR.
11	20/11/2015	EIR	Department of Environment, Water and Natural Resources	Appendix A item #8 – groundwater related activities are not included in the water resources likely environmental impacts.	Reference to dewatering impacts / controls added to item #8.
12	23/11/2015	EIR / SEO	SafeWork SA	SafeWork SA has reviewed the documents as provided and only general comments are provided with no real specific concern for now.	No response required
13	23/11/2015	EIR / SEO	SafeWork SA	Above ground facilities (eg pumping stations) - Consider mapping the location of these above ground facilities with the Adelaide/SA Flood Mitigation Plan to determine the appropriate design requirements to suit	Flood mapping is considered at the time of designing facilities, although it is possible that existing facility locations may not be consistent with current flood maps. The threat of flooding has been considered in the pipeline Safety Management Study.
14	23/11/2015	EIR / SEO	SafeWork SA	Venting (planned operations and maintenance) - Consider the location of the venting facilities/outlet for the adequate review of risks with the surrounding/environment to mitigate the gas release as a fuel source for unwanted fires at all times of the year	This is a standard consideration in vent design. Facility vents that are used for maintenance are designed, such that the vented plume is contained within the fenced compound. Vegetation clearance is maintained in and around gas facilities. Mainline vents are designed to vent large quantities of gas at very high velocities to ensure that the gas is pushed up into the atmosphere.
15	23/11/2015	EIR / SEO	SafeWork SA	Safety distances from other utilities/infrastructures - While the documents do mention consultations with operators/owners of other utilities/infrastructures, it is prudent to see the safety distances marked on the drawings where the pipeline is running in close proximity to or crosses into these utilities	SEA Gas has alignment sheets and a GIS system that records all utility and service crossings.
16	23/11/2015	EIR / SEO	SafeWork SA	Cathodic Protection – Maintenance and inspection - The documents do mention maintenance and regular (annual) inspection & testing of the effectiveness of the cathodic protection system in accordance with SEA Gas Pipeline Integrity Management Plan. SafeWork SA acknowledges the importance of the management and reporting of integrity issues to regulator(s) as critical to assess trends and proactive actions on matters covering pipelines both above and below ground, and to track parameters relevant to the pipeline physical condition such as Cathodic Protection measurements, coating condition, stress corrosion cracking and pressure cycles.	SEA Gas submits an annual report summarising integrity management activities and a five yearly Fitness for Purpose report in accordance with the Petroleum and Geothermal Energy Regulations 2013.

No.	Date Received	Document	Department	Comment	SEA Gas Response
17	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	With respect to the SEA Gas Pipeline –South Australian Environmental Impact Report 2015 (dated 15/9/2015 – our reference #10015370), it is noted the report is quite brief on the exact construction requirements and more particularly requirements at any major crossing of rail lines and arterial roads, etc. I note that section 3.8 (p32/130) indicates that any new construction projects will go through a "detailed planning and design process prior to the commencement of construction" and this is supported. The following activities would require further consultation with DPTI: • Route or site selection • Regulatory approvals • Alignment finalisation • Detailed engineering design It is noted that easements on private property will form the majority of the alignment, however is it highly likely that public roads (arterial and local) will requiring crossing (or where the pipe runs parallel to the road in 'road reserve') at some locations along the potential alignment (refer section 5.8.3, p96/130). DPTI requires further consultation at the time each section of the route goes through detailed design. There are technical requirements for crossing of arterial roads and requirements to ensure if the pipes is travelling parallel to arterial road/s (and located above ground) appropriate clear zones must be provided/maintained. The potential corridor also needs to take into account any future road upgrades the department may be planning in the longer term (this may include establishing the pipeline clear of any future land requirements). Again, detailed consultation with the department is highly recommended. Note that all road works deemed to be required to facilitate safe access must be designed and constructed to comply with Austroads Guides and Australian Standards and to the requirements and satisfaction of DPTI, with all costs to be borne by the applicant. Prior to undertaking any detailed design, the applicant shall contact DPTI to obtain approval and discuss any technical issues regarding the required works.	All the noted requirements would be addressed as part of a licence variation application in accordance with the consultation requirements of the Petroleum and Geothermal Energy Act 2000.
18	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	**Traffic Management Plan:** Whilst it is noted that a CSEMP will be developed (refer p40/130), a Traffic Management Plan (TMP) is also required for all construction locations that will impact the traffic flows on or near an arterial road. The TMP shall be developed by a certified organisation and must be provided to DPTI for approval prior to construction occurring on or adjacent to an arterial road.	The requirement for an approved Traffic Management Plan is now addressed in section 5.8.3.
19	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	**Overmass/over dimensional loads:** All components that are overmass and/or over dimensional will require approval. Further information is available via: http://www.sa.gov.au/topics/transport-travel-and-motoring/heavy-vehicles/national-heavy-vehicle-regulator	The noted requirement would be addressed as part of a license variation application in accordance with the consultation requirements of the Petroleum and Geothermal Energy Act 2000 and through subsequent consultation with DPTI.
20	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	**Construction Workforce:** It is noted that individual compounds accommodating workers during construction are unlikely to be required (refer p40/130) with preference given to local commercial accommodation rather than establishing construction camps	Noted

No.	Date Received	Document	Department	Comment	SEA Gas Response
21	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	**Construction Depot:** Any construction depot (refer p 40/130) that require direct access to an arterial road should be established in consultation with DPTI with any access located and upgraded where necessary.	The noted requirement would be addressed as part of a license variation application in accordance with the consultation requirements of the Petroleum and Geothermal Energy Act 2000 and through subsequent consultation with DPTI.
22	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	**Licenses over Minister for Transport and Infrastructure / Commissioner of Highways and Rail Commissioner land:** Any pipeline construction within land owned by the minister (and commissioner) must be identified and the relevant agreement (licence, lease, etc) entered into with terms and conditions agreeable to the Minister for Transport/Commissioner of Highways.	The noted requirement would be addressed as part of a license variation application in accordance with the consultation requirements of the Petroleum and Geothermal Energy Act 2000 and through subsequent consultation with DPTI.
23	24/11/2015 Confirmed still valid 02/06/2021	EIR/SEO	Department of Planning, Transport and Infrastructure	I have also provided an example of typical requirements attached to these types of construction projects. How these requirements can be included during the Mining Act processes/approvals would need to be discussed further with DSD staff.	Noted These requirements would be addressed in a Construction Safety and Environmental Management Plan.
24	21/11/2015	EIR	Aboriginal Affairs and Reconciliation	At p15, 'Table 2-1: Key additional legislation', second row down and under the heading 'Activity'; I suggest you delete the word 'Permission' and replace it with the words 'Ministerial authorisation'. The replacement words bring you closer to the language used in section 23 of the *Aboriginal Heritage Act, 1988* (the AHA) which is the legislative authority behind the wording on this line in Table 2-1. The replacement words also expressly identifies the Minister (that is the Miinster for Aboriginal Affairs and Reconciliation) as the party from whom the authorisation is sought.	Amended as noted
25	21/11/2015	EIR	Aboriginal Affairs and Reconciliation	I would encourage SEA Gas to continue making inquiries of AHT within DSD-AAR (DSDAAR:HeritageSites: (DSDAARHeritageSites1sa.ilov.auj whether there are any Aboriginal sites or objects located within the area of proposed activity, particularly in relation to activities that involve ground disturbing work. We maintain a Central Archive which includes the Register of Sites and Objects and pertinent information may be available to assist you in your awareness of locations of Aboriginal sites and objects.	Cultural heritage assessment (which includes consulting AHT and a search of the Register) is carried out for any proposed ground-disturbing activities in areas that have not been previously subject to cultural heritage survey.

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26	21/11/2015	EIR	Aboriginal Affairs and Reconciliation	At the bottom of p74 and top of p 75 of the EIR document, reference is made to a number of Aboriginal nations based on reports by V Wood from the years 2002 and 2003. SEA Gas is to be commended for recognising and acting on the connection between the people of Aboriginal nations and their country. The following points may also be worth considering: ○ While respective Aboriginal nations remain firm in who they are as a people and the boundaries of their country, sometimes the corporate bodies representing the interests of Aboriginal nations may shift and change over time. Mention may be made, for example, to Kaurna Nation Cultural Heritage Association Inc. (KNCHA) which was set up by Kaurna people some years after the reports by V Wood. Many such changes are made to enhance the advocacy role of the groups as non-government organisations. ○ Another significant event that post-dates the reports by V Wood is the joint signing by the Ngarrindjeri Regional Authority and the South Australian Government, of the Kungun Ngarrindjeri Yunnan Agreement in 2008. Having such an Agreement in place alters the protocols between the parties to that agreement, around who should be consulted, how and where, on matters concerning Aboriginal heritage in the area of the Ngarrindjeri and Others Native Title Claim SAD6027/1988 (SC1988/004). ○ Finally mention must be made of the South East Aboriginal Focus Group (SEAFG) which is now (2015) in its IOth year of a working relationship with the South East Natural Resources Management (SE NRM) Board in relation to the management of natural resources in the south east region of South Australia. SEAFG plays an active role on matters concerning Aboriginal heritage and this has proven to be a significant positive contribution not only to the SE NRM Board but also to the AHT in its administration of the AHA. SEAFG is composed of Aboriginal people from the South East; SE NRM documentation (see Part 3 Business Plan 2016/17-201819) reports that matters have progressed to a cultural agreement between SEAFG and Burrandies Aboriginal Corporation (BAC). BAC, which is based at Mount Gambier, has been serving the Indigenous Community of the South East of South Australia since 1999 across a range of areas including education, health and housing. V Wood is known for her thorough work and I am sure that given the opportunity to update her reports, the observations made above would have been covered by her. SEA Gas itself will no doubt have its own process in place to update community contact details where relevant to their consultations with Aboriginal parties.	A current listing of Aboriginal heritage groups for the pipeline alignment has been added to the EIR, to supplement and update the list of groups involved in 2002 and 2003. Updates to community contact details are also being undertaken on an ongoing basis.
27	21/11/2015	EIR	Aboriginal Affairs and Reconciliation	The headings '5.4.2 Potential Impacts' (p77) and '5.4.3 Impact Mitigation' (p78) are clear and helpful and indicates a pro-active approach to the possible concerns that may arise in the different activities identified by SEA Gas.	Noted
28	21/11/2015	EIR	Aboriginal Affairs and Reconciliation	Finally in relation to the EIR — and this is a general comment that may need no action at this time — the separated headings in received reports are typically 'Native Title' and 'Aboriginal Heritage' and then there will be 'The Environment' and 'Biodiversity'. The point to be made here is that Native Title and Aboriginal Heritage include environmental concerns and matters of biodiversity. Aboriginal heritage concerns may extend to water, and to flora and fauna because these matters may be considered high priority matters to Aboriginal parties and to Aboriginal tradition as 'Aboriginal tradition' is defined in the AHA.	Noted
29	21/11/2015	SEO	Aboriginal Affairs and Reconciliation	**Objective 6** ❍ At p16 of 38, SEO at 6.1 where the **Goal is to 'minimise disturbance of** heritage (archaeological and built) and culturally sensitive sites and vegetation', my suggestion is that you add 'in accordance with the provisions of the *Aboriginal Heritage Act 1988.';* or that you use words from the AHA so that this Goal reads "minimise disturbance of Aboriginal sites, objects or remains'.	Words ‘’in accordance with the provisions of the relevant Acts’ added after consultation with DSD. Noting that the relevant Acts are listed in the Assessment Criteria.

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30	21/11/2015	SEO	Aboriginal Affairs and Reconciliation	**Objective 6** At p16 of 38, SEO under Assessment Criteria you incorrectly give the year for the AHA as 1998 when it should be 1988.	Amended as noted
31	21/11/2015	SEO	Aboriginal Affairs and Reconciliation	**Objective** 16 ❍ The comments under EIR about having up to date information for consultations with Aboriginal heritage groups applies in particular to Objective 16 under 'Performance Measures' (p25 of 38, SEO) where it says: 'Consultation with relevant heritage groups is required ...'. Again I acknowledge that SEA Gas itself will no doubt have its own process in place to update community contact details.	Noted.
32	21/11/2015	SEO	Aboriginal Affairs and Reconciliation	**Risk Management / Delegations under the AHA Comments Applicable to both EIS and SEO** In order to satisfactorily pursue a risk management strategy that complies with the provisions of the *Aboriginal Heritage Act 1988* (AHA) it is necessary to ensure there is no damage, disturbance or interference to *any* Aboriginal sites, objects **or** remains. DSD-AAR has a Risk Management Guideline that suggests steps a proponent should address when adopting a best practice risk management strategy. Included in that document are measures designed to mitigate the risk of a breach of section 23 of the *Aboriginal Heritage Act 1988.* These steps include: • requesting a search of the Central Archive's Register of Aboriginal Sites and Objects; • seeking the views of the relevant Aboriginal parties as identified in the EIR, and • engaging professional expertise where appropriate to conduct an archaeological and/or anthropological survey with the participation of appropriate Aboriginal custodians who have knowledge of and responsibility for the area of country and/or Aboriginal sites in question.	The processes noted are undertaken and are addressed by a pre-construction cultural heritage assessment for any new construction activities undertaken. This assessment forms part of a request for licence variation in accordance with the Petroleum and Geothermal Energy Act 2000. A specific reference to register/database searches and consulting relevant parties has been added.
33	21/11/2015	SEO	Aboriginal Affairs and Reconciliation	Aboriginal organisations or Traditional Owners of an Aborignal site or object can apply under the relevant paragaraphs of section 6 (AHA), for a delegation from the Minister of the Minister's powers under sections 21, 23,29 and 35. It is advisable for a risk management strategy to include inquiry into whether an application for a delegation has been made under the provisions of section 6 of the AHA in the area where any development activity is proposed. At this time, there is no section 6 application for delegation over the PL13 area.	Noted.
34	26/11/2015	EIR	EPA	**Section 2.2 Other legislation** Pipeline activity would include NDT and other site based activities. These activities would involve radioactive sources being used. Such activities would be covered under Radiation Protection and Control Act 1982 which EPA administers. Need to show the same as applicable legislation.	Reference added as noted.
35	26/11/2015	EIR	EPA	**Section 5.2.2 Groundwater – Page 60 – Impact Mitigation** Last bullet point: EPA is not shown as an agency for liaising. This needs to be included as Water Quality EPP applies.	Reference to EPA added as noted.
36	26/11/2015	EIR	EPA	**Section 5.5.2 Noise – Page 79 – Potential Impacts** Last paragraph under operation of vehicles and equipment: The EPP (Noise) 2007 is a policy under Environment Protection Act 1993 (EP Act). This policy (and other policies under the Environment Protection Act) apply to any type of activity that pollute or might pollute (noise in this case) conducted in South Australia irrespective of whether the activity is subject to authorisation under Part 6 of the EP Act. There is no exception. There is no need for this paragraph singling out for noise alone. Section 2.2 Other legislation already provides the applicable legislation context to all activities. Suggest delete to remove doubt for the reader.	The paragraph has been amended to remove any implication that the EPP (Noise) does not apply. The EPP's particular provisions regarding construction noise and working hours, although not applicable, provide useful guidance; this point has been retained.
37	26/11/2015	EIR	EPA	**Section 5.8.6 Waste management** General note: EPP (Waste to Resources) 2010 applies along with other provisions of the EP Act. Looks like only SA Public Health (Wastewater) related regulations is mentioned (only?). No need to mention specific policy here. General application of the EP Act is stated in section 2.2.	Noted.

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38	26/11/2015	EIR	EPA	**General** There is no formal risk assessment in the EIR. The narration on impact does not provide a structured hazard/aspect identification, risks assessment using criteria, application of control measures and demonstration of adequacy of the controls for the context of activities. The quoted mitigation measures under each category are not specific measures with actual reference to the company's procedures, etc. It is very generic.	The EIR Section 5 and Appendix A have been prepared in accordance with Section 10 of the Petroleum and Geothermal Energy Regulations 2013 and contains information on events that could impact the environment, predicted frequencies and consequences. The PGE Regulations do not mandate that a risk assessment is carried out. SEA Gas carries out a project based risk assessment, using the SEA Gas risk matrix when works are planned in a particular area with the potential to have a material impact on the environment.
39	26/11/2015	EIR	EPA	**General** The EIR document's preparation, review and approval all have happened on the same day, 10/9/2015. Hopefully there was quality assurance applied.	The document was reviewed by all signatories and amended a number of times before reaching the point of formal approval. Accordingly, it is quite common for formal signing of documentation to take place on the same day.
40	26/11/2015	SEO	EPA	**Section 3 Reporting** EP Act's incident reporting requirements apply for all activities (whether licensed or not). No need to state it. But, the company is made aware of the same.	Noted
41	26/11/2015	SEO	EPA	**General** The SEO document's preparation, review and approval all have happened on the same day, 10/9/2015 and it is the same date for the EIR. Hopefully there was quality assurance applied.	The document was reviewed by all signatories and amended a number of times before reaching the point of formal approval. Accordingly, it is quite common for formal signing of documentation to take place on the same day.
42	26/11/2015	SEO	EPA	**General** The Water Quality EPP and the Air & Noise EPP under the EP Act have been revised. The Water Quality EPP will be coming into effect very soon. The Air & Noise EPP is currently undergoing public consultation. Relevant guidelines are either updated or in the process being updated. The company is advised to contact EPA to get the latest information on the status of these policies as the EIR and SEO will be affected.	Reference updated to Water Quality EPP in the EIR Table 2-1. Reference updated to Water Quality EPP in SEO Objective 2.2 and 3.3.

Appendix C – Comments from Government Consultation 2021

No.	Date Received	Document	Department	Comment	SEA Gas Response
1	02/06/2021	SEO	DIT	General - Replace terminology DPTI (Department of Planning, Transport and Infrastructure) with correct name DIT (Department for Infrastructure and Transport)	It has been confirmed that DPTI is not used in the SEO.
2	02/06/2021	SEO	DIT	3.7 Operation – Environmental Objective 10: Minimise risk to public health and safety – Goal 10.1 To adequately protect public safety during construction and commissioning activities by managing hazards. · Confirm if the "Right of Way" definition includes public roads. · Amend text to read "Administrative and engineering controls to be applied (e.g. traffic management plans, traffic control, signage, isolations, detours, road infrastructure repair/reinstatement requirements, notifications and permits with relevant road authority)	The definition of Right of way has been amended to make it clear that the Right of Way can include public roads. Goal 10.1 Performance Measures have been amended as proposed.
3	02/06/2021	SEO	DIT	2. Potential Impacts and Environmental Objectives *Environmental Objective 20: To minimise the risk to public health and safety – Goal 20.1 To adequately protect public safety.* · Amend text to read "Traffic management provisions, plans and practices, road infrastructure repair/reinstatement requirements, and notifications and permits with relevant road authority"	Goal 20.1 Performance Measures have been amended as proposed.
4	02/06/2021	EIR	DIT	General - Replace terminology DPTI (Department of Planning, Transport and Infrastructure) with correct name DIT (Department for Infrastructure and Transport)	It has been confirmed that DPTI is only used where a published document is referred to or in comments from 2015 consultation, where this was the name of the Department at the time.
5	02/06/2021	EIR	DIT	3.7 Operation A routine operation and maintenance program works on arterial roads should be undertaken as planned works (ie not emergency works). DIT prefer that peak traffic periods be avoided.	Requirement has been added to Section 3.7, paragraph 4.
6	02/06/2021	EIR	DIT	3.9 Decommissioning Decommissioning plans for pipeline under roads should consider management and rectification of long term road / ground subsidence/hazard.	Section 3.9, Paragraph 3 modified to specifically include roads.
7	02/06/2021	EIR	DIT	5.8.3 Third-party Infrastructure – Transport Networks Recommend amend text to: · Agreed traffic management measures such as a traffic management plan, are put in place to minimise potential disruptions and manage public safety"	Text amended as proposed.

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8	02/06/2021	EIR	DIT	5.8.3 Third-party Infrastructure – Transport Networks Transport Networks: Include following paragraph into text: · DIT roads, pavement, structures, shoulder, infrastructure and road reserve shall be reinstated to the satisfaction of DIT where works or damage occurs. For sections where DIT's road and road reserve are impacted, SA Water need to comply with relevant parts of DIT's DIT Master Specifications (including and any other requirements that may be further advised by DIT) – refer link: https://www.dit.sa.gov.au/contractor_documents/masterspecifications/Roads · Engagement with DIT also required for any works that may interface with bridge/culvert and other road infrastructure and any future public road crossings or works or any requirement for DIT property easements/licences · Notification is required to the Department for Infrastructure and Transport's Traffic Management Centre on Ph. 1800 018 313 prior to undertaking any road works that would impact the arterial road network and contractor(s) shall complete a 'Notification of Works' form via the following link: https://www.dpti.sa.gov.au/contractor_documents/works_on_roads_by_other_organisations · In the event that Restricted Access Vehicles (including over-size and over-mass vehicles and components) are proposed to be utilised in association with the pipeline, ensure that all necessary approvals/ permits are obtained from the National Heavy Vehicle Regulator. Refer link: www.nhvr.gov.au.	Additional information included, as proposed.
9	02/06/2021	EIR	DIT	7.3 Ongoing Consultation Support Table 7.1 inclusion of annual contact with DIT and other Government agencies, including requirements for planning and development of pipelines.	Noted
10	02/06/2021	EIR	DIT	Appendix B- Comments from Government Consultation 2015 Retain previous Comments (Numbers 17,18,19,20,21,22,23) as are still valid for DIT (with updated weblinks)	All comments have been retained and web links verified.
11	31/05/2021	SEO	EPA	In general, the EPA supports the environmental objectives particularly around Objectives 1, 2 and 12 whereby impacts to soil and water from pipeline activities should be minimised and prevented to avoid land and/or water contamination. With regard to site contamination, page 10 and 21 of the SEO states: "any uncontained spills with larger scale impact are assessed and rehabilitated (where required) using a risk-based approach, consistent with the principles of the National Environment Protection (Assessment of Site Contamination) Measure 1999". SEA gas is reminded of its obligations to notify the EPA under S83 and 83A of the *Environment Protection Act 1993* and any contamination caused shall also be assessed and remediated in accordance with the current South Australian Guidelines for Assessment & Remediation of Site Contamination (November 2019).	The Assessment Criteria for Environmental Objective 3 and 13 has been updated to reflect this comment.
12	31/05/2021	EIR	EPA	Shallow groundwater may be encountered during trenching to repair and install pipelines. Infiltration from surrounding waters may occur during this time, in addition to stormwater entry. In both scenarios, dewatering may be required for works to continue. The EPA's dewatering guideline should be referred to, to ensure all reasonable and practicable measures are taken to prevent environmental harm. Discharging of this water may also require an earthworks drainage licence from the EPA, depending on the volume and turbidity of the water. It is recommended the potential need for dewatering (and how this might be undertaken) be included on page 57 of the EIR where potential interactions with the groundwater are discussed.	The noted impact and mitigation measures have been incorporated in Section 5.2.2.

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13	31/05/2021	EIR	EPA	When works are required across a watercourse, dredging may be required. Dredging is considered by the EPA to be the removal of sediment from the bed of the watercourse while water is present. The EPA's dredging guideline should be followed in this instance. An EPA licence may be required if dredging occurs.	Dredging is not anticipated, as the pipeline is installed several meters below the river bed. If the pipeline needed repair, it would most likely be replaced by another Horizontal Directional Drill. To address the unlikely event that dredging is required, the following words have been added to Section 5.2.1 'should dredging be required, it will be in accordance with the EPA Dredging guideline and licence requirements.'
14	31/05/2021	EIR	EPA	No details have been provided regarding how the River Murray and the Port River will be traversed and the potential impacts to these waterbodies. Being water bodies of substantial size, it is expected that works in these areas will be managed differently to those areas traversing more minor watercourses/waterbodies. The EPA recommends details/statements on the management of pipelines around these waterbodies be incorporated into the EIR.	The pipeline was installed across the River Murray and Port River by Horizontal Directional Drilling (refer page Section 5.3 'Murraylands' and 'Northern Adelaide Plains'). Section 3.8 provides information on the Horizontal Directional Drilling process. The integrity of the pipeline underneath these water bodies is monitored using in-line inspection techniques that will not have any impact on the waterbody.
15	31/05/2021	EIR	EPA	General The management of wastes and chemicals has been considered and addressed adequately within the SEO and EIR. The EPA acknowledges gas emissions are inherently low and can occur during maintenance operations, emergency shut downs and venting. SEA Gas must ensure that all pipeline infrastructure is assessed and maintained to ensure their effective operation and prevent any loss of containment to the environment.	Noted.
16	31/05/2021	EIR	DEW	References to the NRM Boards will need updating to, Hills and Fleurieu Landscape Board, Murraylands and Riverland Landscape Board, Limestone Coast Landscape Board and Green Adelaide. References to the NRM Act need to be changed to the Landscape South Australia Act 2019, throughout the documents.	It has been confirmed that NRM Board is only used where a published document is referred to or in comments from 2015 consultation, where this was the name of the Board at the time. An incorrect reference to the NRM Act was updated in Section 5.2.2.
17	31/05/2021	EIR	DEW	SEA Gas identify potential impacts to soil (in various places). They identify weed seed transfer as a potential impact as a result of soil movement.	Note only, no response required
18	31/05/2021	SEO	DEW	Finally, The Draft Statement of Environmental Objectives, Section 2.1 – *Construction environmental objectives, measures and targets* includes a number of measures relating to soil and native vegetation disturbance/clearance. In early 2020 works were carried out within the Mutton Cove area which involved a relatively small area of native vegetation removal and soil disturbance. It is accepted that these impacts were unavoidable, however, rehabilitation of the area has not been undertaken. This review may provide an opportunity to remind SEA Gas of the need to fulfil its obligations under its plans in a timely manner.	SEA Gas is committed to completing rehabilitation of the site at Mutton Cove. Some planting (215 out of a total of 300 seedlings) was completed in June 2021 and the balance is planned to be completed in July 2021. 25 plants were held back as part of the site was under water and 60 Maireana plants were held back at the nursery to put on additional growth.