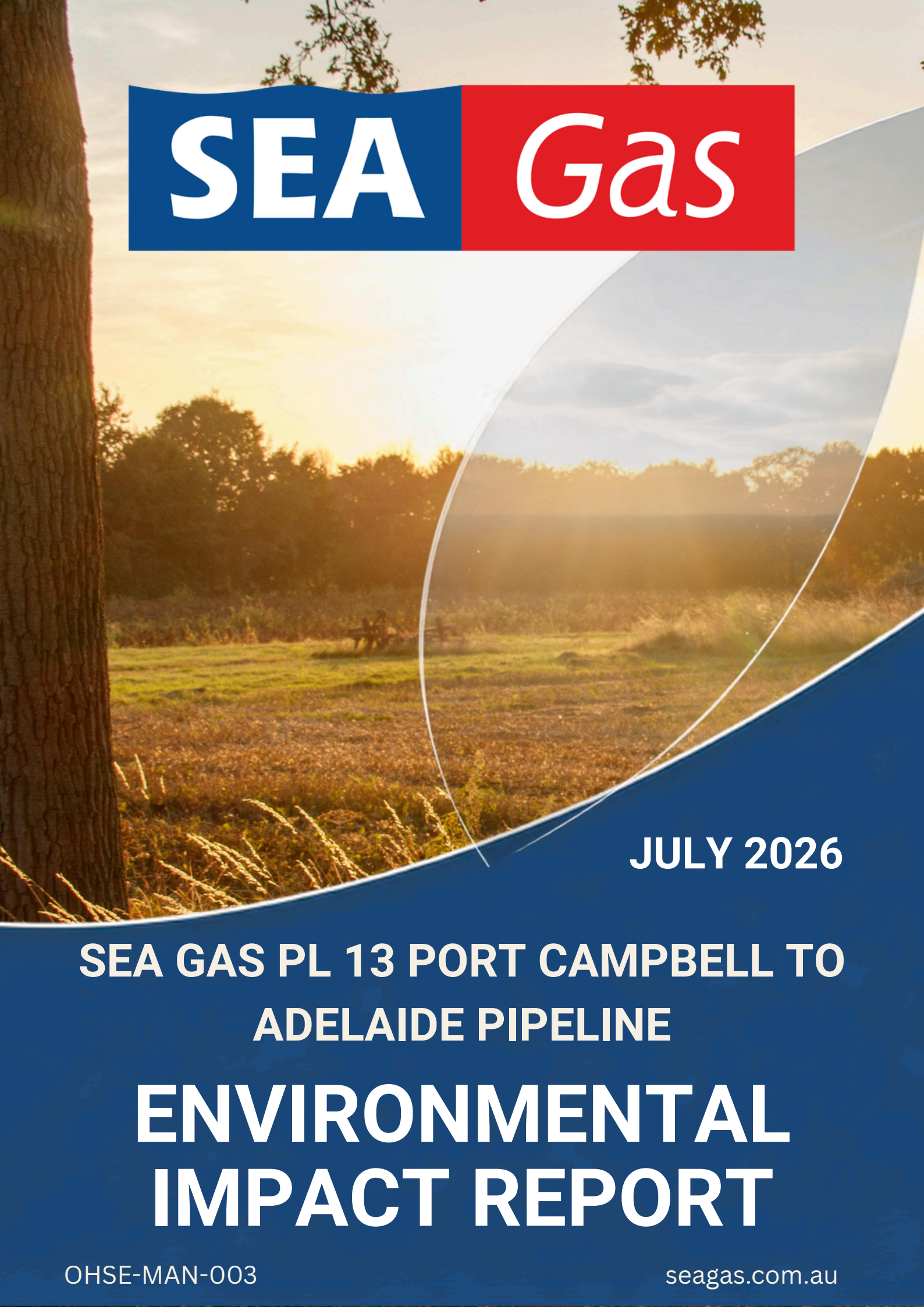




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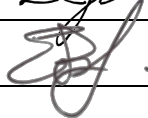
**SEA GAS PL 13 PORT CAMPBELL TO
ADELAIDE PIPELINE**

ENVIRONMENTAL IMPACT REPORT

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SEA Gas PL 13 Port Campbell to Adelaide pipeline

Environmental Impact Report, July 2026

SEA Gas					
Document Ref:	OHSE-MAN-003				
Prepared by:	Adrian Piccinin	Init:	AP	Date:	11/08/2026
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Revision:	6c				

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Distribution Register		
Name	Position Title	Company
Library	-	SEA Gas
Michael Malavazos	Director Engineering Operations	Department for Energy and Mining

Modification Register		
Date	Revision	Details of Change
27/7/2015	0	Initial Issue
10/9/2015	1	Section 5.8.4 and 5.8.5 modified to address DSD comments
15/2/2016	2	Updated to address comments from government agencies as listed in Appendix B.
18/11/2020	3	Five Year Review updated to reflect changes to legislation, SEA Gas operational procedures and operational experience.
22/3/2021	4	Minor amendment to address comments from DEM.
13/07/2021	5	Amendments to address outcomes from Government consultation.
April 2026	6	Five Year Review and amendment to conform to revised requirements of the <i>Energy Resources Act 2000</i> and <i>Energy Resources Regulations 2013</i> – For Consultation.
May 2026	6a	Incorporating feedback from DEM arising from Consultation Plan notification.
July 2026	6b	Incorporating feedback from consultation process detailed in consultation plan meeting the requirements of Regulation 11.
Aug 2026	6c	Document title changes to facilitate public consultation process, as requested by DEM

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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 *Energy Resources 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, relocation and extensions, 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. The EIR covers decommissioning of the SEA Gas pipeline system or sections of the SEA Gas Pipeline system and associated laterals.

This revision incorporates feedback received from the EIR/SEO stakeholder consultation process undertaken during the period late May to early July 2026 to meet the requirement of regulation 11 of the *Energy Resources Regulations 2013*.

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.

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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, maintenance, decommissioning and new construction activities and outlines the control measures, assessment criteria and leading performance criteria 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, relocations, extensions 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:

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- Managing soil disturbance during earthworks associated with operation, maintenance 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 / reseeded 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.

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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 operations, maintenance 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 and renewed in September 2023. 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 *Energy Resources Act 2000* and has been prepared in accordance with current legislative requirements, in particular Section 97 of the Act and Regulation 10 of the *Energy Resources Regulations 2013*.

This EIR is the result of a major review to comply with a change in requirements associated with revisions to the *Energy Resources Act 2000* and *Energy Resources Regulations 2013*.

Prior revisions to the EIR occurred in 2020, 2015, 2009, 2008 and 2007 with the original EIR prepared in 2001. The EIR includes 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 has 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

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Report Title	Date
SEA Gas Project Quarantine Meter Station Pipeline Licence Variation EIR	November 2007
Bolivar Lateral Pipeline Environmental Assessment Report	June 2013
Environmental Impact Report 2015	February 2016
Environmental Impact Report 2020	July 2021

This document has been updated to meet the requirements of the *Energy Regulatory Guideline (ERG) 015 – Environmental Impact Assessment Criteria*.

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, relocation and extensions, 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);
- Future construction of the Yallamurray compressor station (which was covered in the original SEA Gas EER / EIR (SEA Gas 2001)); and
- Decommissioning of the SEA Gas Pipeline system or sections of the SEA Gas Pipeline and associated laterals.

1.2.1 Exclusions and Limitations

This EIR does not cover the following:

- Construction of significant new pipeline and associated facilities
- The section of the pipeline that is contained within the state of Victoria.
- Work undertaken that is outside of the PL13 licence scope and conditions.

This document has been prepared to satisfy the requirements of the *Energy Resources Act 2000* (SA) and the *Energy Resources Regulations 2013* (SA) including the requirement to undertake consultation with relevant stakeholders and is to be submitted to the Department for Energy and Mining and the relevant minister.

SEA Gas does not authorise this document to be used by third parties for any other purpose.

Every reasonable effort has been applied to ensure the accuracy of the information contained within this document. Feedback received through the consultation process and approval process will be taken into consideration in the final review.

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.

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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.



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2 Legislative Framework

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

2.1 Energy Resources Act 2000

Pipeline construction and operation in South Australia is undertaken pursuant to an approved Pipeline Licence under the South Australian *Energy Resources Act 2000*. The Act and the *Energy Resources 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. It also sets out the leading performance criteria and immediately reportable and reportable incidents. The SEO is developed on the basis of information provided in an EIR.

Under Regulation 13 of the *Energy Resources Regulations 2013*, an approved SEO must be reviewed within 6 months of the end of each prescribed period, which has been defined as 5 years from the day of prior approval or as determined by the minister. 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, 2016 and in 2021.

The SEO is undergoing review in 2026 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;
- Contain sufficient information to make possible an informed assessment of the likely impact of the activities on the environment;
- Include an assessment of the environmental impact of regulated activities to which the report applies against the environmental impact assessment criteria, as determined by the minister or prescribed regulations; and
- Include consultation of the proposed environmental impact report in accordance with the requirements of the regulations.

As per Regulation 10 of the *Energy Resources Regulations 2013*, the following information must be provided for the purposes of an EIR:

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- A description of the regulated activities to be carried out under the licence (including their location);
- A description of the specific elements of the environment that can reasonably be expected to be affected by the activities, with particular reference to the environment and existing land uses;
- An assessment of the cultural and heritage 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);
- As required by the Minister – a prudential assessment of the security of natural gas supply; and
- Information on any consultation that has occurred with the owner of the relevant land, any Aboriginal groups or representatives, any agency or instrumentality of the Crown, or any other relevant stakeholders, including specific details about relevant issues that have been raised and any response to those issues, but not including confidential information.

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		
<i>Adelaide Dolphin Sanctuary Act 2005</i>	Duty of care to prevent or minimise harm to the Sanctuary. Under Section 103A(1) of the <i>Energy Resources Act 2000</i> , approval of an SEO applying to the Sanctuary requires concurrence of the Minister for Climate, Environment and Water.	Department for Environment and Water (DEW)
<i>Aboriginal Heritage Act 1988</i>	Ministerial authorisation required if Aboriginal sites, objects or remains are to be damaged, disturbed or interfered with.	Aboriginal Affairs and Reconciliation, Attorney-General's Department
<i>Environment Protection Act 1993</i> (including all Environment Protection Policies (EPP) e.g. <i>Environment Protection (Water Quality) Policy 2015</i> , <i>Environment Protection (Air Quality) Policy 2016</i> and National Environment Protection Measures	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)

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Legislation	Activity	Agency
which operate as an EPP under the EP Act)		
<i>Radiation Protection and Control Act 2021</i>	Non-destructive testing NORMs management	EPA
<i>Heritage Places Act 1993</i>	Permission required if listed heritage places or related objects are to be destroyed / disturbed.	Heritage South Australia, DEW
<i>National Parks and Wildlife Act 1972</i>	'Taking' of protected plant and animal species. Activities in parks and reserves established under the Act.	DEW
<i>Native Title (South Australia) Act 1994</i>	Matters relating to Native Title rights in South Australia.	Attorney General's Department (SA)
<i>Native Vegetation Act 1991</i>	Disturbing or removing native vegetation.	Native Vegetation Council, DEW
<i>Landscape South Australia Act 2019</i>	Management of pest plants and animals. Water sourcing (e.g. from new bores) Water affecting activities.	Landscape Boards, DEW
<i>Planning, Development and Infrastructure Act 2016</i>	Development activities as defined under the act.	Department for Housing and Urban Development
<i>Work Health and Safety Act 2012</i>	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		
<i>Environment Protection and Biodiversity and Conservation Act 1999</i>	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 Climate Change, Energy, the Environment and Water (DCCEEW)
<i>Native Title Act 1993</i>	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.

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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 determined claims Ngarrindjeri and Others Native Title Claim (Part A)((SCD2017/002 in the south-east of South Australia), the Ngarrindjeri – FNSE#2 Overlap Proceedings (SCD2025/001 in the south-east of South Australia) and the Kurna Peoples Native Title Claim SCD2018/001 over the Adelaide area), as shown in Figure 2-1.

Two undetermined registered claims are also within the pipeline alignment, the First Nations of the South East #1 (SC2017/002 in the south-east of South Australia) and First Peoples of the River Murray and Mallee Region #2 (SC2019/001 in the central Murray River region of South Australia), 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.

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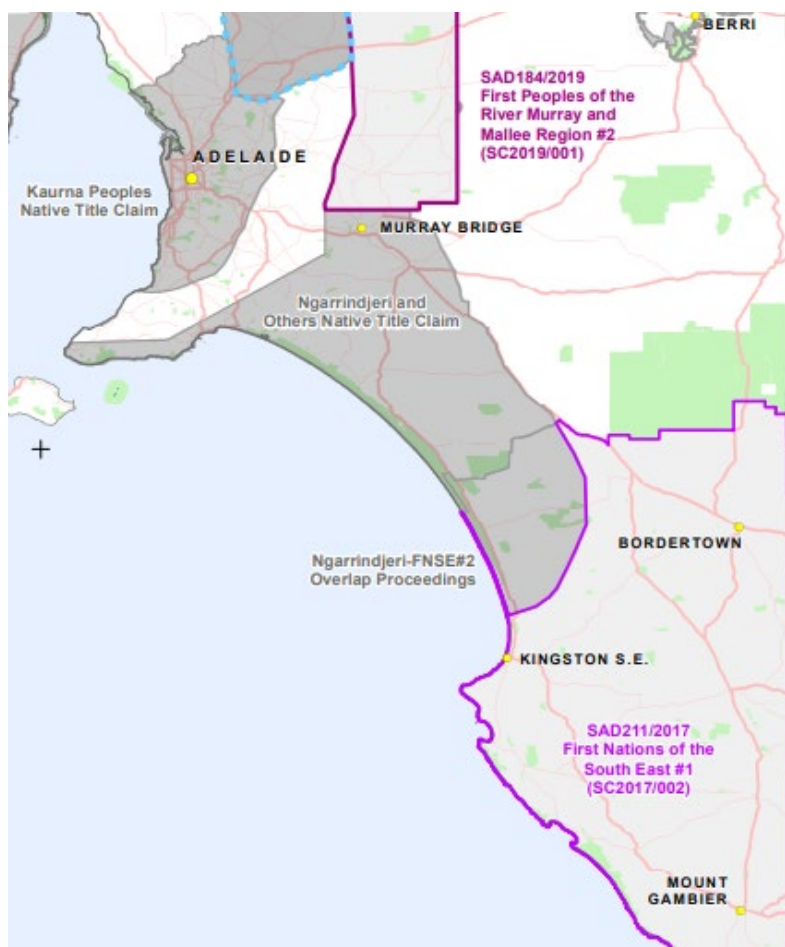


Figure 2-1: Native Title claims along the Pipeline System

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 *Energy Resources Act 2020*, 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 *Native Vegetation Regulations 2017* 14(1a)); and
- For work authorised under the *Energy Resources Act 2000*, the work is undertaken in accordance with an SEO under that Act (see *Native Vegetation Regulations 2017* 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 21(6a) of the *Native Vegetation Act 1991* (see *Native Vegetation Regulations 2017* 14(2)).

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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 *Energy Resources Act 2000*, 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 *Landscape South Australia Act 2019*, 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, modification, enlargement or removal of dams or other structures to collect or divert water flowing in a watercourse or over land;

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- Construction of buildings or structures in a watercourse, lake or floodplain;
- Draining or discharging water directly or indirectly into a watercourse or lake;
- 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 5.4.

2.2.5 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Approval under the Commonwealth 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'.

2.2.6 Planning, Development and Infrastructure Act 2016

External interference from construction activities and/or land use changes over the pipeline have the potential to adversely impact infrastructure. In this regard the pipeline is spatially identified in the Planning and Design Code, established under the *Planning, Development and Infrastructure Act 2016* (PDI Act), through the:

- Gas and Liquid Petroleum Pipelines Overlays.
- Gas and Liquid Petroleum Pipelines (Facilities) Overlay.
- The Desired Outcome of these overlays is the 'management of risk to public safety, the environment and security of energy supply from the encroachment of development on strategic gas and liquid petroleum pipelines and facilities'.

As part of the development assessment process under the PDI Act, development applications lodged into the planning portal will be referred to DEM in accordance with the referral triggers specified in the overlays. The referral process allows DEM to provide expert advice in relation to potential safety issues relating to proposed development; and to identify potential impacts to the pipeline and/or associated facilities.

Approval is required for activities that are defined as 'development' under the PDI Act.

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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

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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: Trilaminar 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) and Enterprise Risk Management Framework (CORP-PO-023), 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.

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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 Section 5. 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.

NB: The isolation and suspension of the Jervois PRMS and Beston interconnect pipe was completed mid 2025 due to the closure of the Beston facility. A final decision on abandonment is anticipated in 2026.

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

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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.

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Plate 3-1: Pallamana Mainline Valve



Plate 3-2: Jervois Meter Station

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Plate 3-3: Quarantine Meter Station



Plate 3-4: Coomandook Compressor Station

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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



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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

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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 Before You Dig Australia 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. Plate 3-5 contains an image of a typical easement. Activities undertaken as part of pipeline operations are summarised in Table 3-4. These activities are also described in more detail in Section 5.

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.

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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 inspection of the pipeline easement is generally undertaken by fixed wing aircraft. Rotary wing (helicopter) aircraft may be used as required and there shall be no 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 and the radiation license conditions. 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

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Activity	Description
	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)).
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 ktCO _{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 infrequent event. The volume of gas released is only sufficient to control the pressure until Emergency Safety Valves are shut in. Venting will typically cease within a short time.
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 SCADA system is run out of the SEA Gas System Control Centre (SCC) which operates 24 hours a day, 7 days a week.

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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.

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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.

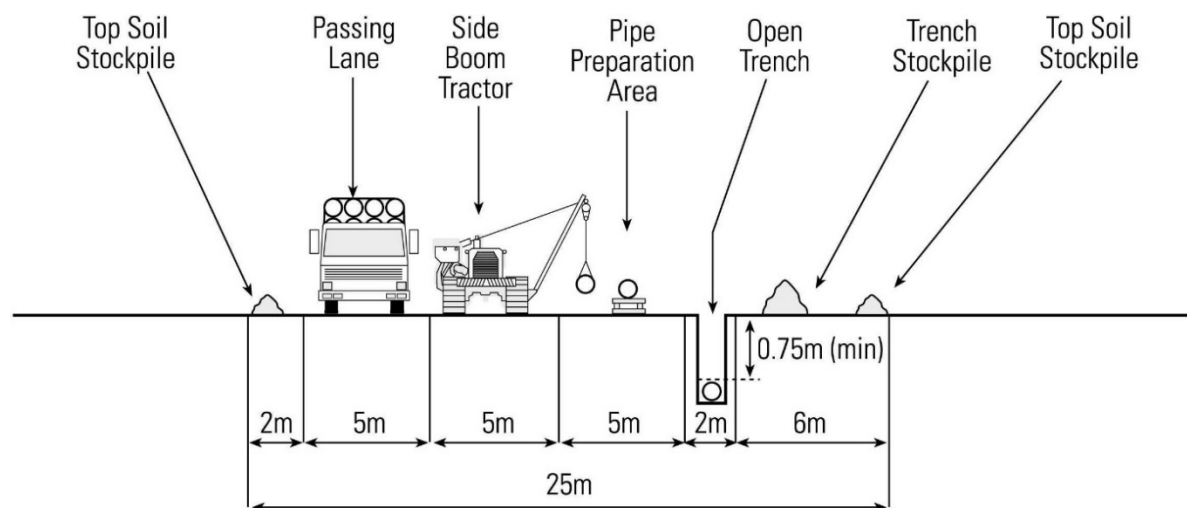
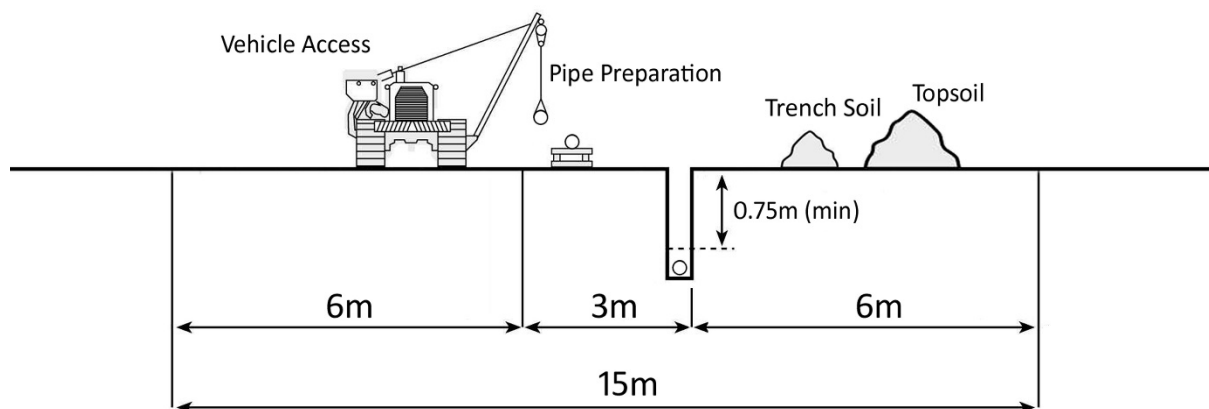


Figure 3-1: Typical right-of-way for cross-country pipeline construction of large diameter pipeline



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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.

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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.

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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)

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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)

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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)

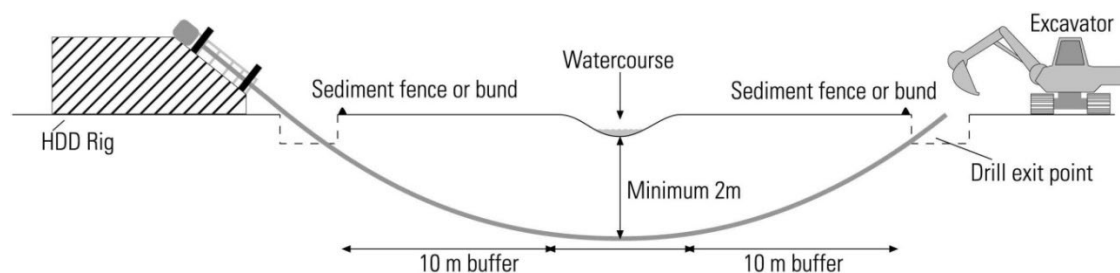
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The length of the open trench will vary depending on the scale of the pipeline construction and the sensitivity of the surrounding area and can typically be 1–10 km for large scale pipeline construction. For a small lateral, the entire trench would 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. HDD entry and exit points are located a sufficient distance from the watercourse to avoid direct or indirect impact to the watercourse.

Thrust boring may also be used to install pipelines beneath infrastructure such as roads, railways, and buried utilities, or to cross watercourses. Bellholes for thrust boring are also typically located to avoid any impact to the infrastructure or watercourse they are crossing. A typical watercourse boring operation is shown in Figure 3-4.



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Figure 3-3: Typical profile of horizontal directional drilling

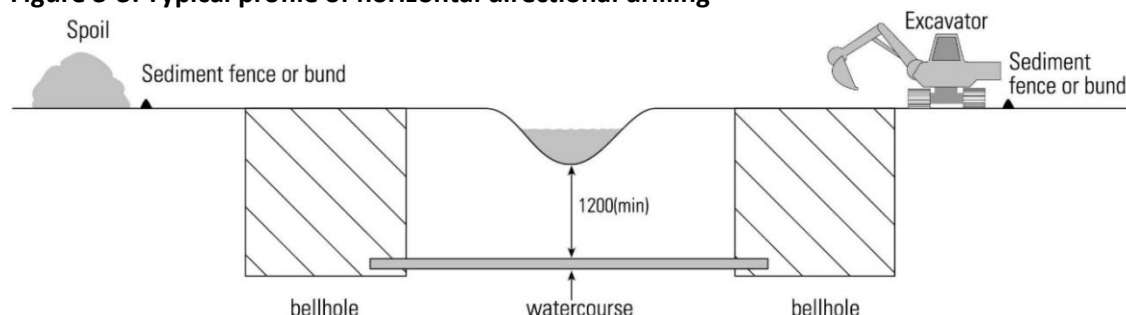


Figure 3-4: Typical watercourse boring operation (profile view)

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.

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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 5.11.

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.

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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.

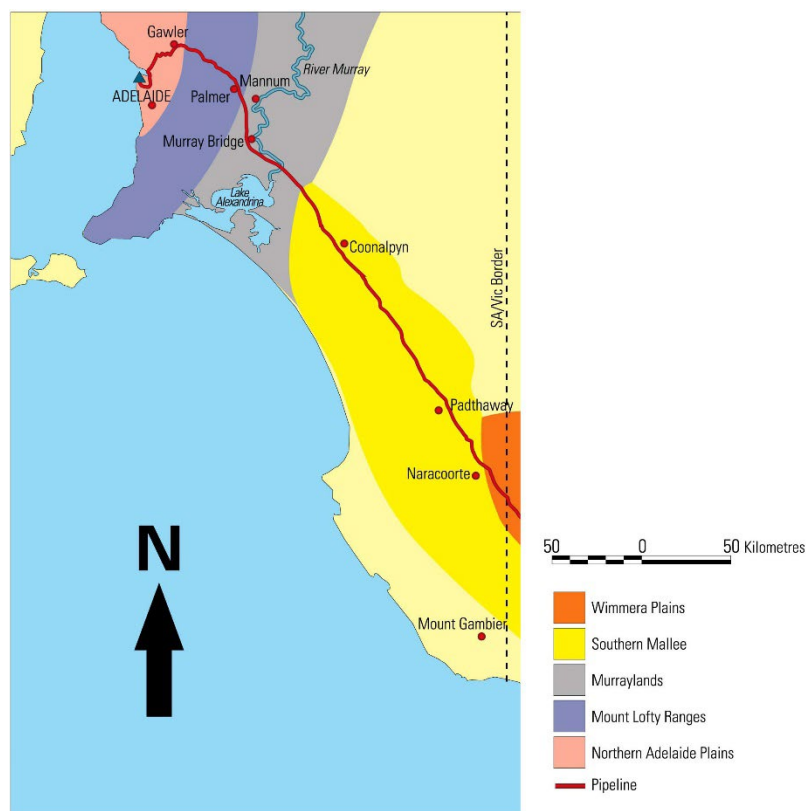


Figure 4-1: Environmental regions on the Port Campbell to Adelaide pipeline route

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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 2026). Average annual rainfall at Naracoorte is 497 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, 2026).

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 459 mm, decreasing to 386 mm at Cooke Plains (Bureau of Meteorology 2026).

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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 2026). Average annual rainfall at Murray Bridge is 346 mm (Bureau of Meteorology 2026). 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 672 mm (Bureau of Meteorology 2026).

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

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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 425 mm (Bureau of Meteorology 2026).

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5 Environmental Impact Assessment

This section summarises the methodology and results of the environmental impact assessment for the construction, commissioning, operation, maintenance and decommissioning of the South Australian section of the PCA covered under Pipeline Licence PL13. 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 Methodology

The impact assessment method has been developed in accordance with the Environmental Impact Assessment Criteria published under the *Energy Resources Act 2000*, the *Energy Resources Regulations 2013* and using guidance provided in the *Energy Regulatory Guideline (ERG) 015 – Environmental Impact Assessment Criteria*.

The impact assessment was undertaken using the following steps:

- 1. Identifying environmental elements** that could be impacted by the proposed regulated activities (Criteria 1).
- 2. Identifying the potential impact events** that could impact elements of the environment during the construction, commissioning, operation, maintenance and decommissioning phases (Criteria 2).
- 3. Confirming the potential of impact events to occur** (Criteria 3).
- 4. Identifying relevant control and management measures** for each potential impact event, needed to eliminate or otherwise reduce any potential environmental harm to as low as reasonably achievable (part Criteria 4).
- 5. Identifying uncertainties and assumptions** associated with the effectiveness of control and management strategies (part Criteria 4).
- 6. Assessing environmental significance** of each potential impact event, based on the sensitivity of the receiving environment and the magnitude of potential impacts, considering factors such as the frequency, duration, extent and severity of impacts as well as potential cumulative impacts (Criteria 5).

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7. **Developing environmental objectives and assessment criteria** for all potential impacts determined for the elements of the environment. These objectives will be carried through to the SEO (Criteria 6).

The steps followed in the impact assessment are described below.

5.1.1 Identifying environmental elements

Elements of the environment that have the potential to be impacted by the regulated activities were first identified. All phases of the regulated activities were considered including construction, commissioning, operation, maintenance and decommissioning.

The following environmental elements have been identified and assessed:

- Soils and terrain;
- Water resources (surface and ground water);
- Flora and fauna (including native flora and fauna);
- Cultural and historical heritage (aboriginal and non-aboriginal);
- Noise & vibration;
- Air Quality & GHG
- Public health and safety;
- Security of gas supply;
- Waste management;
- Hazardous Storage, Spill and Emergency response;
- Weeds, pests and pathogens;
- Third party infrastructure, landholders and land use (including visual amenity and socio economic);

5.1.2 Identifying potential impact events

Elements of the environment may be impacted in different ways by the regulated activities. All potential impacts from the regulated activities were identified and defined as potential impact events.

Each potential impact event was characterised by:

- The source of impact, defined as the activities associated with the proposed operation that could reasonably be expected to negatively impact a receptor for the environmental element (considering construction, commissioning, operation, maintenance and decommissioning stages)
- The pathway of impact, defined as the mechanism by which a proposed activity may interfere with environmental elements

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- The environmental receptor of impact, defined as the component of the environmental element that may be detrimentally affected by the proposed activity in the absence of control measures.

Any uncertainties in the identification and description of the sources, pathways and environmental receptors as a result of assumptions or knowledge gaps were identified for each potential impact event.

5.1.3 Confirming the potential of impact events to occur

For each potential impact event, the occurrence of the source, pathway and environmental receptor within the proposed regulated activities scope was verified.

Potential impact events for which the full source, pathway and environmental receptor linkage was confirmed were considered as having the potential to occur and relevant control and management measures were then identified.

Potential impact events for which the source, pathway and environmental receptor linkage was incomplete were not considered as having the potential to occur and were not considered further in this environmental impact assessment.

5.1.4 Identifying relevant control and management measures

Measures to control and manage potential impact events were identified. The hierarchy of controls approach was adopted consistently with the *Energy Regulatory Guideline (ERG) 015 – Environmental Impact Assessment Criteria*. Identification of control and management measures considered the following priority of order:

Elimination measures that eliminate the source of a potential impact event, preventing the impact from occurring.

Substitution measures that replace the material or process at the source of a potential impact event with a less hazardous one, significantly reducing the likelihood of a potential impact event to occur.

Design and engineering (physical) control measures that act to separate the source from the pathway and environmental receptor to either:

- avoid or reduce the likelihood of a potential impact event to occur, or
- avoid or reduce the consequences of an impact event occurring

Management system control measures that implement a procedure to manage the activity at the source of a potential impact event to either:

- avoid or reduce the likelihood of a potential impact event to occur, or
- avoid or reduce the consequences of an impact event occurring.

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5.1.5 Identifying uncertainties and assumptions

Uncertainties and assumptions related to the likely effectiveness of the proposed control and management strategies were identified. This included the assumptions underlying any analysis or modelling undertaken to assess potential impacts and effectiveness of proposed measures.

5.1.6 Assessing environmental significance

The level of significance of each potential impact event was assessed considering the following factors outlined in the *Energy Regulatory Guideline (ERG) 015 – Environmental Impact Assessment Criteria*:

- The level to which a potential impact can be avoided through elimination (prevention)
- The estimated frequency of the potential impact occurring
- The anticipated duration of the potential impact
- The extent of the potential impact
- The severity of the potential impact
- The cumulative effects (if any) of the potential impact when considered in conjunction with other impacts on the same receptor
- The sensitivity of the receiving environment.

To assist in describing potential impacts for each factor listed above, the definitions in Table 5-1 and Table 5-2 were used.

Table 5-1: Definitions used to describe potential impacts

Factor		Description
Avoidance		Yes: Impacts can be avoided through the identified controls
		No: Impact cannot be avoided through the identified controls
Magnitude	Frequency	High: Impacts occur frequently or are present throughout the life of the project
		Moderate: Impacts occur several times during the lifespan of activities
		Low: Impacts occur infrequently
		Rare: Impacts not expected or only occur in exceptional circumstances
	Duration	Permanent: Impacts to the environment are permanent and non-reversible
		Long-lasting: Impact to the environment persist for a period of years but are reversible
		Short term: impacts of less than a year duration and are reversible
	Extent	Widespread: Impacts occur on a regional scale
		Moderate: Impacts extend beyond the project site and immediate surrounds without occurring on a regional scale
		Localised: Impacts are limited to the project site and immediate surrounds
	Severity	High: Statutory reference values or environmental quality standards are exceeded

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Factor	Description
	Moderate: Statutory reference values or environmental quality standards are not exceeded but the impact results in an increase in the occurring content/level
	Low: imperceptible or indistinguishable from natural background levels
Cumulative effects	Yes: Receptors are already impacted by similar activities
	Possible: Receptors could be impacted by similar activities depending on the site
	No: Receptors are not already impacted by similar activities
Sensitivity	Refer Table 5-2

Overall environmental significance

The overall environmental significance of each potential impact event was assessed using a matrix that considered the sensitivity of the receiving environment and the magnitude of the impact (Table 5-4).

Categories for sensitivity and magnitude used in this matrix are defined in Table 5-2 and Table 5-3. (Note: The categories of magnitude consider frequency, duration, extent, severity and cumulative effects, and align with the more detailed definitions provided in Table 5-1 above).

Impacts were considered acceptable if they were in the ‘Negligible’ or ‘Low’ category of environmental significance, while impacts in the ‘Moderate’ category were generally considered acceptable if they were as low as reasonably practicable (ALARP) following the application of mitigation measures. High and Major impacts would be considered unacceptable necessitating redesign of the regulated activities (however there were no High or Major impacts identified).

Additional commentary providing justification why impacts are considered ALARP for ‘Moderate’ impacts is provided in the Impact Assessment Outcomes sections and the Impact Assessment tables provided through Section 5.

The environmental significance assessment considers any proposed controls or management measures to determine the outcome of the significance assessment.

Table 5-2: Categories for sensitivity

Sensitivity	Description
High	The environmental value is protected as a result of Australia’s international commitments The environmental value holds a statutory protection (national parks, etc) The environmental value is intact The environmental value is unique to the environment in which it occurs. It is isolated to the affected system/area which is poorly represented in the region, territory, country or the world. It has not been exposed to threatening processes, or they have not had a noticeable impact on the integrity of the environmental value.
Moderate	The environmental value is recorded as being important at a regional or local level, The environmental value is in a moderate to good condition despite it being exposed to threatening processes. It is relatively well represented in the systems/areas in which it occurs, but its abundance and distribution are limited by threatening processes. Threatening processes have reduced its resilience to change.

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Sensitivity	Description
Low	The environmental value is not listed on any recognised or statutory register. It is in a poor to moderate condition as a result of threatening processes It is abundant and widely distributed or representative examples exists throughout the host systems/areas. There is no detectable response to change, or change does not result in further degradation of the environmental value.

Table 5-3: Categories for magnitude

Magnitude	Description*
High	An impact that is widespread and/or is permanent or long-lasting. An impact that occurs frequently. Statutory reference values or environmental quality standards are exceeded.
Medium	An impact that has a relatively large scope or is long-lasting. An impact that occurs several times during the lifespan of activities. Statutory reference values or environmental quality standards are not exceeded but the impact results in an increase in the occurring content/level.
Low	An impact with no or little effects on the receptor. The effects have a limited scope and are short-term. An impact that is infrequent. The effect is deemed to be imperceptible or indistinguishable from natural background levels.

**Note: If one or more of these criteria are exceeded, the magnitude would generally be elevated to the next level*

Table 5-4: Significance Assessment Matrix

Magnitude of Impact			
Sensitivity of Environmental Value	High	Moderate	Low
High	Major	High	Moderate
Medium	High	Moderate	Low
Low	Moderate	Low	Negligible

5.1.7 Developing environmental objectives and assessment criteria

Environmental objectives and assessment criteria were developed for all potential impacts determined through the environmental impact assessment process. Objectives were developed to align with the elements of the environment. These objectives are defined in the impact assessment summary tables provided in Section 5 and will be carried through to the SEO.

Leading performance criteria were also developed for impact events that rely significantly on a control strategy to reduce the potential environmental impact.

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5.2 Affected parties, legislation and standards table

Legislation and non-legislated standards, views of affected parties and key environmental receptors relevant to each element is summarised in Table 5-5.

Table 5-5: Legislation and non-legislated standards, views of affected parties and key environmental receptors

Environmental Element	Applicable legislation	Applicable non-legislated standards	Views of affected parties	Environmental receptor
Soils and Terrain	• Landscape South Australia Act 2019 • Environment Protection Act 1993 • Environment Protection (Water Quality) Policy 2015 • Planning, Development and Infrastructure Act 2016	• Best Practice Erosion and Sediment Control (IECA, 2008) • EPA Guideline 638/07 Site contamination – acid sulfate soil materials • National Acid Sulfate Soils Guidance (2018) – National acid sulfate soils identification and laboratory methods and manual • APGA Code of Environmental Practice 2022 • AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Soil quality • Vegetation • Land users
Water Resources (surface and ground water)	• Environment Protection Act 1993 • Environment Protection (Water Quality) Policy 2015 • Landscape South Australia Act 2019 • Adelaide Dolphin Sanctuary Act 2005	• Best Practice Erosion and Sediment Control Guidelines (IECA, 2008) • National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (Site Contamination NEPM) • APGA Code of Environmental Practice 2022 • EPA Dredge Guideline • AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Surface water quality • Aquatic ecosystems • Surface water users • Vegetation • Groundwater users including bores for domestic and agricultural purposes and vegetation (groundwater dependent ecosystems (GDE)). • Hydraulic properties
Flora and Fauna	• Native Vegetation Act 1991 • Native Vegetation Regulations 2017 • National Parks and Wildlife Act 1972	• National Light Pollution Guidelines for Wildlife • AS/NZS 4282 Control of the obtrusive effects of outdoor lighting	Refer to Appendix C for a summary of feedback from consultation process.	• Native vegetation • Native flora and fauna

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Environmental Element	Applicable legislation	Applicable non-legislated standards	Views of affected parties	Environmental receptor
	• Landscape South Australia Act 2019 • Environment Protection (Commercial and Industrial Noise) Policy 2023 • Environment Protection and Biodiversity Conservation Act 1999 (Cth) • Adelaide Dolphin Sanctuary Act 2005	• APGA Code of Environmental Practice 2022 • AS 2885		
Cultural and historical heritage (aboriginal and non-aboriginal)	• Aboriginal Heritage Act 1988 • Aboriginal and Torres Strait Islander Act 2005 • Native Title (South Australia) Act 1994 • Native Title (Cth) Act 1993 • Coroners Act 2003. • Heritage Places Act 1993	• APGA Code of Environmental Practice 2022 • AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Sites, objects or remains, whether known or unknown. • Culturally sensitive vegetation
Noise and Vibration	• Environment Protection Act 1993 • Environment Protection (Commercial and Industrial Noise) Policy 2023	• EPA 425/23 Construction Noise Information Sheet • APGA Code of Environmental Practice 2022 • AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Adjacent land users • Native fauna and livestock
Air Quality & GHG	• Environment Protection Act 1993 • Environment Protection (Air Quality) Policy 2016 • Climate Change and Greenhouse Gas Emissions Reduction Act 2007 • National Greenhouse and Energy Reporting Act 2007	• National Environment Protection (Ambient Air Quality) Measure 2021 • APGA Code of Environmental Practice 2022 • AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Vegetation • Surrounding land users • Air
Public Health & Safety	• Energy Resources Act 2000 • Energy Resources Regulations 2013 • Fire and Emergency Services Act 2005 • Electrical Safety Act 2002 • Public Health Act 2011 • Work Health and Safety Act 2012 • Road Traffic Act 1961 • Civil Aviation Act 1988 and Regulations 1988	• AS1940 - The storage and handling of flammable and combustible liquids • AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Public • Native vegetation and fauna • Livestock and land use.
Security of Supply	• Energy Resources Act 2000 • Energy Recourses Regulations 2013	• AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	• Gas pipeline customers

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Environmental Element	Applicable legislation	Applicable non-legislated standards	Views of affected parties	Environmental receptor
	Security of Critical Infrastructure Act 2018			
Waste management	- Environment Protection (Waste to Resources) Policy 2010 (Waste to Resources EPP) - South Australian Public Health (Wastewater) Regulations 2013 - Radiation Protection and Control Act 2021	- SA Waste Strategy 2020-2025 - APGA Code of Environmental Practice 2022 - AS 2885 - EPA 1093/21 Environmental management of dewatering during construction activities	Refer to Appendix C for a summary of feedback from consultation process.	- Soil - Surface water - Vegetation.
Hazardous Storage, Spill and Emergency Response	- Fire and Emergency Services Act 2005 - Energy Resources Act 2000 - Energy Recourses Regulations 2013 - Dangerous Substances Act 1979 - Environmental Protection Regulations (South Australia) 2023	- EPA guideline 080/016 Bunding and Spill Management - AS 1940 - The storage and handling of flammable and combustible liquids - Australian Dangerous Goods Code - National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (Site Contamination NEPM) - APGA Code of Environmental Practice 2022 - AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	- Soil quality - Surface water quality - Surface water users - Groundwater quality - Groundwater users - Vegetation
Weeds, pests and pathogens	- Landscape South Australia Act 2019 - South Australia's Biosecurity Policy 2020-2023 - Controlled Substances (Pesticides) Regulations 2017 - Biosecurity Act 2015 (Cth)	- Australian Weeds Strategy 2017-2027 (Commonwealth of Australia, 2017) - APGA Code of Environmental Practice 2022 - AS 2885	Refer to Appendix C for a summary of feedback from consultation process.	- Native vegetation and biodiversity - Landholders and land use.
Third party infrastructure, landholders and land use (including visual amenity and socio economic)	- Landscape South Australia Act 2019 - Biosecurity Act 2015 (Cth) - Environment Protection (Waste to Resources) Policy 2010 - Public Health (Wastewater) Regulations 2013 - Civil Aviation Safety Regulations	- AS/NZS 4282 Control of the obtrusive effects of outdoor lighting - Guideline EPA 080/16 Bunding and Spill Management - AS 1940 - The storage and handling of flammable and combustible liquids - Australian Dangerous Goods Code	Refer to Appendix C for a summary of feedback from consultation process.	- Landholders/land use - Stock - Utility/ infrastructure owners or used - Road users - Passing traffic - Local community

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Environmental Element	Applicable legislation	Applicable non-legislated standards	Views of affected parties	Environmental receptor
		• National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (Site Contamination NEPM) • APGA Code of Environmental Practice 2022 • AS 2885		

5.3 Soils and Terrain

5.3.1 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.

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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.

Sothorn 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 podsollic 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

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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).

5.3.2 Impact Events

The impact events relevant to soils and terrain are:

- Excavation associated with construction activity leading to potential for soil compaction, soil erosion, soil subsidence, soil inversion or acid sulphate soil formation.
- Excavation and reinstatement activity during operations and maintenance and decommissioning leading to potential for soil compaction, soil erosion, soil subsidence, soil inversion or acid sulphate soil formation.
- Movement of vehicles along pipeline corridor and access tracks leading to potential for soil compaction.

Refer to Table 5-6 for details of the assessment of potential impact events and confirmation of impact events

The impact events are discussed further below. Note: Soil contamination is discussed in Section 5.12.

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

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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 / reseeded 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 5.9

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.

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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.

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.

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Table 5-6: Potential Impact Events and Confirmation of Impact Events - Soils and Terrain

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Soil & Terrain	Construction and commissioning	ST01	Excavation associated with construction activity leading to potential for soil compaction, soil erosion, soil subsidence, soil inversion or acid sulphate soil formation.	Excavation associated with construction e.g. clear-and-grade operations, trenching, backfilling and reinstatement.	Direct disturbance	Soil quality Vegetation Land users.	Location of activity and topography and soil type at the site.	Low sensitivity to change due to knowledge gained from pre-construction soil investigations and prior construction activity.	Yes – potential for soil impact. Siting may reduce or remove SPR linkage.
Soil & Terrain	Operation, maintenance and decommissioning	ST02	Excavation and reinstatement activity during operations maintenance and decommissioning leading to potential for soil compaction, soil erosion, soil subsidence, soil inversion or acid sulphate soil formation.	Earthworks associated with operation e.g. excavation for pipeline, coating or equipment inspection /repair or replacement installation and / or maintenance of anode beds new tie-ins.	Direct disturbance	Soil quality Vegetation Land users.	Location of activity.	Low sensitivity to change due to knowledge gained from prior excavations and inspections / maintenance during pipeline operation.	Yes – potential for soil impact. Siting may reduce or remove SPR linkage.
Soil & Terrain	Construction, commissioning, operation, maintenance and decommissioning	ST03	Movement of vehicles along pipeline corridor and access tracks leading to potential for soil compaction.	Movement of vehicles along pipeline corridor and access tracks e.g. pipeline patrols CP surveys coating surveys pig tracking.	Direct disturbance	Soil quality Vegetation Land users.	Location of activity.	Pipeline access in an emergency may require access in wet weather creating compaction issues.	Yes – potential for soil impact, but low risk.

5.3.3 Control Measures

Control measures to reduce the risk and impact to soils and terrain are detailed in Table 5-7, including environmental objectives and criteria.

Table 5-7: Control Measures, Environmental Objectives and Criteria – Soils and Terrain

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	ST01	Excavation associated with construction activity leading to potential for soil compaction, soil erosion, soil inversion or acid sulphate soil formation.	- Undertake planning and assessment to identify constraints or areas where special management measures are required (e.g. erodible soils, steep banks, acid sulphate soils, contamination) and avoid such areas as far as practicable. - Keep topsoil stockpiled separately to subsoils. - Install and maintain erosion control devices where required. - Return trench spoil in the appropriate horizon order where possible. - Topsoil is to be returned to its original layer. - Implement appropriate physical and biological stabilisation and site rehabilitation measures. - Rehabilitate and revegetate/reseed the pipeline easement, prioritising areas prone to wind erosion. - Ensure adequate soil compaction over excavated areas. - Return excavation spoil to the excavation line and to a level consistent with surrounding soils. - Avoid positioning of excavations in areas prone to subsidence. - Reinstate surface contours, natural drainage patterns and watercourse banks as soon as possible. - Avoid positioning of trench lines and pipeline in areas at risk of mass movement or land slip. - Remediate soil compaction by ripping or scarifying. - Implement a stakeholder consultation program and photo point monitoring (where required) to validate compliance with site management plans. - Induct construction personnel and contractors in relation to compliance expectations.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To avoid or minimise adverse impacts on soils and terrain.	To minimise soil erosion and sedimentation as a result of construction activities.	- Records of audits/inspections show that erosion along the ROW is consistent with the surrounding environment.¹ - Records of audits/inspections show no significant uncontrolled soil erosion as a result of pipeline construction activities.¹ - Records of audits/inspections show land contour and watercourse banks reinstated to pre-construction conditions.¹	- Soil management (e.g. – prevention of mass soil movement, protection of soils from contamination, avoidance of significant geological features, adequate compaction to avoid trench subsidence) and ROW reinstatement. - Temporary silt fencing, filtration and sediment control measures implemented and monitored in susceptible areas along the ROW. - Construction workforce trained in relation to SEO and CSEMP requirements. - Where required, compliance auditing of ROW (i.e. – assessment of erosion susceptibility and effectiveness of engineering controls). - Minimising time between clear and grade and subsequent restoration in areas susceptible to erosion. - Avoidance of areas prone to land slippage. - Minimising ground disturbance and vegetation clearing necessary for safe pipeline construction. - Where practicable, construction to be scheduled during the drier time of year to minimise potential for erosion of exposed soils. - Any necessary pipeline trench or groundwater dewatering (or hydrotest water discharge) is undertaken in a manner that does not cause erosion of nearby areas or sediment loss.
						To prevent soil inversion.	Records of audits/inspections show no evidence of subsoil on surface (validation may include colour, texture, ribbon length, pH and ‘carbonate fizz’ testing or chemical analysis).¹	- Adherence to administrative protocols in SEA Gas Pipeline Excavation procedure (TECH-PR-013) and Environmental Reinstatement Procedure (OHSE-PR-013). - Induction of construction workforce in relation to SEO and CSEMP compliance expectations. - Where required, photo point monitoring to validate compliance.

¹ Audit/Inspection frequency is as determined and documented in the CSEMP

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Restrict the use of heavy machinery to the minimum necessary to complete the task. - Identify means of disposal of excess soil prior to construction activities. - Acid Sulphate soils managed in accordance with EPA Guideline 638/07 Site Contamination – acid sulphate soil materials. - Undertake a desktop assessment and/or field screening to identify areas of potential acid sulphate soils (PASS). - Place any intercepted soils identified as PASS in an isolated bunded stockpile area. - Treat any identified acid sulphate soils with agricultural lime in accordance with the EPA guideline prior to backfill. - Monitor sites for erosion, evidence of inversion, subsidence, compaction and ground stability, and implementing remediation and prevention measures where required.			To mitigate soil compaction, if necessary, by remediation.	Records of audits/inspections demonstrate no visual evidence of soil compaction (e.g. hard soil, local water pooling and failure of revegetation to successfully establish) following ROW remediation. ¹	- Ripping of identified compacted areas. - Where required, compliance auditing of ROW. - Restricting all vehicles and equipment movements to the ROW or designated access tracks and roads.
						To identify and avoid acid sulphate soils and to have in place strategies for managing exposure.	Records of audits/inspections demonstrate no evidence of likely acid sulphate soil exposure (e.g., odour, discoloration, vegetation loss). ¹	- Identification prior to construction of areas which may potentially have acid sulphate soils. - Adherence to excavation procedures and CSEMP in relation to acid sulphate soil management. - Inadvertently exposed acid sulphate soils encountered during construction are effectively treated.
						To identify and manage pre-existing site contamination.	Records of audits/inspections demonstrate no HSE incidents in relation to pre-existing site contamination. ¹	Administrative controls in place (refer Incident & Hazard Management Procedure (OHSE-PR-004)) to manage identified site contamination.
						To reinstate soil and/or terrain as near as practicable to pre-construction contours, profiles or conditions.	Records of audits/inspections show that surface contours along the ROW are consistent with adjoining land. ¹	- ROW reinstatement in accordance with CSEMP and in consultation with landholders. - Induction of construction workforce in relation to SEO and CSEMP compliance expectations. - Where required, compliance auditing of ROW. - Where required, photo point monitoring to validate compliance.
Operation, maintenance and decommissioning	ST02	Excavation and reinstatement activity during operations, maintenance and decommissioning leading to potential for soil compaction erosion, inversion, subsidence or acid	- Keep topsoil stockpiled separately to subsoils. - Install and maintain erosion control devices where required. - Return trench spoil in the appropriate horizon order where possible. - Topsoil is to be returned to its original layer. - Implement appropriate physical and biological stabilisation and site rehabilitation measures.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To maintain soil stability along the easement.	To remediate erosion or subsidence as a consequence of pipeline operations in a timely manner.	- Records of audits/inspections demonstrate no un-remediated soil erosion or subsidence along the pipeline easement. ² - Records of audits/inspections show that pipeline operations do not enhance soil erosion on the easement. ²	- Scheduled ground and aerial patrols of the easement and additional patrols following significant weather events. - Stakeholder consultation program to validate compliance. - Periodic Inspection of Critical Watercourse Crossings listed in the Critical Watercourse Inspection Register (OHSE-R-001) and additional inspections following significant weather events. ³ - Where required, photo point monitoring to validate compliance.

² Aerial and ground patrols are undertaken on a daily, weekly, fortnightly, monthly and 3 monthly basis as defined in the Pipeline Integrity Management Plan. Landholders and key stakeholders are consulted on a 1 to 5 yearly basis as defined in the Pipeline Integrity Management Plan.

³ Critical watercourse inspections are undertaken on a monthly (aerial patrols) to annually basis as defined in the Pipeline Integrity Management Plan.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
		sulphate soil formation.	- Rehabilitate and revegetate/reseed the pipeline easement, prioritising areas prone to wind erosion. - Ensure adequate soil compaction over trench lines. - Return trench spoil to trench line and to a level consistent with surrounding soils. - Avoid positioning of trench lines in areas prone to subsidence. - Reinstate surface contours, natural drainage patterns and watercourse banks as soon as possible. - Avoid positioning of trench lines and pipeline in areas at risk of mass movement or land slip. - Remediate soil compaction by ripping or scarifying. - Implement a stakeholder consultation program and photo point monitoring (where required) to validate compliance with site management plans. - Induct operations personnel and contractors in relation to compliance expectations. - Restrict the use of heavy machinery to the minimum necessary to complete the task. - Identify means of disposal of excess soil prior to operational activities. - Acid Sulphate soils managed in accordance with EPA Guideline 638/07 Site Contamination – acid sulphate soil materials. - Undertake a desktop assessment and/or field screening to identify areas of potential acid sulphate soils (PASS). - Place any intercepted soils identified as PASS in an isolated bunded stockpile area. - Treat any identified acid sulphate soils with agricultural lime in accordance with the EPA guideline prior to backfill. - Monitor sites for erosion, evidence of inversion, subsidence, compaction and ground stability, and implementing remediation and prevention measures where required.					
						To prevent soil inversion.	- Records of audits/inspections show that vegetative cover is consistent with surrounding land. ² - Records of audits/inspections demonstrate no evidence of subsoil on surface (validation may include colour, texture, ribbon length, pH and ‘carbonate fizz’ testing or chemical analysis).²	- Induction of operations personnel and contractors in relation to SEO compliance expectations. - Excavation activities carried out in accordance with Pipeline Excavation Procedure (TECH-PR-013) in order to adequately separate stockpiled topsoil away from sub-surface fill during excavation. - Reinstatement in accordance with Environmental Reinstatement Procedure (OHSE-PR-013) to ensure appropriate placement of topsoil. - Monitoring of the re-establishment of vegetation (Note: unsuccessful re-establishment of vegetation may indicate soil inversion). - Where required, easement auditing and photo point monitoring to validate compliance.
						To effectively manage impacts of acid sulphate soil exposure.	Records of audits/inspections provide no evidence of likely acid sulphate soil exposure (e.g. odour, discoloration, vegetation loss). ²	- Soil & engineering report where necessary prior to conducting excavations, with a view to identifying potential acid sulphate soils. - Adherence to Pipeline Excavation Procedure (TECH-PR-013) in relation to acid sulphate soil management.
						To identify and manage pre-existing site contamination.	Records demonstrate no HSE incidents in relation to pre-existing site contamination.	Administrative controls in place (refer Incident & Hazard Management Procedure (OHSE-PR-004)) to manage identified site contamination.
						To identify activities off the easement which may result in soil instability and to jointly manage potential risks in consultation with stakeholders.	- Records of audits/inspections demonstrate that surface contours along the easement are consistent with adjoining land.² - Records show that alteration of surface contours (e.g. – berms and contour banks to manage erosion) are initiated in consultation with stakeholders.	- Regular liaison with stakeholders (landholders, land users, mining applicants, utilities, Shire Councils). - Where required, compliance auditing of easement and photo point monitoring to validate compliance.
Construction, commissioning, operation, maintenance and decommissioning	ST03	Movement of vehicles along pipeline corridor and access tracks leading to potential for soil compaction.	- Restrict activities that cause soil compaction to approved areas (e.g. by right-of-way and access tracks). - Rectify soil compaction during rehabilitation by ripping or scarifying. - Where required, compliance auditing of easement and photo point monitoring to validate compliance.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been	To maintain soil stability along the easement.	To effectively manage soil compaction.	Records of site audits/inspections provide no visual evidence of soil compaction (e.g. hard soil, local water pooling or poor re-establishment of vegetation) along the easement.^{1,2}	- Ripping of identified compaction. - Where required, compliance auditing of easement and photo point monitoring to validate compliance.



Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Restrict the use of heavy machinery to the minimum necessary to complete the task. - Restrict vehicle use during excavations and construction activities in wet or boggy conditions. - Monitor sites for compaction resulting from vehicle movement and implement remediation and prevention measures where required.	successfully implemented.				

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5.3.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with construction activity is **Moderate** whilst the significance associated with Operations and Maintenance activity is **Negligible**. An ALARP assessment for construction activity indicated: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts to soil. These controls are also readily available for implementation and the integrity of the controls in place is visible upon inspection.

Refer to Table 5-8 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-8: Environmental Significance Assessment – Soils and Terrain

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
ST01	Excavation associated with construction activity leading to potential for soil compaction, soil erosion, soil inversion or acid sulphate soil formation	No – excavations periodically required for new infrastructure.	Rare – potential impact event is related to new construction projects which occur rarely. The have been three laterals constructed since the original PL13 pipeline construction in 2003.	Long lasting: Experience informs the view that larger areas of disturbance associated with construction projects may take longer to remediate but generally are reversible.	Moderate – potential impacts whilst generally confined to easement can occur over larger areas due to the scale of activities.	Moderate – potential impact event may have a moderate severity impact but is dependent on the nature of the land use of the chosen pipeline route, recognising that route selection will seek to avoid ecologically sensitive areas.	Possible – Receptors may be impacted by other potential impact events.	Low/Medium – the pipeline route selection criteria typically seeks to avoid areas of environmental value.	Magnitude = Moderate Significance = Moderate ALARP assessment: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts to soil. These controls are also readily available for implementation and the integrity of the controls in place is visible upon inspection.
ST02	Excavation and reinstatement activity during operations, maintenance and decommissioning leading to potential for soil compaction, erosion, inversion or acid sulphate soil formation.	No – excavations required periodically to ensure safe and reliable operations.	Low – potential impact event occurs during excavations which are low frequency – approx. 5 pa.	Short term: With identified controls in place, any issues are anticipated to be minor, with impacts of less than a year in duration and are reversible.	Localised – impacts are generally confined to easement.	Low – potential impact event severity is anticipated to have low severity impact relative to the mostly disturbed background levels associated with the easement.	Possible – Receptors may be impacted by other potential impact events.	Low - pipeline easement is generally over land that is largely cleared of native vegetation and used for agriculture, industry and urban development. There is no further degradation of environmental value anticipated from the potential impact event in these areas.	Magnitude = Low Significance =Negligible
ST03	Movement of vehicles along pipeline corridor and access tracks leading to potential for soil compaction.	No – vehicle movement is an essential part of pipeline maintenance, operations and new construction.	Low – although there are frequent vehicle movements, movements over the same area tend to be infrequent unless caused by a specific activity or event.	Short term: With identified controls in place, any issues are anticipated to be minor, with impacts of less than a year in duration and are reversible.	Localised - impacts are generally confined to easement.	Low – potential impact event severity is anticipated to have low severity impact relative to the mostly disturbed background levels associated with the easement.	Possible – Receptors may be impacted by other potential impact events.	Low - pipeline easement is generally over land that is largely cleared of native vegetation and used for agriculture, industry and urban development. There is no further degradation of environmental value anticipated from the potential impact event in these areas.	Magnitude = Low Significance = Negligible

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5.4 Water Resources (Surface and Ground Water)

5.4.1 Existing Environment

Surface Water

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.

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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.

Groundwater

The pipeline traverses three broad hydrogeological units (see Table 5-9). 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 5-9.

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

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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 5-9: 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.

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5.4.2 Impact Events

Surface Water

The impact events relevant to surface water are:

- Surface water runoff from land disturbance during construction, commissioning, operations, maintenance and decommissioning activities results in increased sediment load and turbidity in watercourses.
- Earthworks during pipeline construction, commissioning, operations, maintenance and decommissioning result in interruption or modification to surface drainage patterns reducing surface water availability to users.

Refer to Table 5-10 for details of the assessment of potential impact events and confirmation of impact events.

These are discussed further below.

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.

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.

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:

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- 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. Watercourse crossing locations and techniques are selected to minimise potential impacts. Construction is timed to avoid high flow periods and if possible is carried out when there is no flow, which is generally achievable for the environments traversed by the Pipeline System. Flow diversion techniques are employed for open cut crossings if necessary if low flows are present, to avoid flow disruption or siltation downstream. If horizontal directional drilling is undertaken, entry and exit points are located a sufficient distance from the watercourse to avoid direct impact, and controls are implemented (e.g. sediment and erosion controls, drilling mud containment) to avoid any indirect impact from the activity.

With the application of appropriate avoidance and mitigation strategies, potential short term impacts from watercourse crossings can be reduced to an acceptable level.

Groundwater

The impact events relevant to ground water are:

- Excavation and dewatering due to commissioning, operations, maintenance and decommissioning activities resulting in groundwater drawdown impacting groundwater users.
- Backfilling of trenches following excavation for pipeline construction, commissioning, operations, maintenance and decommissioning changes the hydraulic properties of the trench resulting in changed hydraulic conditions.

Refer to Table 5-10 for details of the assessment of potential impact events and confirmation of impact events

These are discussed further below.

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.

Due to the nature of pipeline construction activities, impacts to deep aquifers are not likely to occur.

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Changes to Hydrological Conditions

The intersection of shallow groundwater by the open trench and the possible requirement for dewatering 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 5.3.1.

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.

Other Issues

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. However, with appropriate planning and management, impacts can be avoided, and this has not been considered as a potential impact event.

Constraints to Standard Construction Activities

Although not an impact event that affects elements of the environment, the presence of shallow groundwater may also constrain standard construction activities. Saturated clays and sands may constrain construction at many of the identified shallow groundwater zones during winter (see Table 5-9). 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.

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Table 5-10: Potential Impact Events and Confirmation of Impact Events – Water Resources

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Surface Water	Construction, Commissioning, Operation, Maintenance and Decommissioning	WR01	Surface water runoff from land disturbance during construction, commissioning, operations, maintenance and decommissioning activities results in increased sediment load and turbidity in watercourses.	- Land disturbance during construction - Erosion of reinstated landform - Excavation and land reinstatement for pipeline maintenance or repair (e.g. pipeline coating, equipment repair or placement, installation or maintenance of anode beds, new tie ins)	Surface water run off	- Surface water quality - Aquatic ecosystems - Users of surface water.	Location of activity.	Low sensitivity to change due to knowledge gained from prior excavations.	Yes – potential for impact. Siting may reduce or remove SPR linkage.
Surface Water	Construction, Commissioning, Operation, Maintenance and Decommissioning	WR02	Earthworks during pipeline construction, commissioning, operations, maintenance and decommissioning result in interruption or modification to surface drainage patterns reducing surface water availability to users.	- Excavation during construction - Excavation for coating/pipeline inspection or refurbishment, installation or maintenance of anode beds, new tie ins.	Reduction in surface water availability	Vegetation Aquatic ecosystems Surface water users	Location of activity.	Low sensitivity to change due to knowledge gained from prior excavations.	Yes – potential for impact. Siting may reduce or remove SPR linkage.
Groundwater	Construction, Commissioning, Operation, Maintenance and Decommissioning	WR03	Excavation and dewatering due to commissioning, operations, maintenance and decommissioning activities resulting in groundwater drawdown impacting groundwater users.	- Excavation for construction and maintenance - Dewatering of excavations.	Groundwater drawdown.	Groundwater users including bores for domestic and agricultural purposes and vegetation (groundwater dependent ecosystems (GDE)).	Shallow groundwater is not present along the entire pipeline and GDE identification relies on regional mapping and investigations may identify it is not groundwater dependent.	Low sensitivity to change as conservative approach to assumptions undertaken.	Yes – potential for impact. Siting may reduce or remove SPR linkage.
Groundwater	Construction, Commissioning Operation, Maintenance and Decommissioning	WR04	Backfilling of trenches following excavation for pipeline construction, commissioning, operations, maintenance and decommissioning changes the hydraulic properties of the trench resulting in changed hydraulic conditions.	Backfilled trench (shallow)	Direct impact	Hydraulic properties	The trench is shallow and not anticipated to result in significant change. For majority of the pipeline the trench will be above the groundwater table.	Low sensitivity to change due to knowledge gained from prior excavations.	No – the scale of the impact is not of a scale to be noticeable and unlikely to reach the receptor.

5.4.3 Control Measures

Control measures to reduce the risk and impact to water resources are detailed in Table 5-11, including environmental objectives and criteria.

Table 5-11: Control Measures, Environmental Objectives and Criteria – Water Resources

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction, Commissioning, Operation, Maintenance and Decommissioning	WR01	Surface water runoff from land disturbance during construction, commissioning, operation, maintenance and decommissioning activities results in increased sediment load and turbidity in watercourses.	• Locate any new construction to avoid surface water features such as lakes and wetlands as far as practicable • Undertake planning and assessment to identify sensitive areas where special management measures are required • Avoid stockpiling of materials in watercourses/drainage lines • Use appropriate sediment and silt control devices • Install permanent berms on slopes where required • Minimise period between clearing and reinstatement at or near watercourses • Stabilise, reinstate and revegetation of the construction ROW, particularly near watercourses and drainage lines. • Undertake open cut watercourse crossings in accordance with controls outlined under WR02 • Locate HDD drill entry and exit points away from watercourse banks, sensitive vegetation and any heritage sites. • Monitor HDD mud flow rates to determine whether seepage or other losses may be occurring • Dispose of drilling mud and cuttings as per regulatory requirements • Induct construction workforce in relation to SEO and CSEMP compliance expectations. • Where required, undertake ongoing monitoring of the easement during operations and maintenance of any erosion or sedimentation controls. • Implement appropriate measures to permanently solve any recurring erosion or sedimentation problems.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise and manage impacts to water resources.	To restrict sediment discharge which enters surface water.	• Records of audits/inspections (including turbidity measurements where relevant) demonstrate no deterioration of surface water quality resulting from construction activities when compared with adjacent areas.^{1,2} • Records demonstrate no reasonable complaints received in relation to increased sediment load and turbidity in water courses. • Records of audits / inspections demonstrate compliance with SA - EPA Environment Protection (Water Quality) Policy 2015.^{1,2}	• Administrative management guidelines detailed in project specific CSEMP to include: ○ No stockpiling of materials in watercourses/drainage lines ○ Use of appropriate sediment and silt control devices ○ Installation of permanent berms on slopes ○ Minimising period between clearing and reinstatement at or near watercourses ○ Stabilisation, reinstatement and revegetation of watercourses and drainage lines. • Induction of construction workforce in relation to SEO and CSEMP compliance expectations. • Acquisition of all necessary approvals and permits for water affecting activity through relevant Landscape Board or EPA licensing for dredging if required. • Where required, compliance auditing of ROW. • Where required, photo point monitoring to validate compliance.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction, Commissioning, Operation, Maintenance and Decommissioning	WR02	Earthworks during pipeline construction, commissioning, operations, maintenance and decommissioning result in interruption or modification to surface drainage patterns reducing surface water availability to users.	- Identify and avoid surface water features and sensitive areas as far as is practicable. - Comply with conditions set out in CSEMP and ELL, including requirements for landholder consultation. - Ensure the construction and maintenance workforce is inducted in relation to compliance expectations. - Avoid watercourse crossing works during periods of flood or heavy rainfall. - Dam or divert surface water to enable excavations where required, following consultation / water affecting activity permit from the Landscape Board where required. - Should dredging be required, ensure that it is undertaken in accordance with the EPA Dredging Guideline and licence requirements. - Complete watercourse crossings in the shortest time practicable. - Cease clear and grade activities at least 10m from the banks of flowing watercourses until construction of the crossing is imminent. - Delay grading and trenching across watercourses until immediately prior to pipe laying (i.e. after the pipe is welded and the watercourse crossing prepared). - Contain pumps within lined, bunded areas. - Install temporary watercourse crossings and select appropriate construction techniques in consultation with the Landscape Board. - Install silt barriers when there is a risk of sedimentation from excavations or during temporary diversions. - Liaise with third party land users regarding potential disruptions, in accordance with SEA Gas' Third Party Contact and Consultation Procedure (OHSE-PR-032). - Schedule air and ground patrols of the easement following significant weather events. - Undertake environmental inspections looking for evidence of erosion, abnormal vegetation growth or vegetation loss. - Where required, install and monitor photo points to validate compliance with control measures. - Minimise periods of disturbance and reinstate sections of the easement which intersect or are adjacent to water bodies.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise and manage impacts to water resources.	To minimise short term and prevent long term interruption or modification to surface drainage patterns during construction.	- Records of audits/inspections demonstrate no adverse impacts (e.g. downstream ecology or land use) resulting from watercourse flow reductions or diversions as a result of construction activities.^{1,2} - Records of audits/inspections demonstrate no evidence of altered watercourse flows following ROW reinstatement.^{1,2} - Records of inspections/audits demonstrate no evidence of project related erosion of watercourses intersecting or adjacent to construction ROW.¹ - Records of site audits/inspections demonstrate surface drainage profiles are restored to pre-construction conditions or better.¹ - No new water affecting activities as defined under the Landscape South Australia Act undertaken unless applicable permits have been obtained.	- Avoidance of surface water features as far as is practicable. - Identification of sensitive areas and specific CSEMP requirements. - Compliance with CSEMP and SEO conditions, including landholder consultation. - Induction of construction workforce in relation to SEO and CSEMP compliance expectations. - Engineering controls through installation of temporary watercourse crossings and selection of appropriate construction techniques in consultation with catchment management stakeholders. - Acquisition of all necessary approvals for watercourse crossings prior to construction (e.g. water affecting activity permit through relevant Landscape Board or EPA licensing for dredging if required). - Where required, compliance auditing of ROW. - Where required, photo point monitoring to validate compliance.
					To minimise and manage impacts to water resources.	To maintain current surface drainage patterns during operation.	- Records of audits/inspections demonstrate drainage along the easement is maintained to pre-existing conditions or better.^{1,2} - Records of audits/inspections	- Environmental inspections looking for evidence of erosion, abnormal vegetation growth or vegetation loss. - Scheduled ground and aerial patrols of the easement in conjunction with additional patrols following significant weather events. - Scheduled landholder liaison in accordance with SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-032).

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Install and subsequently remove temporary watercourse/water body protection measures to prevent flow interruptions and degraded water quality. - Rehabilitate watercourse crossing points and banks as soon as possible after works have been completed.				demonstrate surface drainage profiles are restored following maintenance activities. ²	Installation and monitoring of photo points to validate compliance following maintenance activities.
					To minimise and manage impacts to water resources.	To minimise disruption to third party use of surface waters.	Records demonstrate no reasonable complaints received from stakeholders in relation to surface water impacts.	- Administrative (procedural & consultation with stakeholders) controls to manage potential disruptions. - Minimise disturbance and expeditious reinstatement along sections of ROW which intersect or are adjacent to water bodies. - Engineering controls through installation of temporary watercourse crossings.
Construction, Commissioning, Operation, Maintenance and Decommissioning	WR03	Excavation and dewatering during construction, commissioning operations, maintenance and decommissioning resulting in groundwater drawdown impacting groundwater users.	- Undertake planning and assessment to identify constraints and areas where special management measures are required. - Include the locations of shallow groundwater, groundwater discharge, acid sulphate soils and groundwater infrastructure on Alignment Sheets. - Select the pipeline alignment to avoid direct impact to groundwater discharge areas, where practicable. - Schedule construction during times of low water tables where practicable. - Ensure the trench is compacted to a level consistent with surrounding soils. - Install trench plugs to prevent longitudinal water flow within the trench. - Protect groundwater from acid sulphate soils where necessary. - Dewater waterbodies in accordance with the EPA's dewatering guideline. - Liaise with Landscape Boards, DEW, EPA, DEM and affected landholders regarding the management of groundwater issues where required. - Where required, undertake compliance auditing to validate compliance with the CSEMP and relevant procedures/management plans.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise and manage impacts to water resources.	To adequately manage groundwater.	- Records of audits/inspections demonstrate no evidence of project related groundwater impacts arising from construction activities.¹ - Records demonstrate no reasonable complaints received from groundwater users as a result of pipeline construction and operation.	- Administrative and engineering controls implemented to manage: - Avoidance of damage to groundwater infrastructure - Potential for alteration of groundwater flows (e.g. ensuring adequate trench compaction and use of trench plugs) - Construction constraints imposed by shallow groundwater - Protection of groundwater from acid sulphate soils. - Where required, compliance auditing of ROW.

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5.4.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with surface water run off leading to sediment load and turbidity increase in water courses during construction activity is **Low to Moderate** whilst the significance associated with other Operations and Maintenance activity is **Low** or **Negligible**.

An ALARP assessment for construction activity indicated: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts. These controls are also readily available for implementation and the integrity of the controls in place is visible upon inspection.

Refer to Table 5-12 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-12: Environmental Significance Assessment – Water Resources

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
WR01	Surface water runoff from land disturbance results in increased sediment load and turbidity in watercourses.	No – excavations required during construction and then periodically to ensure safe and reliable operations.	Low – construction is short term and sediment runoff (with controls in place) would not be a frequent event. During operations, potential impact event occurs during excavations which are low frequency.	Short term – with identified controls in place, any issues are anticipated to be minor, and short duration and are reversible.	Localised – impacts are generally confined to easement or immediately adjacent.	Low to Moderate – potential impact event severity is anticipated to have low severity however failure of controls could result in a higher level of impact.	Possible – Receptors may be impacted by other activities in the area.	Medium – majority of the watercourses crossed by the project are small, ephemeral creek lines. The pipeline traverses a prescribed watercourse (River Murray), prescribed surface water area and 3 prescribed water resource areas. However, majority of the environment is disturbed.	Magnitude = low to moderate. Significance = Low to Moderate ALARP assessment: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts. These controls are also readily available for implementation and the integrity of the controls in place is visible upon inspection.
WR02	Earthworks during pipeline construction and operations/ maintenance result in interruption or modification to surface drainage patterns reducing surface water availability to users	No – construction earthworks may result in minor / temporary impacts. No impact is expected in operations as land will be reinstated to pre-existing levels.	Low – construction is short term and minor alteration to flow (with controls in place) would not be a frequent event.	Short term – with identified controls in place, any issues are anticipated to be minor, and short duration and are reversible.	Localised – impacts are generally confined to easement or immediately adjacent.	Low – potential impact event severity is anticipated to have low severity however failure of controls could result in a higher level of impact.	Possible – Receptors may be impacted by other activities in the area.	Medium – majority of the watercourses crossed by the project are small, ephemeral creek lines. The pipeline traverses a prescribed watercourse (River Murray), prescribed surface water area and 3 prescribed water resource areas. However, majority of the environment is disturbed.	Magnitude = low. Significance = Low
WR03	Excavation and dewatering during construction and operations resulting in groundwater drawdown impacting groundwater users.	No – excavations required periodically to ensure safe and reliable operations.	Low – construction is short term during operations, potential impact event occurs during excavations which are low frequency.	Short term - only occur during periods of excavation.	Localised – any impacts are generally confined to easement or immediately adjacent.	Low – impact is not expected to be observable at nearest sensitive receptor.	Possible – Receptors may be impacted by other activities in the area.	Low – highly disturbed ecosystems along most of the pipeline.	Magnitude = low. Significance = Negligible

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5.5 Flora and Fauna (including biodiversity and sensitive ecosystems)

5.5.1 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

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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 (*Eucalyptus 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 (listed as Endangered in SA, 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 Endangered).

The Southern Brown Bandicoot was listed as nationally Endangered in 2001. 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

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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 (listed in 2016 as Critically Endangered in SA), Little Lorikeet (listed as Endangered in SA), Yellow-tailed Black-Cockatoo, Western Whipbird, Malleefowl (listed in 2020 as Vulnerable in SA) and Blue-winged Parrot (listed as Vulnerable in SA). 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.

In 2021, the Mallee Bird Community of the Murray Darling Depression Bioregion was listed as Endangered under the *Environment Protection and Biodiversity Conservation (EPBC) Act*, in recognition of the impact of invasive species, the loss and fragmentation of habitat, and climate related events impacting an assemblage of 20 bird species dependant on the bioregion.

Galaxias rostratus (Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow) were listed as critically endangered in 2016.

The Gang-gang Cockatoo was listed as nationally Endangered in 2022.

The South-eastern Red-tailed Black Cockatoo was listed as Endangered in 2000, in SA.

The Mallee Whipbird was listed as nationally Endangered in 2023

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:

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- *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 (Critically Endangered 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 (listed in 2020 as Vulnerable, in SA) (SAMDB NRM Board 2014).

In 2026, the Murray River and its associated wetlands, floodplains and ground water systems were classified as a Critically Endangered Threatened Ecological Community, under the *Environment Protection and Biodiversity Conservation (EPBC) Act*, in recognition of the issues facing the system and to provide a focus for intervention.

In 2021, the Mallee Bird Community of the Murray Darling Depression Bioregion was listed as Endangered under the *Environment Protection and Biodiversity Conservation (EPBC) Act*, in recognition of the impact of invasive species, the loss and fragmentation of habitat, and climate related events impacting an assemblage of 20 bird species dependant on the bioregion.

The destruction of wombat burrows in designated Wombat Borrow Protection Zones is prohibited under the *National Parks and Wildlife Act 1972*.

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Galaxias rostratus (Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow) were listed as critically endangered in 2016, in SA.

The Silver Perch was listed as nationally Endangered in 2024.

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 (listed in 2020 as Vulnerable in SA) 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

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Crested Grebe, Australasian Shoveler and Musk Duck, are primarily associated with either the Barossa or Warren Reservoirs (approximately 3 km from the pipeline).

The Chestnut-rumped Heathwren was listed as Endangered in 2020, in SA.

The Southern Brown Bandicoot was listed as nationally Endangered in 2001.

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*.

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Bead Samphire was listed in 2020 as Vulnerable in SA.

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.

5.5.2 Impact Events

The impact events relevant to flora and fauna are:

- Removal of native vegetation as a result of construction activities.
- Damage to or fragmentation of fauna habitats as a result of construction activities.
- Fauna mortality as a result of construction activities.
- Disruption to critical fauna lifecycle stages as a result of construction activities.
- Damage to or removal of native vegetation as a result of pipeline operation, maintenance and decommissioning activities.
- Disturbance to fauna as a result of pipeline operation, maintenance and decommissioning activities.

Refer to Table 5-13 for details of the assessment of potential impact events and confirmation of impact events.

These are discussed further below. Note that weeds, pests and pathogens are assessed in Section 5.13.

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.

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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 5.9.

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.

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Construction

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.

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.

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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,

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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.

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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.

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Table 5-13: Potential Impact Events and Confirmation of Impact Events – Flora and Fauna

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Flora and Fauna	Construction and commissioning	FF01	Removal of native vegetation as a result of construction activities.	- Creation of construction access and clearing of ROW - Earthworks (trenching, blasting, stockpiling) - Vehicle movement.	Physical disturbance/ removal of vegetation.	Native vegetation	Location of activity and presence of native vegetation.	Construction in areas where there is little or no native vegetation would reduce the potential for impact.	Yes – potential for impact to biodiversity and/or ecological value within and surrounding the project area. Siting may reduce SPR linkage.
Flora and Fauna	Construction and commissioning	FF02	Damage to or fragmentation of fauna habitats as a result of construction activities.	- Creation of construction access and clearing of ROW - Earthworks (trenching, blasting, stockpiling) - Vehicle movement.	Physical disturbance/ removal of vegetation/habitat.	Native fauna	Location of activity and presence of native vegetation / habitat.	Construction in areas where there is little or no native vegetation / habitat would reduce the potential for impact.	Yes – potential for impact to biodiversity and/or ecological value within and surrounding the project area. Siting may reduce SPR linkage.
Flora and Fauna	Construction and commissioning	FF03	Fauna mortality as a result of construction activities.	- Vegetation clearance - Earthworks (trenching, blasting) - Presence of open trench - Vehicle movement.	Direct disturbance Potentially increased access by pest animals (e.g., Red Fox, Feral Cat)	Native fauna	Location of activity and presence and abundance of native fauna	Construction in areas where there is little or no native vegetation / habitat would reduce the potential for impact.	Yes – potential for impact to biodiversity and/or ecological value within and surrounding the project area. Siting may reduce SPR linkage.
Flora and Fauna	Construction and commissioning	FF04	Disruption to critical fauna lifecycle stages as a result of construction activities.	Noise caused by presence of construction equipment and personnel on site.	Air	Native fauna	Location of activity and presence and abundance of native fauna.	Construction in areas where there is little or no native vegetation / habitat would reduce the potential for impact.	Yes – potential for impact to biodiversity and/or ecological value within and surrounding the project area. Siting may reduce SPR linkage.
Flora and Fauna	Operation, maintenance and decommissioning	FF05	Damage to or removal of native vegetation as a result of pipeline operation, maintenance and decommissioning activities.	- Vehicle movement - Earthworks/ excavations.	Physical disturbance/ removal of vegetation Limited regeneration of native vegetation	Native vegetation	Location of activity and presence of native vegetation.	Low sensitivity to change for a defined location due to existing knowledge of vegetation presence on the easement and use of control measures.	Yes – potential for impact to biodiversity and/or ecological value within and surrounding the project area. Siting may reduce SPR linkage.
Flora and Fauna	Operation, maintenance and decommissioning	FF06	Disturbance to fauna as a result of pipeline operation, maintenance and decommissioning activities.	Noise Vehicle movement Earthworks	Vehicle collision Air Physical disturbance	Native fauna	Location of activity and presence of native vegetation	Low sensitivity to change for a defined location due to existing knowledge of vegetation presence and use of control measures.	Yes – potential for impact to biodiversity and/or ecological value within and surrounding the project area. Siting may reduce SPR linkage.

5.5.3 Control Measures

Control measures to reduce the risk and impact to flora and fauna are detailed in Table 5-14, including environmental objectives and criteria.

Table 5-14: Control Measures, Environmental Objectives and Criteria – Flora and Fauna

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goals	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	FF01	Removal of native vegetation as a result of construction activities.	- Undertake planning and route selection via on-ground surveys prior to construction to avoid remnant vegetation as per SEA Gas Vegetation Clearance Procedure (OHSE-PR-005). - Conduct 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. - Use CSEMP, ELL, and alignment sheets to identify remnant vegetation requiring avoidance, including significant vegetation listed under the Environment Protection and Biodiversity Conservation Act (Cth) 1999 (EPBC Act). - Eliminate clearing/trimming vegetation where practicable by using previously disturbed areas. - Trim vegetation rather than clearing where possible. - Where practicable, retain living and dead trees along the ROW that provide habitat. - Restrict disturbance along the ROW to approved access and work areas. - Reduce width of ROW during construction in identified environmentally significant areas. - Obtain relevant permits for vegetation clearance activities prior to construction. - Source native seed and plant species for site specific rehabilitation. - Offset the loss of native vegetation by carrying out suitable revegetation or other works to obtain a 'significant environmental benefit (SEB)' in accordance with relevant regulatory requirements.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise adverse impacts to flora and fauna.	To minimise clearing or trimming of remnant native flora and avoid unapproved clearing or trimming.	- Ecological assessment undertaken by appropriately trained and experienced personnel to determine baseline biodiversity along the pipeline, and to identify and avoid any areas of sensitivity or 'no-go' areas. - Records (e.g. ecological assessments, audits / inspections) demonstrate that remnant vegetation is avoided where practicable and trimming of native flora minimised. ¹ - Records demonstrate that necessary approvals under the Native Vegetation Act have been obtained and SEB obligation has been satisfied where clearance is required.	- Elimination, by utilising where practicable previously disturbed areas. - CSEMP, Environmental Line List (ELL) and alignment sheets identify remnant vegetation requiring management/avoidance. - Administrative controls to flag/mark areas of remnant and significant vegetation under the Environment Protection and Biodiversity Conservation Act (Cwth) 1999 (EPBC Act). - Where practicable, retention of living and dead trees (habitat) along the ROW. - Approved trimming of vegetation to be conducted by qualified operators in lieu of removal where practicable (Refer Native Vegetation Clearance Procedure (OHSE-PR-005)). - Disturbance along the ROW to be restricted to approved access and work areas. - Where practicable, reduction of ROW width during construction in identified environmentally significant areas. - Administrative control of vegetation clearance activities, ensuring that applicable permits or clearance consents are obtained as required prior to commencement. - Where practicable, provenance seed and plant species to be sourced for rehabilitation, prior to commencing vegetation clearance.
						To appropriately rehabilitate the ROW to as near as reasonably practicable to pre-construction conditions while maintaining line of sight between the marker posts along the easement.	- Records demonstrate that species biodiversity along the ROW is as far as reasonably practicable, consistent with pre-construction conditions. (Note: An assessment of consistency with surrounding areas will take into account that regrowth is a time and rainfall dependent process). - Records demonstrate no reasonable complaints received from landholders in relation to vegetation regrowth along the ROW.	- Revegetation with appropriate local provenance native species of areas along the easement where remnant vegetation has been cleared during construction. - Post construction restoration of pasture and broad acre areas along the ROW in consultation with landholders. - Where required, compliance auditing of ROW. - Where required, photo point monitoring to validate compliance.
						To achieve a Significant Environmental Benefit (SEB) for native vegetation clearance.	Records demonstrate that vegetation offsets are fulfilled in consultation with stakeholders:	Where clearance of native vegetation cannot be avoided Significant Environmental Benefit to be implemented in consultation with stakeholders.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goals	Assessment Criteria	Leading Performance Criteria
							SEB is approved by the South Australian Native Vegetation Council.	
Construction and commissioning	FF02	Damage to or fragmentation of fauna habitats as a result of construction activities.	- Identify and flag significant fauna habitats that require management or avoidance during construction. - Avoid clearing hollow bearing or old growth trees, particularly Eucalypts (including dead trees) as far as practicable. - If watercourse crossings are required, use crossing methods that minimise impacts to in-stream habitats, and implement mitigation measures as per the CSEMP. - Ensure that measures are implemented (e.g. buffer zones, sediment and erosion controls) to prevent any significant impact to the Adelaide Dolphin Sanctuary. - Develop and implement site specific rehabilitation measures and undertake revegetation where appropriate as outlined above in FF01.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise adverse impacts to flora and fauna.	To minimise disturbance and potential for entrapment of fauna and livestock.	- Ecological assessment undertaken by appropriately trained and experienced personnel to determine baseline biodiversity along the pipeline, and to identify and avoid any areas of sensitivity or 'no-go' areas. - Records (e.g. audits / inspections / incident reports) show that native fauna and livestock attrition due to construction activities is As Low As Reasonably Practicable (ALARP).¹	- Identification and flagging of significant fauna habitats that require management or avoidance during construction. - Elimination of significant areas through optimum alignment selection which minimises or avoids impacts to nesting or breeding habitats (e.g. – South-eastern Red-tailed Black-Cockatoo). - Exclusion of livestock from operational areas along the ROW. - Provision of ramps at regular intervals in trench lines and excavations to mitigate against entrapment of fauna or livestock. - Daily inspection of open trenches and excavations for trapped fauna and livestock.
Construction and commissioning	FF03	Fauna mortality as a result of construction activities.	- Provide ramps at regular intervals in trench lines and excavations to minimise entrapment of fauna or livestock. - Avoid driving at dawn, dusk and night where practicable. - Minimise the period that the trench is open during construction. - Regularly inspect open trenches and excavations for trapped fauna and livestock.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise adverse impacts to flora and fauna.	To minimise disturbance and potential for entrapment of fauna and livestock.		
Construction and commissioning	FF04	Disruption to critical fauna lifecycle stages as a result of construction activities.	- In areas of higher ecological significance, avoid construction during breeding periods for significant species (e.g. South-eastern Red-tailed Black-Cockatoo), where practicable and/or implement management protocols (e.g. buffer zones) to minimise impacts. - Manage noise impacts by: - Maintaining machinery and vehicles in accordance with manufacturer specifications - Shutting down noisy	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise adverse impacts to flora and fauna.	To minimise disturbance and potential for entrapment of fauna and livestock.		

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goals	Assessment Criteria	Leading Performance Criteria
			equipment and machines when not in use Implementing noise attenuation measures if required.					
Operation, maintenance and decommissioning	FF05	Damage to or removal of native vegetation as a result of pipeline operation, maintenance and decommissioning activities.	- Avoid traversing areas of native vegetation where possible when accessing or patrolling the easement. - Restrict line of sight clearance to the minimum necessary for safe pipeline operation. - Undertake pre-start environmental assessment for excavations in areas of significant flora or fauna (as identified in the ELL) and implementing appropriate management measures identified by the assessment. - Restrict any vegetation clearance required for excavations to the	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise adverse impacts to flora and fauna.	To restrict clearing of native vegetation during the course of operational activities to sites which were offset during construction or for which approval has been obtained.	- Records of audits / inspections show that approved trimming of native vegetation is restricted to the minimum necessary to ensure line of sight between pipeline marker posts.² - Records demonstrate that vegetation management within the easement or on adjacent land to the easement is limited to previously disturbed areas unless appropriate approval has been obtained. ²	- Vegetation is trimmed to ensure line of sight between pipeline marker posts in accordance with AS2885 requirements in accordance with Vegetation Clearance Procedure (OHSE-PR-005). - Vegetation trimming minimises impacts to flora and fauna.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goals	Assessment Criteria	Leading Performance Criteria
			easement and limit it to the minimum necessary. - Trim vegetation rather than clearing, where possible in accordance with AS2885 requirements and Vegetation Clearance Procedure (OHSE-PR-005). - Avoid removing trees retained on the easement during construction. - Where vegetation removal is required, avoid disturbance to soil where practical to preserve root and seed stock along the easement. - Respread cleared vegetation over the easement and undertake active revegetation where required.			To promote and maintain regrowth of native vegetation along the easement, consistent with the surrounding area, ensuring that line of sight between pipeline marker posts is maintained.	- Records of audits / inspections demonstrate that species abundance and vegetative cover along the easement to be as near as practicable to adjoining areas in accordance with site specific management criteria. (Note: Assessment of consistency with surrounding areas will take into account that regrowth is a time and rainfall dependent process).² - No reasonable complaints received from landholders or third-party users in relation to adverse impacts to vegetation, native fauna or livestock.	- Regular inspections of the easement to validate revegetation works. - Liaison with landholders and land users to validate re-vegetation of broad acre areas following maintenance activities. - Elimination of operational impacts by restricting maintenance activities to designated facilities, access tracks and public thoroughfares unless stakeholders have been consulted. - Note: Prior to conducting vegetation trimming along the easement stakeholders must be consulted (Refer Native Vegetation Clearance Procedure (OHSE-PR-005)).

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goals	Assessment Criteria	Leading Performance Criteria
Operation, maintenance and decommissioning	FF06	Disturbance to fauna as a result of pipeline operation, maintenance and decommissioning activities.	- Undertake pre-start environmental assessment for excavations in areas of significant flora or fauna (as identified in the ELL) and implementing appropriate management measures identified by the assessment. - Plan excavations at maintenance sites to minimise the period that the trench is open. - Provide means of escape for fauna trapped in open trenches - Regular inspection of trenches to check for trapped fauna, especially in areas of high ecological sensitivity. - Minimise the time between clearing and rehabilitation when excavations are required. - Ensure management measures are implemented (e.g. buffer zones, sediment and erosion controls) to prevent any impact to the Adelaide Dolphin Sanctuary.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise adverse impacts to flora and fauna.	To ensure that maintenance activities are planned and conducted in a manner that minimises impacts on vegetation, native fauna and livestock.	Records (e.g. audits, inspections, incident reports) demonstrate that native fauna, flora and livestock impacts associated with maintenance activities are reduced to ALARP. ²	- Pre-start environmental assessment for excavations in areas of significant flora or fauna (as identified in the Environmental Line List (OHSE-PR-018)). - Management plan implemented for significant (EPBC listed) fauna and flora species (i.e. South-eastern Red-tailed Black-Cockatoo). - Exclusion of livestock from active maintenance areas along the easement in consultation with landholders. - Provision of ramps at regular intervals in open trenches and other excavations to mitigate against entrapment of fauna or livestock - Daily inspection of open trenches and excavations for trapped fauna and livestock. - Prompt reinstatement and revegetation of cleared vegetation. - Where required, auditing of easement and photo point monitoring to validate compliance.

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5.5.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with flora and fauna is **Low** or **Negligible**. Control measures targeted at assessing the sites prior to commencement of work will make sure areas of higher sensitivity will be avoided. Potential impacts from the proposed activities are localised and limited scale and readily manageable using standard control measures.

Refer to Table 5-15 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-15: Environmental Significance Assessment – Flora and Fauna

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
FF01	Removal of native vegetation as a result of construction activities.	No – controls would largely avoid native vegetation clearance, however native vegetation may be present, and complete avoidance may not be possible.	Low – clearance is limited to the construction period.	Long lasting – impact is longer term, but generally reversible through site rehabilitation and revegetation. Impacts would be offset by SEB.	Localised – vegetation clearance limited to the ROW and access roads.	Low – vegetated areas would generally be avoided by the pipeline. Impacts would be offset by SEB.	Possible – other projects in the area could also result in clearance of native vegetation.	Low - medium – pipeline alignments would generally be located in areas of low sensitivity and avoid native vegetation in good condition, however complete avoidance may not be possible.	Magnitude = Low Significance = Low
FF02	Damage to or fragmentation of fauna habitats as a result of construction activities.	No – controls would largely avoid fauna habitat (native vegetation), however complete avoidance may not be possible.	Low – clearance is limited to the construction period.	Long lasting – impact is longer term, but generally reversible through site rehabilitation and revegetation. Impacts would be offset by SEB	Localised – fauna habitat reduction is restricted to the ROW. Fauna are generally likely able to traverse the ROW clearance area to access habitat on the other side.	Low – fauna habitat (vegetated areas) would generally be avoided by the pipeline. Impacts would be offset by SEB.	Possible – other projects in the area could also result in impact to fauna habitats.	Low - medium – pipeline alignments would generally be located in areas of low sensitivity and avoid vegetation providing significant fauna habitat, however complete avoidance may not be possible.	Magnitude = Low Significance = Low
FF03	Fauna mortality as a result of construction activities.	No – controls would largely avoid impact, however some impact (e.g. collision) could occur.	Low – impacts are relatively unlikely and are limited to the construction period.	Short term – impact to fauna species is limited to the construction period.	Localised – impacts would be restricted to the project site and immediate surroundings.	Low – impacts not likely to be significant on a population basis.	Possible – other projects or activities in the area could also result in impacts to fauna.	Low - medium – pipeline alignments would generally be located in areas of low sensitivity and avoid vegetation providing significant fauna habitat.	Magnitude = Low Significance = Low
FF04	Disruption to critical fauna lifecycle stages as a result of construction activities.	No – controls would largely avoid habitat for significant fauna, however noise and general disturbance from construction activities cannot be avoided.	Low – impacts are relatively unlikely and are limited to the construction period.	Short term – impacts last days to weeks.	Localised – impacts occur only in or adjacent to the active construction zone, which progresses along the ROW.	Low – impacts not likely to be significant on a population basis.	Possible – other projects or activities in the area could also result in impacts to fauna.	Low - medium – pipeline alignments would generally be located in areas of low sensitivity and avoid vegetation providing significant fauna habitat.	Magnitude = Low Significance = Low
FF05	Damage to or removal of native vegetation as a result of pipeline operation and maintenance activities.	No – vegetation trimming in the ROW may be required to maintain line of sight. Clearance may be required for excavation (if native vegetation present at the site).	Low – any notable vegetation impacts would be infrequent.	Long lasting – impact is longer term, but generally reversible through site rehabilitation and revegetation.	Localised – vegetation impacts generally restricted to the easement, with clearance occurring in limited areas if excavation is required.	Low – vegetation clearance would generally be small-scale, in areas which were previously cleared for construction.	Possible – other projects in the area could also result in clearance of native vegetation.	Low – impacts would generally be restricted to the easement which was previously cleared for construction.	Magnitude = Low Significance = Negligible
FF06	Disturbance to fauna as a result of pipeline operation and maintenance activities.	No – activities resulting in disturbance to fauna cannot be completely avoided.	Low – impacts would generally be infrequent.	Short term – impacts would generally be limited in duration.	Localised – vegetation impacts generally restricted to the easement.	Low – impacts on fauna would be very limited and not likely to be significant on a population basis.	Possible – other projects or activities in the area could also result in impacts to fauna.	Low – the pipeline is predominantly located in areas of low sensitivity with limited fauna habitat value.	Magnitude = Low Significance = Negligible

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5.6 Cultural and Historic Heritage (aboriginal and non-aboriginal)

5.6.1 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 Kurna 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:

- First Nations of the South East
- First Peoples of the River Murray Mallee Region
- Kurna Yerta Aboriginal Corporation
- Mannum Aboriginal Community Association
- Ngarrindjeri Aboriginal Corporation
- Ngarrindjeri Regional Authority
- Nori Native Title Aboriginal Corporation
- Peramangk Aboriginal Corporation
- South East Aboriginal Focus Group;

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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 Wolseley – 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 Potarwutj, 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.

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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 people 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.

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The pipeline alignment had been previously 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.

5.6.2 Impact Events

The impact events relevant to cultural and historic heritage are:

- Construction and commissioning activities result in disturbance of heritage (archaeological and built) and culturally sensitive sites and vegetation.
- Operational, maintenance and decommissioning excavation activities result in disturbance of identified heritage (archaeological and built) and culturally sensitive sites and vegetation or disturbance of not previously identified sites.

Refer to Table 5-16 for details of the assessment of potential impact events and confirmation of impact events.

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Table 5-16: Potential Impact Events and Confirmation of Impact Events – Cultural and Historic Heritage

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Cultural Heritage	Construction and commissioning	CH01	Construction activities result in disturbance of heritage (archaeological and built) and culturally sensitive sites and vegetation	• Eart • works (trenching, topsoil removal, installation of pipeline infrastructure) • Creation of construction access • Clear and grade operations • Horizontal directional drilling. • Clearing operations	Direct disturbance	Sites, objects or remains, whether known or unknown. Culturally sensitive vegetation	Review of known heritage sites and consultation with relevant government and Aboriginal groups may not result in identification of all cultural heritage sites. Route selection to avoid cultural heritage areas, where practicable.	Cultural heritage sites may not all be recorded in register or there may be insufficient awareness.	Yes – potential for impact
Cultural Heritage	Operation, maintenance and decommissioning	CH02	Operational excavation activities result in disturbance of identified heritage (archaeological and built) and culturally sensitive sites and vegetation or disturbance of not previously identified sites.	• Erosion and subsidence repairs • Pipeline incident/emergency • Coating/pipeline inspection or refurbishment • Installation and/or maintenance of anode beds • New tie-ins/ replacement/ repair. • Clearing operations	Direct disturbance	Sites, objects or remains, whether known or unknown. Culturally sensitive vegetation	Review of known heritage sites and consultation with relevant government and Aboriginal groups may not result in identification of all cultural heritage sites. Route selection to avoid cultural heritage areas, where practicable.	Cultural heritage sites may not all be recorded in register or there may be insufficient awareness.	Yes – potential for impact

5.6.3 Control Measures

Control measures to reduce the risk and impact to cultural and historic heritage are detailed in Table 5-17, including environmental objectives and criteria.

Table 5-17: Control Measures, Environmental Objectives and Criteria – Cultural and Historic Heritage

Phase	Impact ID	Impact Event	Control Measures	Uncertainty & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	CH01	Construction and commissioning activities result in disturbance of heritage (archaeological and built) and culturally sensitive sites and vegetation.	- Undertake cultural heritage surveys with relevant Traditional Owners groups, prior to construction in areas that have not been previously surveyed. - Confine construction activities to areas deemed suitable by Traditional Owners through a cultural heritage survey (work area clearance), where practicable - Where practicable, select pipeline alignments that avoids known cultural heritage sites and all standing buildings and structures, as identified in AAR searches or during heritage surveys. - Where appropriate, install flagging, protective fencing and erosion control measures to protect sites near the easement that are not directly impacted by construction. - Implement site management measures to avoid impacts to sites along the pipeline alignment. - Obtain appropriate authorisations for any unavoidable site disturbances required for pipeline construction. - Conduct site inductions for construction workers and site visitors, including protocols for the accidental discovery of heritage material, in accordance with the Cultural Heritage Management Procedure (OHSE-PR-019). - Review site specific considerations before undertaking operational activities that could disturb sites. - Identify and avoid SEB and other non-Aboriginal heritage sites (e.g. through searches on NatureMaps) and consult with relevant stakeholders to implement management and control measures.	High certainty that proposed control measures will be effective. Standard control measures that are well understood and that have been successfully implemented.	To minimise and manage impacts to heritage and culturally sensitive sites and values during construction activities.	To minimise disturbance of heritage (archaeological and built) and culturally sensitive sites and vegetation in accordance with the provisions of the relevant acts.	- Records of audits/site inspections demonstrate no impact to identified heritage sites without prior approval in accordance with applicable legislative requirements: ¹ <i>Aboriginal Heritage Act (SA) 1988</i> (AH Act) <i>Heritage Place Act (SA) 1993</i> (HP Act). - All newly identified sites reported to the appropriate authority, consistent with any applicable Native Title Agreement, the AH Act and the Coroners Act 2003.	- Identification of known heritage sites along the ROW (including search of relevant registers/databases) - Consultation with relevant parties (including government agencies and/or relevant Aboriginal cultural heritage groups) where appropriate. - Avoidance of cultural heritage sites as far as practicable - Pre-construction site surveys and cultural heritage monitoring during clear and grade operations within sensitive areas. - Implementing management protocols for accidental discovery of cultural heritage material (refer Cultural Heritage Management Procedure (OHSE-PR-019)) - Acquisition of all necessary approvals permits and authorisations prior to construction. - Records demonstrate that site works cease upon the discovery of Aboriginal or non-Aboriginal Heritage. - All necessary approvals /notifications actioned in the event of accidental discovery of cultural material.
Operation, maintenance and decommissioning	CH02	Operational, maintenance and decommissioning excavation activities result in disturbance of identified heritage (archaeological and built) and culturally sensitive sites and vegetation or disturbance of not previously identified sites.	- Consult with relevant heritage groups in the event that access is required in other than existing surveyed areas. - Conduct site surveys and cultural heritage monitoring (where required) before and during excavations in other than existing surveyed areas. - Review site-specific considerations (e.g. Environmental Line List (OHSE-PR-018) before excavation in existing surveyed areas. - Where appropriate, install flagging, protective fencing and erosion control measures to protect sites near the easement that are not directly impacted by construction. - Implement site management measures to avoid impacts to sites along the pipeline alignment. - Obtain appropriate authorisations for any unavoidable site disturbances required for pipeline operations. - Conduct site inductions for workers and site visitors, including protocols for the accidental discovery of heritage material, in accordance with the Cultural Heritage Management Procedure (OHSE-PR-019).	High certainty that proposed control measures will be effective. Standard control measures that are well understood and that have been successfully implemented.	To adequately protect heritage and culturally sensitive sites and values during operational activities.	To ensure that identified heritage (archaeological and built) and culturally sensitive sites and vegetation are not disturbed and where new sites are identified, they are appropriately managed.	- No impact to known sites without prior approval in accordance with applicable legislative requirements including Aboriginal Heritage Act (SA) 1998 and Heritage Places Act (SA) 1993. - Newly identified sites are reported to the appropriate authority and recorded.	- Consultation with relevant heritage groups in the event that access is required in other than existing surveyed areas. - Site surveys and cultural heritage monitoring (where required) before and during excavations in other than existing surveyed areas. - Review of site-specific consideration (e.g. Environmental Line List (OHSE-PR-018) before excavations in existing surveyed areas. - Implementation of cultural heritage management protocols (Refer Cultural Heritage Management procedure (OHSE-PR-019)) in the event of accidental discovery of cultural heritage material during operational activities.

Phase	Impact ID	Impact Event	Control Measures	Uncertainty & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Review site specific considerations before undertaking operational activities that could disturb sites. - Identify and avoid SEB and other non-Aboriginal heritage sites (e.g. through searches on NatureMaps) and consult with relevant stakeholders to implement management and control measures.					- All necessary approvals /notifications actioned in the event of accidental discovery of cultural material. - Incident reporting - Records of audits, where required, demonstrate that site works cease upon the discovery of Aboriginal or non-Aboriginal Heritage.

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5.6.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with cultural and historic heritage is **Moderate** for construction and **Low** for operational activities. Potential impacts to heritage is managed to ALARP (low frequency) by control measures adopted to identify Aboriginal and built heritage prior to undertaking earthworks.

Refer to Table 5-18 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-18: Environmental Significance Assessment – Cultural and Historic Heritage

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
CH01	Construction activities result in disturbance of heritage (archaeological and built) and culturally sensitive sites and vegetation.	No – impacts may occur even when following appropriate protocols due to the incomplete mapping of culturally sensitive areas.	Low – Desktop and in person surveys of the pipeline construction areas have identified known heritage areas and these areas have been either avoided or relevant permissions obtained to disturb site. Unauthorised impact would only occur in an unplanned event (e.g. activity outside approved areas). Obscured/subsurface Aboriginal and built Heritage sites that have not been previously identified may be disturbed during construction excavation activity however this is unlikely with controls in place.	Permanent – impacts to heritage sites are permanent and non-reversible.	Localised – impacts confined to disturbed site.	High – permanent impact to heritage, Traditional Owners and their communities.	Yes – archaeological sites within the vicinity of the pipeline have been impacted over a prolonged period of time throughout the pipeline area, with permanent damage and ongoing impact to Traditional Owners and their communities.	Medium – a desktop and in person heritage assessment of the development area did not identify all known Aboriginal or built heritage sites.	Magnitude = Moderate Significance = Moderate Potential impacts to heritage managed to ALARP (low frequency) by control measures adopted, to identify Aboriginal and built heritage prior to undertaking earthworks.
CH02	Operational excavation activities result in disturbance of identified heritage (archaeological and built) and culturally sensitive sites and vegetation or disturbance of not previously identified sites.	No – impacts may occur even when following appropriate protocols due to the incomplete mapping of culturally sensitive areas.	Rare – Operations areas disturbed during pipeline construction. Heritage areas on easement that have not been disturbed during construction are identified and an exclusion zone established.	Permanent – impacts to heritage sites are permanent and non-reversible	Localised – impacts confined to disturbed site.	Moderate – permanent impact to heritage, Traditional Owners and their communities.	Yes – archaeological sites within the vicinity of the pipeline have been impacted over a prolonged period of time throughout the pipeline area, with permanent damage and ongoing impact to Traditional Owners and their communities.	Low – Operations areas have been significantly disturbed during pipeline construction.	Magnitude: Moderate Significance: Low

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5.7 Noise and Vibration

5.7.1 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, developments in the areas of Gawler East and Munno Para have moved 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. Work is in progress to install a silencer at the Munno Para MLV vent to enable pipeline emergency venting whilst complying with EPA noise emission criteria.

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.

5.7.2 Impact Events

The impact events relevant to noise and vibration are:

- Disturbance to sensitive receptors and fauna from construction noise.
- Disturbance to sensitive receptors and fauna from routine operational and maintenance noise.
- Disturbance to sensitive receptors and fauna from decommissioning noise

Refer to Table 5-19 for details of the assessment of potential impact events and confirmation of impact events.

These are discussed further below.

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 Pipeline System would be classed as ‘public infrastructure’, and therefore construction noise would fall outside the *Environment Protection (Commercial and Industrial Noise) Policy 2023*, however the general environmental duty under the EP Act is relevant. The *Local Nuisance and Litter Control Act*

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2016 (LNLC Act) would generally apply to public infrastructure (with the exception of emergency works or works scheduled to avoid or reduce inconvenience or disruption to traffic or pedestrians). However, as the activities would be carried out under an authorisation under the Energy Resources Act which imposes requirements to minimise noise (i.e. PL 13 and the SEO), it would also be exempt from the LNLC Act.

Consequently, noise impacts from construction would need to comply with the general environmental duty provisions of the EP Act. To meet this duty, EPA guideline 425/23 *Construction noise* indicates that the Department for Infrastructure and Transport (DIT) *Guideline for the Management of Noise and Vibration: Construction and Maintenance Activities* should be referenced for construction noise in relation to public infrastructure.

Under the EPA and DIT construction noise guidelines, construction noise that causes an adverse impact on amenity should, where possible, be restricted to 7.00 am to 7.00 pm, Monday to Saturday. Outside these hours, the protocols outlined in the DIT guideline should be followed, which include further assessment, consultation and minimisation/mitigation.

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

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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 (Commercial and Industrial 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 (Commercial and Industrial Noise) Policy 2023* 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.

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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.

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Table 5-19: Potential Impact Events and Confirmation of Impact Events – Noise and Vibration

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Noise & Vibration	Construction and commissioning	NV01	Disturbance to sensitive receptors and fauna from construction noise.	- Operation of construction vehicles and equipment in the ROW and access tracks. e.g. excavators / earth moving equipment - Transport vehicles (delivering construction materials / removing spoil and waste) - Power generator/s - Dewatering pumps - High pressure abrasive blasting of pipeline. - Pipeline venting and gas release during pipeline commissioning activities	Air	Adjacent land users Native fauna and livestock	Proximity of sensitive receptors to the pipeline is dependent on the site of construction.	Low sensitivity to change due to pipeline mapping and permanence of pipeline location. Sources and controls are well known	Yes – Potential for noise / vibration impact. SPR linkage depends on location of sensitive receptors relative to the construction site.
Noise and Vibration	Operations and, maintenance	NV02	Disturbance to sensitive receptors and fauna from routine operational and maintenance noise.	- Operation of compressor stations and other facilities (e.g. PRMS) - Vehicles/machinery (e.g. chainsaw) used for vegetation trimming to maintain line of sight along the ROW. - Vehicles/machinery (e.g. spraying truck) used for weed removal activities along the ROW. - Small planes or drones conducting aerial inspections of ROW. - High pressure abrasive blasting during pipeline repairs. - Venting/high pressure gas released during pipeline maintenance activities. (large quantities of gas (10-100TJ) released over 1-6 hour period during emergency venting)	Air	Adjacent land users Native fauna and livestock	Proximity of sensitive receptors to the pipeline is dependent on the site of activities.	Low sensitivity to change due to pipeline mapping and permanence of pipeline location. Sources and controls are well known	Yes – Potential for noise / vibration impact. SPR linkage depends on location of sensitive receptors relative to the site.
Noise & Vibration	Decommissioning	NV03	Disturbance to sensitive receptors and fauna from decommissioning noise	- Operation of construction vehicles and equipment - Pipeline venting.	Air	Adjacent land users Native fauna and livestock	Proximity of sensitive receptors to the pipeline is dependent on the site of activities.	Low sensitivity to change due to pipeline mapping and permanence of pipeline location. Sources and controls are well known	Yes – Potential for minor noise / vibration impact. SPR linkage depends on location of sensitive receptors relative to the site.

5.7.3 Control Measures

Control measures to reduce the risk and impact to noise and vibration are detailed in Table 5-20, including environmental objectives and criteria.

Table 5-20: Control Measures, Environmental Objectives and Criteria – Noise and Vibration

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and Commissioning	NV01	Disturbance to sensitive receptors and fauna from construction noise.	- Comply with relevant EPA noise policies and guidelines when conducting noise generating construction and commissioning activities near residences as per EPA Guideline for Assessment of Abrasive Blasting (EPA 672/17). - Noise management hierarchy of control applied in accordance with SEA Gas Noise Emissions Hazard Standard (OHSE-ST(H)-017) to minimise noise (avoid, minimise potential impacts, manage). - Restrict noisy activities to normal working hours (7.00 am - 7.00 pm, Monday to Saturday) where practicable. - If unavoidable out of hours work is required during construction activities, undertaking consultation, assessment, management, mitigation and consultation consistent with the DIT Guideline for the Management of Noise and Vibration: Construction and Maintenance Activities. - Provide advanced notice to nearby residents, landholders and land users when unavoidable out-of-hours or short duration excessive noise will be generated, as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022). - Conduct pre-start environmental assessments for excavations in areas of significant fauna (as identified in the Environmental Line List (OHSE-PR-018)). - Apply noise attenuation controls to vehicles, plant and equipment where required. - Maintain construction vehicles, plant and equipment in good working order. - Limit duration of abrasive blasting works where possible, as per SEA Gas Abrasive Blasting and Painting Procedure (OHSE-PR-022). - Where required, undertake compliance auditing of ROW.	High certainty that proposed control measures will be effective, industry standard control measures that are well understood and that have been successfully implemented.	To minimise construction noise.	To minimise noise impacts associated with the movement and operation of construction vehicles and equipment.	- ROW activities must comply with the relevant EPA noise policies and guidelines unless prior consultation and agreement with stakeholders have occurred. - No reasonable noise complaints received in relation to noise abatement issues are left unresolved.	- Construction noise near residences must comply with EPA noise policies and guidelines. - Consultation with local residents/landholders/land users when unavoidable out-of-hours or short duration excessive noise will be generated. - Engineering controls to be applied to vehicles, plant and equipment in order to comply with noise abatement requirements.
				High certainty that proposed control measures will be effective, industry standard control measures that are well understood and that have been successfully implemented.		To minimise noise impacts associated with pipeline or facility commissioning activities.		

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Operations and maintenance	NV02	Disturbance to sensitive receptors and fauna from routine operational and maintenance noise.	- Noise management hierarchy of control applied in accordance with SEA Gas Noise Emissions Hazard Standard (OHSE-ST(H)-017) to minimise noise (avoid, minimise potential impacts, manage). - Locate and design compressor stations and above ground facilities to meet EPA noise criteria. - Model pipeline facility noise emissions for new or modified facilities based on detailed design information (incorporating any new receptors near the site since initial modelling at commissioning.) - Provide advanced notice to nearby residents, landholders and land users when unavoidable out-of-hours or short duration excessive noise will be generated as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022). - Comply with EPA noise policies and guidelines (EPA Guideline for Assessment of Abrasive Blasting (EPA 672/17)). - Conduct pre-start environmental assessments for excavations in areas of significant fauna (as identified in the Environmental Line List (OHSE-PR-018)). - Pre-maintenance compliance auditing of vehicle and equipment servicing records. - Apply noise attenuation controls to vehicles and equipment where required. - Limit duration of abrasive blasting where possible, as per SEA Gas Abrasive Blasting and Painting Procedure (OHSE-PR-022). - Restrict maintenance activities to designated facilities, access tracks and public thoroughfares, unless stakeholders are consulted. - Locate venting facilities away from residences. - Incident reporting and gas venting recording systems in place. - Maintain a project-specific Emergency Response Plan. - Induct and train operational personnel in emergency response procedures, with clearly defined roles and responsibilities for emergency events. - Where required, conduct regular audits of emergency response systems. - Implement an incident reporting system in place.	High certainty that proposed control measures will be effective, industry standard control measures that are well understood and that have been successfully implemented.	To minimise noise impacts due to routine operational activities.	To ensure that routine operational activities comply with noise abatement standards.	- Records (e.g. noise measurements during commissioning / operation of facilities) demonstrate routine operational activities in the near vicinity of sensitive areas (e.g. - near residences) comply with the relevant EPA noise policies and guidelines. - Records demonstrate that all reasonable complaints received in relation to noise abatement issues are resolved.	- Noise assessment undertaken for new above-ground facilities located near residences to ensure compliance of operational noise with the Environment Protection (Commercial and Industrial Noise) Policy 2023. - Operational activities near residences or sensitive land use areas to comply with EPA noise policies and guidelines. - Consultation with local residents/landholders/land users when short duration excessive noise will be generated. - Where required, compliance auditing of ROW. - Consultation with stakeholders when planned unavoidable out-of-hours or short duration excessive noise will be generated. - Incident reporting.
Decommissioning	NV03	Disturbance to sensitive receptors and fauna from decommissioning noise.	- Implement controls measures consistent with controls for pipeline construction. - Locate venting facilities away from residences. - Schedule venting during daylight hours. - Provide advance notice to nearby residents and landholders of planned venting. - Implement a decommissioning noise plan.	High certainty that proposed control measures will be effective, industry standard control measures that are well understood and that	Minimise noise impacts on amenity.	To minimise disturbance to landholder and third party stakeholders during decommissioning activities.	- Records demonstrate no reasonable noise complaints received from residents are left unresolved. - Records demonstrate that landholder activities not materially restricted or compromised as a result of	- Activities are undertaken in accordance with approved decommissioning and rehabilitation plans. - Records of communications with landholders and affected third parties prior to, during and

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
				have been successfully implemented.			decommissioning activities, unless by prior arrangement. Records of audits/inspections demonstrate that noise from decommissioning is appropriately managed.	following decommissioning activities. Landholder activities not materially restricted as a result of decommissioning activities.

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5.7.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with noise and vibration **Low** to **Moderate** for construction and **Low** for operations, maintenance and decommissioning activities. Potential impacts to noise and vibration associated with construction is managed to ALARP by implementing control measures that are recognised as standard industry practice and are considered effective in reducing impacts due to noise and vibration.

Refer to Table 5-21 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-21: Environmental Significance Assessment – Noise and Vibration

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
NV01	Disturbance to sensitive receptors and fauna from construction noise.	No – impacts can be minimised through identified controls but not avoided.	Low – impacts do not occur after construction has been completed.	Short term – impacts are temporary, occurring only during construction phase.	Localised – occurs only in the active construction zone, which moves progressively along the ROW.	Low to Moderate - not expected to exceed statutory reference values or environmental quality standards.	Possible – some potential for cumulative effects depending on third party operations in the area.	Low (most of the ROW) to Medium (near occupied residences, significant fauna and livestock areas).	Magnitude = Low to Moderate Significance = Low to Moderate ALARP assessment: Control measures identified are recognised as standard industry practice and are considered effective in reducing impacts due to noise.
NV02	Disturbance to sensitive receptors and fauna from routine operational noise.	No – impacts can be minimised through identified controls but not avoided. However, design of compressor stations and other facilities can ensure that exceedance of operational noise criteria is avoided.	Low – activities such as inspections may occur monthly to annually, however activities generating higher noise levels (e.g. repairs) are generally infrequent.	Short term – impacts temporary, occurring only during occasional maintenance.	Localised – generally occurs at point locations, or moves progressively along the ROW.	Low - not expected to exceed statutory reference values or environmental quality standards.	Possible – some potential for cumulative effects depending on third party operations in the area.	Same as above	Magnitude = Low Significance = Low
NV03	Disturbance to sensitive receptors and fauna from decommissioning noise	No – impacts can be minimised through identified controls but not avoided.	Low – impacts are planned/managed and occur only for pipeline decommissioning.	Short-term – impacts may last days to weeks.	Localised – generally occurs at above-ground facilities.	Low to Moderate - not expected to exceed statutory reference values or environmental quality standards.	Possible – some potential for cumulative effects depending on third party operations in the area.	Same as above	Magnitude = Low Significance = Low

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5.8 Air Quality and Greenhouse Gas

5.8.1 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.

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, glass production and power generation.

On a smaller scale, industrial emissions from the regional centre of Murray Bridge include those from the dairy production (in transition) 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.

5.8.2 Impact Events

The impact events relevant to air quality and greenhouse gas:

- Dust generation from construction activities impacts receptors.
- Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during construction impact receptors (including GHG Emissions from gas venting during commissioning)
- Dust generation from operation, maintenance and decommissioning activities impacts receptors.
- Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during operation, maintenance and decommissioning impact receptors.
- GHG emissions associated with normal and abnormal operations, maintenance and decommissioning activity and process combustion impact receptors.

Refer to Table 5-23 for details of the assessment of potential impact events and confirmation of impact events

These are discussed further below.

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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:

- Scale of the activities (any new construction activities or excavation would be relatively small scale);
- Temporary nature of the work; and
- 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 5.9 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

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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 5-22.

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 5-22.

Table 5-22: 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'	<i>1-hour duration not reported in 2001 modelling</i>	-	-	-	31,240

The results of emissions modelling from the Coomandook compressor station and future Yallamurray compressor station shown in Table 5-22 indicate that the predicted ground level concentrations for NO₂ and CO comply with relevant the NEPM standard and EPA allowable GLCs.

Stack source emissions of NO₂ (Coomandook 0.2 g/m³, Yallamurray 0.3 g/m³) and CO (Coomandook and Yallamurray 0.1 g/m³) for both sites also comply with the maximum allowable levels of 0.35 g/m³

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for NO₂ and 1 g/m³ 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.

Greenhouse Gas

Greenhouse gases emitted during pipeline operations would predominantly arise from small amounts of natural gas (namely methane) vented during routine maintenance/operation and from combustion products emitted during compressor station and heater 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 (NGER) 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. Note that SEA Gas is not legislatively obligated to submit NGER reporting under current operations but currently elects to do so.

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 CO₂e/GJ) fuels such as coal and petroleum products, and displacing more greenhouse gas intensive fuels in electricity generation.

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Table 5-23: Potential Impact Events and Confirmation of Impact Events – Air Quality and Greenhouse Gas

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Air Quality and GHG	Construction and commissioning	AQ01	Dust generation from construction activities impacts receptors.	Activities associated with construction including: • Construction of access tracks and ROW • Construction of work areas • Vehicle and equipment movement • Earthworks and blasting	Air/ atmosphere/ winds Direct disturbance	Vegetation Surrounding land users	Location of affected people relative to activity.	Low sensitivity to change due to pipeline mapping (construction) and permanence of pipeline location.	Yes- Potential for air quality/GHG impact. SPR linkage depends on location of sensitive receptors relative to the construction site.
Air Quality and GHG	Operation, maintenance and decommissioning	AQ02	Dust generation from operation, maintenance and decommissioning activities impacts receptors.	Activities associated with operation and maintenance including: • Vehicle and equipment movement along the pipeline for pipeline patrols, easement inspection/access • Excavations for pipeline maintenance	Air/ atmosphere/ winds Direct disturbance	Vegetation Surrounding land users	Location of affected people relative to activity.	Low sensitivity to change due to pipeline mapping (construction) and permanence of pipeline location.	Yes- Potential for air quality/GHG impact. SPR linkage depends on location of sensitive receptors relative to the maintenance site.
Air Quality and GHG	Construction and commissioning	AQ03	Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during construction impact receptors. Including GHG Emissions from gas venting during commissioning	Activities associated with construction that require vehicles and machinery such as: • Construction of access tracks and ROW • Construction of work areas • Vehicle and equipment movements	Air/ atmosphere/ winds	Surrounding land users	Location of affected people relative to activity.	Low sensitivity to change due to pipeline mapping and permanence of pipeline location.	Yes- Potential for air quality/GHG impact.
Air Quality and GHG	Operation, maintenance and decommissioning	AQ04	Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during operation, maintenance and decommissioning impact receptors.	Activities associated with operations & maintenance that require vehicles and machinery such as: • Weed control • Line of site clearance (vegetation trimming) • Excavations for pipeline maintenance • Removal of pipeline 'pig' during maintenance • Patrols	Air/atmosphere/ winds	Surrounding land users	Location of affected people relative to activity.	Low sensitivity to change due to pipeline mapping and permanence of pipeline location.	Yes- Potential for air quality/GHG impact. While the source has been confirmed, it is unlikely that high levels of vehicle/ emissions will reach any receptors.

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
				- Travel to/from site - Gas process heater (WBH) - Gas compression					
Air Quality and GHG	Operation, maintenance and decommissioning	AQ05	GHG emissions associated with normal and abnormal operations, maintenance and decommissioning activity and process combustion impact receptors.	GHG Emissions from: - Continuous small purge of instrument gas from valve actuators - Equipment fugitive emissions - Equipment venting (maintenance and operational) - PSV lifting - Emissions from pipeline due to pipeline failure and escape of natural gas to the atmosphere. - Gas process heater (WBH) - Gas compression	Atmosphere	Surrounding land users Air	Location of affected people relative to activity.	Low sensitivity to change due to pipeline mapping and permanence of pipeline location.	Yes- Potential for air quality/GHG impact While the source has been confirmed, it is uncertain if high levels of GHG will reach any receptors.

5.8.3 Control Measures

Control measures to reduce the risk and impact to air quality and greenhouse gas are detailed in Table 5-24, including environmental objectives and criteria.

Table 5-24: Control Measures, Environmental Objectives and Criteria – Air Quality and Greenhouse Gas

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	AQ01	Dust generation from construction activities impacts receptors.	• Use water trucks and sprayers to limit dust generation. • Drive vehicles at speeds slow enough to minimise dust generation. • Induct the construction workforce on SEO and CSEMP requirements. • Audit compliance of ROW against the SEO and CSEMP. • Conduct abrasive blasting in accordance with SEA Gas Abrasive Blasting and Painting Procedure (OHSE-PR-022). • Schedule dust generating activities to avoid adverse weather conditions (e.g. periods of high winds). • Rehabilitate disturbed areas progressively throughout construction, where possible. • Minimise the extent of exposed and stripped surface area. • Manage soil stockpiles (e.g. by covering, minimising duration). • Consult with landholders and impacted parties prior to dust generating activities. • Maintain records of landholder communication and complaints as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022).	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise atmospheric emissions.	To minimise the generation of dust.	• Records demonstrate no reasonable complaints received in relation to fugitive dust emissions.	• Site specific dust impacts managed by use of water trucks and sprayers. • Construction workforce inducted/trained regarding SEO and CSEMP requirements • Where required, compliance auditing undertaken at agreed frequency and where practicable associated actions implemented. • Incidents and complaints are investigated and where practicable associated corrective actions implemented
Construction and commissioning	AQ03	Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during construction impact receptors. Including GHG Emissions from gas venting during commissioning	• Air quality managed in accordance with Environment Protection (Air Quality) Policy 2016 • Switch off vehicles and equipment when not in use, where practicable • Maintain vehicles and equipment in good working order through regular servicing. • Fit vehicles and equipment with appropriate emissions control equipment and ensure that maintenance is undertaken as per manufacturers specifications. • Consult with stakeholders prior to planned gas venting activities as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022). • Undertake venting activities during working hours where practicable. • Track and report on greenhouse gas emissions, included vented gas in accordance with SEA Gas - Gas Loss Report (TECH-F-017)).	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.		To minimise impacts of gas venting activities.	• Records demonstrate no reasonable complaints received in relation to gas venting activities. • Records demonstrate gas venting events have been documented.	• Greenhouse emissions hierarchy of control applied in accordance with SEA Gas Climate Change Sustainability Standard (OHSE-SST-001) to minimise gas emissions (avoid, reduce, offset). • Gas venting activities to include consultation with stakeholders. • Emissions tracking for greenhouse gas abatement and reporting purposes.
						To minimise impacts of emissions generation from vehicles and equipment.	• Records demonstrate no reasonable complaints received in relation to vehicle and equipment emissions.	
Operation, Maintenance and Decommissioning	AQ02	Dust generation from operation, maintenance and decommissioning activities impacts receptors.	• Use water trucks and sprayers to limit dust generation. • Drive vehicles at speeds slow enough to minimise dust generation. • Consult with landholders and impacted parties prior to dust generating activities. • Install dust hazard signage.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To minimise atmospheric emissions.	To minimise the generation of dust.	• Records demonstrate no reasonable complaints received in relation to dust management.	• Safe operating procedures to be applied in relation to site specific dust management requirements (i.e. fugitive dust and use of water trucks and sprayers)

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Exclude non-essential personnel from work areas. - Conduct abrasive blasting in accordance with SEA Gas Abrasive Blasting and Painting Procedure (OHSE-PR-022). - Schedule dust generating activities to avoid adverse weather conditions (e.g. periods of high winds). - Minimise the extent of exposed and stripped surface area. - Manage soil stockpiles (e.g. by covering, minimising duration). - Consult with landholders and impacted parties prior to dust generating activities. - Maintain records of landholder communication and complaints as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022).					Where required, compliance auditing to be undertaken as detailed in the Audit and Assurance procedure.
Operation, Maintenance and Decommissioning	AQ04	Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during operation, maintenance and decommissioning impact receptors.	- Air quality managed in accordance with Environment Protection (Air Quality) Policy 2016 - Consult with landholders and impacted parties prior to maintenance activities, as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022). - Design and operate compressor station to comply with EPA air quality criteria. - Comply with EPA licence requirements for compressor station operations. - Fit vehicles and equipment with appropriate emissions control equipment and ensure that maintenance is undertaken as per manufacturers specifications. - Switch off vehicles and equipment when not in use, where practicable - Maintain vehicles and equipment in good working order through regular servicing.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.		To minimise impacts of emissions generation from vehicles and equipment.	Records demonstrate no reasonable complaints received in relation to vehicle and equipment emissions.	- Maintenance procedures are implemented. - EPA licence requirements for compressor station operations are complied with. - Incident Reporting
Operation and Maintenance	AQ05	GHG emissions associated with normal and abnormal operations, maintenance and decommissioning activity and process combustion impact receptors.	- Consult with landholders and impacted parties prior to gas venting as per SEA Gas Third Party Contact and Consultation Procedure (OHSE-PR-022). - Track and report on greenhouse gas emissions, included vented gas as per SEA Gas - Gas Loss Report (TECH-F-017)). - Undertake venting activities during working hours where practicable. - Restrict activity to fenced compounds with controlled access, where required.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.		To eliminate uncontrolled atmospheric emissions and minimise impacts of gas venting activities.	- Records demonstrate no reasonable complaints received in relation to planned gas emissions. - Gas venting events are documented.	- Maintenance procedures are implemented - Greenhouse gas hierarchy of control applied in accordance with SEA Gas Climate Change Sustainability Standard (OHSE-SST-001) to minimise gas emissions (avoid, reduce, offset) - Planned gas venting activities to include consultation with stakeholders. - Emissions tracking for greenhouse gas abatement and reporting purposes.

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5.8.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with noise and greenhouse gas is **Low** or **Negligible** for all impact events. Control measures targeted at managing dust, venting and combustion release ensure areas of higher sensitivity will be avoided. Potential impacts from the proposed activities are localised and limited scale and readily manageable using standard control measures.

Refer to Table 5-25 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-25: Environmental Significance Assessment – Air Quality and Greenhouse Gas

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
AQ01	Dust generation from construction and commissioning activities impacts receptors.	No – dust generating activities such as earthworks are required during construction. While impacts to receptors can be generally be controlled, they may occur (e.g. in extreme weather conditions).	Moderate – impacts to receptors could occur but would not be frequent.	Short term – duration of dust impacts is restricted to construction duration at the receptor. Impacts are reversible.	Localised/moderate - depending on environmental conditions (wind direction/speed/dryness), dust impacts may extend further.	Low/moderate – impacts may be higher during summer months (lower rainfall).	Possible – receptors may already be impacted by fugitive dust emissions, depending on the site.	Low - pipeline easement is generally over land that is largely cleared of native vegetation and used for agriculture, industry and urban development. Above-ground facilities are generally distant from residences or other receptors. There is no further degradation of environmental value anticipated from the potential impact event in these areas.	Magnitude = Low to moderate Significance = Low
AQ02	Dust generation from operation and maintenance activities impacts receptors.	No – periodic pipeline monitoring and maintenance activities are required to ensure safe and reliable operations. While impacts to receptors can be generally be controlled, they may occur (e.g. in extreme weather conditions).	Low – vehicle movement is the most likely dust generating activity during operation and maintenance but is not likely to result in material impacts to receptors. Earthworks for maintenance are low frequency and impact to receptors would be very infrequent.	Short term – dust impacts associated with pipeline maintenance will last as long as the activity. Impacts are expected to last significantly less than a year. Impacts are reversible.	Localised - depending on environmental conditions (wind direction/speed/dryness), dust impacts may extend further.	Low/moderate – may be higher during summer months (lower rainfall).	Possible – receptors may already be impacted by fugitive dust emissions, depending on the site.		Magnitude = Low to moderate Significance = Low
AQ03	Vehicle and equipment emissions (nitrous oxides, sulfur oxides, carbon monoxides) during construction impact receptors. Including GHG Emissions from gas venting during commissioning	No – vehicle and equipment operation are an essential part of pipeline construction. Impacts to receptors are generally low to negligible but cannot be completely avoided.	Low –movement of vehicles along the construction area/ROW, operation of equipment and venting of gas occurs during construction and commissioning, however impact to receptors would be a very infrequent occurrence.	Short term – impacts from vehicle and equipment emissions associated with pipeline construction are restricted to the construction period. Impacts are reversible.	Localised – impacts are limited to the project site and immediate surrounds.	Low – No measurable impact is likely, given negligible emissions levels from vehicles and equipment.	Possible – receptors may already be impacted by fugitive emissions from existing farming, transport and industrial land uses along the pipeline area.		Magnitude = Low Significance = Negligible
AQ04	Vehicle and equipment emissions (nitrous oxides, sulphur oxides, carbon monoxides) during operation and maintenance impact receptors.	No – vehicle movement and equipment operation is an essential part of pipeline operation and maintenance. Impacts to receptors are generally low to negligible but cannot be completely avoided.	Low – vehicles and equipment use for pipeline maintenance are infrequent and impact to receptors would be a very infrequent occurrence. Although compressor station operation is constant, impact (e.g. exceedance of criteria) is not expected.	Short term – vehicle and equipment emissions associated with pipeline maintenance will last as long as the maintenance does. Impacts are expected to last less than a year. Impacts are reversible.	Localised – impacts are limited to the project site and immediate surrounds.	Low - No measurable impact is likely, given negligible emissions levels from vehicles and equipment and compliance of compressor station with air quality criteria and EPA licence requirements.	Possible – receptors may already be impacted by fugitive emissions from existing farming, transport and industrial land uses along the pipeline area.		Magnitude = Low Significance = Negligible
AQ05	GHG emissions associated with normal and abnormal operations, maintenance activity and process combustion impact receptors.	No – emissions occur as part of operations, although work is underway to reduce this.	Moderate – process control and fugitive venting is continuous although very small with	Short term – the impacts from fugitive gas emissions or pipeline	Localised – fugitive gas emissions, and vented gas can impact the site	Moderate – reference values are not expected to be exceeded but a gas leak would result in an increase	No – receptors are not already impacted by similar activities.		Magnitude = Moderate Significance = Low



			negligible impact, Maintenance, abnormal operation and process venting is less frequent although larger events. Combustion gas release is continuous however impact on receptors is not frequent.	venting are reversible and short term.	and immediate surrounds.	to the existing level of natural gas in the environment.			
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5.9 Public Health and Safety

5.9.1 Existing Environment

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 AS2885 (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: Landholder liaison programs
- 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 Procedure and Permits: In place to govern how excavation is undertaken on the pipeline right of way.
- Participation in a One Call Services: Before You Dig Australia

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- Easements Agreements: Conditions that prevent landowners from carrying out work that may interfere with the safety of the pipeline.
- Regulatory Process: apply stringent controls to construction of some assets (e.g. pipelines and flowlines).
- Pipeline Patrols: Patrol and surveillance activities conducted in accordance with procedures, established patrol frequencies and patrolling requirements, related to specific risks on the Pipeline System
- Signage: Increase 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
- Mineral Exploration.

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:

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- 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 Before you Dig Australia (BYDA) 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;

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- 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.

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.

5.9.2 Impact Events

The impact events relevant to public health and safety are:

- Construction and commissioning hazards impact public health and safety.
- Fire initiated by construction activities impacts public health and safety.
- Operation/maintenance hazards or pipeline incidents impact public health and safety.
- Fire initiated during operation and maintenance activities impacts public health and safety.
- Decommissioning activities impact public health and safety.

Refer to Table 5-26 for details of the assessment of potential impact events and confirmation of impact events.

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Table 5-26: Potential Impact Events and Confirmation of Impact Events – Public Health and Safety

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Public Health and Safety	Construction and commissioning	HS01	Construction and commissioning hazards impact public health and safety.	- Construction-related traffic or roadworks - Worksites and excavations - Operation of construction equipment - Blasting	Direct impact	Public.	Location of construction activity relative to populated or trafficked areas.	Construction in sparsely populated areas could reduce the potential for interaction.	Yes – potential for impact. Siting may reduce SPR linkage.
Public Health and Safety	Construction and commissioning	HS02	Fire initiated by construction activities impacts public health and safety.	- Welding - Spark from mobile equipment - Other ‘hot work’ activities.	Flammable vegetation	Public Native vegetation and fauna Livestock and land use.	Location and seasonal timing of activity.	Construction in sparsely populated, less fire-prone areas or cool seasons could reduce the potential for impact.	Yes – potential for impact. Siting may reduce SPR linkage.
Public Health and Safety	Operations and maintenance	HS03	Operation/maintenance hazards or pipeline incidents impact public health and safety.	- Traffic or roadworks for operation / maintenance - Worksites and excavations - Operation of equipment - Unauthorised access to hazardous areas in above-ground facilities - Pipeline incidents or emergencies (e.g third party interference, pipeline failure/rupture)	Direct impact Unauthorised access	Public.	Location of maintenance activity or pipeline incident.	Location in sparsely populated areas could reduce the potential for interaction.	Yes – potential for impact.
Public Health and Safety	Operations and maintenance	HS04	Fire initiated during operation and maintenance activities impacts public health and safety.	- Welding - Spark from mobile equipment - Other ‘hot work’ activities.	Flammable vegetation	Public Native vegetation and fauna Livestock and land use.	Location and seasonal timing of activity.	Construction in sparsely populated, less fire-prone areas or cool seasons could reduce the potential for impact.	Yes – potential for impact.
Public Health and Safety	Decommissioning	HS05	Decommissioning activities impact public health and safety.	- Traffic or roadworks for decommissioning - Worksites and excavations - Operation of equipment - Unauthorised access to hazardous areas in above-ground facilities	Direct impact Unauthorised access	Public.	Location and timing of activity.	Location in sparsely populated areas could reduce the potential for interaction.	Yes – potential for impact.

5.9.3 Control Measures

Control measures to reduce the risk and impact to public health and safety are detailed in Table 5-27, including environmental objectives and criteria.

Table 5-27: Control Measures, Environmental Objectives and Criteria – Public Health and Safety

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	HS01	Construction and commissioning hazards impact public health and safety.	- Identify construction hazards via Job Hazard Analysis and Permit to Work system. - Consult with affected stakeholders prior to and during construction and commissioning activities. - Apply administrative and engineering controls (e.g. – traffic management plans, traffic control, signage, isolations, detours, road infrastructure repair / reinstatement requirements, notifications and permits with the relevant road authority) along the ROW to isolate the construction workforce and public from hazards. - Induct construction workforce and site visitors in relation to CSEMP compliance expectations. - Implement an Emergency Response Plan. - Where required, undertake compliance auditing of ROW against the CSEMP.	High certainty that proposed control measures will be effective. Industry standard controls measures that are well understood and that have been successfully implemented.	To minimise the risk to public health and safety.	To adequately protect public safety during construction activities by managing hazards.	Records show no injuries or incidents involving the public that could have been reasonably prevented by the operator.	- Construction hazards identified via Job Hazard Analysis & Permit to Work system. - Consultation with affected stakeholders prior to and during construction and commissioning activities. - 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 the relevant road authority) along the ROW to isolate the construction workforce and public from hazards. - Induction of construction workforce and site visitors in relation to CSEMP compliance expectations. - Project specific Emergency Response Plan to be implemented and exercised. - Where required, compliance auditing of ROW.
Construction and commissioning	HS02	Fire initiated by construction and commissioning activities impacts public health and safety.	- Manage construction fire hazards via a Job Hazard Analysis and Permit to Work system. - Utilise personal protective equipment during construction activities. - Induct the construction workforce and site visitors in relation to emergency management procedures. - Undertake compliance auditing of ROW against the CSEMP. - Guides, codes and standards are available to provide appropriate prevention and management measures, as provided by the Fire and Emergency Services Act 2005 and Country Fire Service. - Ensure that multiple access and egress point are available on site for emergency services and contractors. - Implement appropriate fire prevention/control equipment and measures in place during construction activities. - Maintain records detailing relevant fire authority permits in relation to Hot Work during fire ban days (refer Fire Prevention procedure (OHSE-PR-011)).	High certainty that proposed control measures will be effective. Industry standard controls measures that are well understood and that have been successfully implemented.	To minimise the risk to public health and safety.	To mitigate risk of fire during construction activities.	Records demonstrate no construction or commissioning related fires.	- Elimination of ‘Hot Work’ during declared fire bans unless relevant fire authority permits are in place. - Management of construction fire hazards, via Job Hazard Analysis & Permit to Work system (refer also Fire Prevention Procedure (OHSE-PR-011)). - Personal protective equipment applied during construction and commissioning activities. - Liaison with Country Fire Service (SA) and Country Fire Authority (Vic). - Induction of construction workforce and site visitors in relation to emergency management procedures. - Where required, compliance auditing of ROW.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Operations and maintenance	HS03	Operation/maintenance hazards or pipeline incidents impact public health and safety.	- Design, construct and operate pipeline system in accordance with AS2885. - Implement a Pipeline Integrity Management Plan incorporating 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 - Planned maintenance inspection and repair - Maintenance of safety critical equipment - Corrosion management, inspection and monitoring - Assessing and repairing defects - Management of changes to operating conditions - Utilising competent personnel and providing training - Audit, verification, review and continuous improvement. - Install security measures (e.g. fencing and signage) to prevent unauthorised access to above-ground facilities. - Comply with Job Safety Analysis and Safe Work Method Statement Procedure (TECH-PR-003) & Permit to Work Procedure (TECH-PR-004). - Maintain records of communications with landholders and third parties prior to and during planned maintenance activities. - Implement traffic management provisions, plans and practices, road infrastructure repair/reinstatement requirements, and notifications and permits within the relevant road authority. - Maintain records of Remaining Life Review, Fitness for Purpose reports, Risk Assessments, site inspections and audits, quarterly reports, KPIs, incident reports. - Maintain records demonstrating compliance with AS 2885 and the site Emergency Response Plan. - Undertake ground and aerial inspections/controls.	High certainty that proposed control measures will be effective. Industry standard controls measures that are well understood and that have been successfully implemented.	To minimise the risk to public health and safety.	To adequately protect public safety.	- Records demonstrate no records of injuries or incidents involving members of the public that could have been reasonably prevented by the operator. - Records demonstrate no pipeline loss of containment in an area not designed for a gas escape. - Records demonstrate no reduction in pipeline MAOP due to pipeline integrity. - Records demonstrate no immediate repair necessary to maintain safe pipeline operation.	- Compliance with Job Safety Analysis and Safe Work Method Statement Procedure (TECH-PR-003) & Permit to Work Procedure (TECH-PR-004). - Records of communications with landholders and third parties prior to and during planned maintenance activities. - Use of signage and/or isolating methods to identify/exclude unauthorised personnel from hazardous areas. - Traffic management provisions, plans and practices, road infrastructure repair/reinstatement requirements, and notifications and permits with the relevant road authority. - Records of Remaining Life Review, Fitness for Purpose Reports; Risk Assessments; site inspections and audits; Quarterly Reports; Key Performance Indicators. - Records demonstrating compliance with AS2885. - Emergency Response Plan in place. - Incident reporting.
					To minimise the risk to public health and safety.	To prevent unauthorised activity along the easement that may adversely impact on pipeline or facility integrity.	Records demonstrate no unauthorised activity on the easement that has the potential to impact on pipeline integrity.	- Inspection/Patrol activities (aerial and ground). - Comprehensive landholder liaison program and landholder database detailing communications. - Maintain clear identification of pipeline by marker signage in accordance with AS2885. - All reports of unauthorised activity are reported and investigated.
					To minimise the risk to public health and safety.	To actively educate landholders, land users and emergency service in respect to pipeline safety and emergency procedures.	Records demonstrate no unauthorised activity on the easement that has the potential to impact on pipeline integrity.	- Community education program and 'Before You Dig Australia', asset referral service widely advertised. - Records of liaison and provision of pipeline awareness information to Emergency Services.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties and Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Advertise community education programs and 'Before You Dig Australia' asset referral service number. - Maintain records of liaison and provision of pipeline awareness information to Emergency Services. - Ensure that multiple access and egress point are available on site for emergency services and contractors. - Conduct a minimum of two Emergency Response Exercises each year. - Locate pipeline venting facilities away from residential areas. - Emergency Response Manual (TECH-MAN-011) outlines procedures to manage emergency situations. - Pipeline risk assessment in accordance with AS 2885.6.		To minimise the risk to public health and safety.	To minimise the impact on public health and safety in the event of a pipeline incident or emergency.	- Records show that emergency response procedures are effectively implemented in the event of an emergency, as assessed by post-incident debrief. - Records show that emergency response exercises are conducted, reported on and actions arising are addressed.	- Emergency Response Plan in place. - Crisis Management Plan in place. - A minimum of two Emergency Response Exercises conducted each year. - Pipeline venting facilities are located away from residential areas. - The risk of noise impacts from pipeline venting is reduced 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 pipeline venting, additional controls are identified through further assessment and implemented by the responsible party to ensure the risk remains ALARP
Operations and maintenance	HS04	Fire initiated during operation and maintenance activities impacts public health and safety.	- Compliance with Fire Prevention Procedure (OHSE-PR-011) - Job Safety Analysis and Safe Work Method Statement Procedure (TECH-PR-003) & Permit to Work Procedure (TECH-PR-004) - Appropriate fire prevention/control equipment and measures in place during construction and commissioning activities - Emergency Response Manual (TECH-MAN-011) outlines procedures to manage emergency situations - Relevant fire authority permits in relation to Hot Work during fire ban days are obtained where necessary (Refer Fire Prevention procedure (OHSE-PR-011)). - Scheduled weed management conducted at facilities to minimise fire risk.	High certainty that proposed control measures will be effective. Industry standard controls measures that are well understood and that have been successfully implemented.	To minimise the risk to public health and safety.	To avoid fires associated with pipeline maintenance activities.	- Records demonstrate that no fires have occurred as a consequence of maintenance activities. - Records demonstrate facility vegetation management, inspections and audits are undertaken.	- Records detailing fire safety and emergency preparedness for operations and maintenance personnel. - Compliance with Job Safety Analysis and Safe Work Method Statement Procedure (TECH-PR-003) & Permit to Work Procedure (TECH-PR-004). - Appropriate fire prevention/control equipment and measures in place during operations and maintenance activities. - Records detailing relevant fire authority permits in relation to Hot Work during fire ban days (Refer Fire Prevention procedure (OHSE-PR-011)). - Incident reporting. - Scheduled weed maintenance conducted at facilities
Decommissioning	HS05	Decommissioning activities impact public health and safety.	- Undertake decommissioning in accordance with an approved decommissioning plan and rehabilitation plan. - Undertake decommissioning as required by the legislative requirements of the day. - Consult with appropriate regulatory authorities, industry associations and landholders during planning and implementation of decommissioning. - Remove above-ground infrastructure.		To appropriately decommission the pipeline in accordance with regulatory requirements and accepted best practice environmental management.	To safely decommission the pipeline and associated above ground infrastructure in accordance with appropriate regulatory requirements.	Pipeline and associated above-ground infrastructure decommissioned to an appropriate standard that addresses the environmental objectives for operations and construction, as appropriate and as required by the legislative requirements of the day.	- Approved decommissioning plan - Approved rehabilitation plan - Records of consultation with appropriate regulatory authorities, industry associations and landholders. - No above-ground infrastructure is evident. - Where required, auditing to validate compliance.

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5.9.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with public health and safety is **Low** or **Moderate** for all impact events. Potential impacts to public health and safety are managed to ALARP by implementing control measures that are recognised as standard industry practice and are considered effective in minimising impacts. Fire containment measures would be implemented to ensure fire spread is reduced to ALARP.

Refer to Table 5-28 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-28: Environmental Significance Assessment – Public Health and Safety

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
HS01	Construction and commissioning hazards impact public health and safety.	Yes – implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event, although very unlikely, remains a possibility.	Rare – only expected to cause impact in exceptional circumstances.	Short term to Long-lasting – construction activities and related impacts are generally short term, however longer term impacts (e.g. injury or death) are possible.	Localised – any impact would be confined to the site and immediate surrounds.	Low to high – an incident / unplanned event could result in injury or death.	No – construction hazards not likely to result in cumulative impacts with other projects.	Medium - pipeline would generally be located in land cleared of native vegetation with low population density, however activities closer to residential areas are possible.	Magnitude = Low to moderate Significance = Low to moderate ALARP assessment: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts.
HS02	Fire initiated by construction activities impacts public health and safety.	Yes – implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event, although very unlikely, remains a possibility.	Rare – only expected to cause impact in exceptional circumstances.	Short term to Long-lasting – long term impacts are possible depending on the scale of the fire.	Moderate – impacts from a fire may extend beyond the site and immediate surrounds but would not be expected to occur on a regional scale. Management system measures are put in place to prevent initiation of fire and ensure propagation of potential fire is quickly managed.	Low to high – fires could result in death or damage to property or extensive damage to native vegetation and habitat.	Possible – if fires have occurred in nearby areas or within the same area, additional fires may result in cumulative impacts.	Medium - pipeline would generally be located in land cleared of native vegetation. Fire is a hazard to agricultural activities and buildings / infrastructure and any people present.	Magnitude = Low to moderate Significance = Low to Moderate ALARP assessment: Control measures recognised as standard industry practice, and considered effective, would be implemented to ensure likelihood of occurrence, duration and severity of impact are kept to ALARP. Containment measures would be implemented to ensure fire spread is reduced to ALARP.
HS03	Operation/maintenance hazards or pipeline incidents impact public health and safety.	Yes – operation in accordance with AS 2885 and implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event (e.g. damage from third party interference), although very unlikely remains a possibility.	Rare – only expected to cause impact in exceptional circumstances.	Short term to long-lasting – impacts would generally short term, however longer term impacts (e.g. injury or death) are possible.	Localised – any impact would be confined to the site and immediate surrounds.	Low to high – an incident / unplanned event could result in injury or death.	No – not likely to result in cumulative impacts with other projects.	Medium - pipeline is predominantly located in agricultural cleared low population density, however some sections are closer to residential areas.	Magnitude = Low to moderate Significance = Low to moderate ALARP assessment: Implementation of identified controls, including operation and maintenance of the pipeline in accordance with Australian Standard AS 2885 effectively reduces risks to ALARP.
HS04	Fire initiated during operation and maintenance activities impacts public health and safety.	Yes – implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event, although very unlikely remains a possibility.	Rare – only expected to cause impact in exceptional circumstances.	Short term to long-lasting – long term impacts are possible depending on the scale of the fire.	Moderate – impacts from a fire may extend beyond the site and immediate surrounds but would not be expected to occur on a regional scale. Management system measures are put	Low to high – fires could result in death or damage to property or extensive damage to native vegetation and habitat.	Possible – if fires have occurred recently or nearby, or within the same area, additional fires may result in cumulative impacts.	Medium - pipeline is predominantly located in land cleared of native vegetation, with minimal vegetation of high environmental value. Fire is a hazard to agricultural activities and buildings /	Magnitude = Low to moderate Significance = Low to moderate ALARP assessment: Control measures recognised as standard industry practice, and

					in place to prevent initiation of fire and ensure propagation of potential fire is quickly managed.			infrastructure and any people present.	considered effective, would be implemented to ensure likelihood of occurrence, duration and severity of impact are kept to ALARP. Containment measures would be implemented to ensure fire spread is reduced to ALARP.
HS05	Decommissioning activities impact public health and safety.	Yes – implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event, although very unlikely remains a possibility.	Rare – only expected to cause impact in exceptional circumstances.	Short term to long-lasting – impacts would generally short term, however longer term impacts (e.g. injury or death) are possible.	Localised – any impact would be confined to the site and immediate surrounds.	Low to high – an incident / unplanned event could result in injury or death.	No – not likely to result in cumulative impacts with other projects.	Medium - pipeline is predominantly located in agricultural cleared low population density, however some sections are closer to residential areas.	Magnitude = Low to moderate Significance = Low to moderate ALARP assessment: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts.

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5.10 Security of Gas Supply

5.10.1 Existing Environment

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.

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 5.9.

A significant incident such as a pipeline rupture could take 1-2 weeks to repair. However, as discussed in Section 5.9, a rupture is a very unlikely event, particularly in a well constructed pipeline managed in accordance with AS 2885.

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‘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.

5.10.2 Impact Events

The impact events relevant to security of gas supply are:

- Equipment failure or pipeline integrity issue reduces gas availability for pipeline customers.
- Pipeline incident or emergency results in reduction or interruption to gas supply pipeline customers.

Refer to Table 5-29 for details of the assessment of potential impact events and confirmation of impact events.

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Table 5-29: Potential Impact Events and Confirmation of Impact Events – Security of Gas Supply

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Security of Supply	Operation	SS01	Equipment failure or pipeline integrity issue reduces gas availability for pipeline customers.	Equipment failure or pipeline integrity issue.	Reduced gas availability.	Gas pipeline customers	Extent of reduction in gas availability depends on location and nature of equipment failure or integrity issue.	Moderate sensitivity to change in assumption/uncertainty	Yes- potential for impact to pipeline customers.
Security of Supply	Operation	SS02	Pipeline incident or emergency results in reduction or interruption to gas supply pipeline customers.	Pipeline incident or emergency.	Reduced or interrupted gas supply.	Gas pipeline customers	Extent of reduction or interruption to gas availability depends on location and nature of incident / emergency.	Moderate sensitivity to change in assumption/uncertainty	Yes- potential for impact to pipeline customers.

5.10.3 Control Measures

Control measures to reduce the risk and impact to security of gas supply are detailed in Table 5-30, including environmental objectives and criteria.

Table 5-30: Control Measures, Environmental Objectives and Criteria – Security of Gas Supply

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Operation	SS01, SS02	Equipment failure or pipeline integrity issue reduces gas availability for pipeline customers. Pipeline incident or emergency results in reduction or interruption to gas supply pipeline customers.	- Design, construct and operate pipeline system in accordance with AS2885. - Implement a Pipeline Integrity Management Plan incorporating 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 - Planned maintenance inspection and repair - Maintenance of safety critical equipment - Corrosion management, inspection and monitoring - Assessing and repairing defects - Management of changes to operating conditions - Utilising competent personnel and providing training - Audit, verification, review and continuous improvement. - Ensure Emergency Response Plan and Crisis Management Plan are in place. - Conduct Emergency Response Exercises. - Undertake incident reports and investigations as required. - Develop and implement a site rehabilitation plan in consultation with stakeholders if damage results from a pipeline incident or emergency.	High certainty that proposed control measures will be effective.	To maintain security of gas supply.	To have systems in place to assess the ongoing fitness-for-purpose of infrastructure and management systems to ensure the security of supply.	- Records demonstrate no unplanned interruption to gas supply that impacts the public. - Records demonstrate no reduction in pipeline MAOP due to pipeline integrity. - Records demonstrate compliance with Energy Resources Act (SA) 2000 Requirements for Fitness-for-purpose assessments.	- Pipeline Integrity Management Plan in place. - Records of Remaining Life Review, Fitness for Purpose Reports; Change Management; site inspections and audits; Quarterly Reports; Key Performance Indicators. - Records demonstrating compliance with AS2885 including Safety Management Study reviews, as per Regulation 29 of the Energy Resources Regulations (SA) 2013.
						To minimise the impact on the community of a pipeline incident or emergency resulting in gas supply loss or curtailment.	- Emergency response procedures are effectively implemented in the event of an emergency, as assessed by the post-incident debrief. - Records demonstrate emergency response exercises are conducted, reported on and actions arising are addressed. - Any ministerial direction in relation to gas supply is followed. - Records demonstrate that material incidents that impact gas supply or have the potential to impact gas supply are investigated.	- Emergency Response Plan in place. - Crisis Management plan in place. - A minimum of two Emergency Response Exercises conducted each year. - Compliance with any ministerial direction in relation to gas supply. - Incident reports and investigations.
						To restore gas supply as soon as is practicable.	Records demonstrate that pipeline repaired in a timeframe that represents good industry practice.	Appropriate repair strategies in place based on identified pipeline risks.
						To appropriately reinstate and rehabilitate any damage that may result from a pipeline incident or emergency, such that it is as near as practicable to prior to disturbance and allows stakeholder usage to continue.	Records demonstrate that damage arising from a pipeline incident or emergency is remediated to as near as practicable to conditions prior to disturbance, such that stakeholder usage can continue.	- Site rehabilitation plan developed in consultation with stakeholders. - Site rehabilitation plan implemented and auditing and photo point monitoring to validate compliance.

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5.10.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with security of gas supply is **Moderate**. Potential impacts to security of gas supply are managed to ALARP by operation and maintenance of the pipeline in accordance with Australian Standard AS 2885.

Refer to Table 5-31 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-31: Environmental Significance Assessment – Security of Gas Supply

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
SS01	Equipment failure or pipeline integrity issue reduces gas availability for pipeline customers.	Yes – operation in accordance with AS 2885 should generally avoid equipment failure or pipeline integrity issues	Rare – only expected to cause impact in exceptional circumstances.	Short term – reduction in gas availability could extend for days to weeks.	Moderate – a number of customers could be impacted, however gas supply to all customers is not likely to be interrupted.	Moderate – all major customers other than those supplied directly via the SESA Pipeline in Mount Gambier and Teys have access to an alternate gas supply.	No – customers are not likely to be impacted by alternative supply interruptions.	Medium - all major customers other than those supplied directly via the SESA Pipeline in Mount Gambier and Teys have access to an alternate gas supply.	Magnitude = Moderate Significance = Moderate ALARP assessment: Operation and maintenance of the pipeline in accordance with Australian Standard AS 2885 effectively reduces risks to security of supply to ALARP.
SS02	Pipeline incident or emergency results in reduction or interruption to gas supply pipeline customers.	Yes – operation in accordance with AS 2885 should generally avoid pipeline incident or emergency, however damage (e.g. from third party interference), although very unlikely remains a possibility.	Rare – only expected to cause impact in exceptional circumstances.	Short term – pipeline incident could result in gas shortfalls for days to weeks.	Widespread – depending on the location of the incident, a large number of customers could potentially be impacted	Moderate – all major customers other than those supplied directly via the SESA Pipeline in Mount Gambier and Teys have access to an alternate gas supply.	No – customers are not likely to be impacted by alternative supply interruptions.	Medium - all major customers other than those supplied directly via the SESA Pipeline in Mount Gambier and Teys have access to an alternate gas supply.	Magnitude = Moderate Significance = Moderate ALARP assessment: Operation and maintenance of the pipeline in accordance with Australian Standard AS 2885 effectively reduces risks to security of supply to ALARP.

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5.11 Waste Management

5.11.1 Existing Environment

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 5-32.

Table 5-32: 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.

5.11.2 Impact Events

The impact events relevant to waste management are:

- Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline construction and commissioning activities.
- Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline operation, maintenance and decommissioning activities.

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Refer to Table 5-33 for details of the assessment of potential impact events and confirmation of impact events.

These are discussed further below.

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 in Section 5.11.3.

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 5.3.1, 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.

Table 5-33: Potential Impact Events and Confirmation of Impact Events -Waste Management

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Waste Management	Construction and commissioning	WM01	Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline construction and commissioning activities.	• Packaging • Used chemicals and oils (oil, solvents, primer, rust proofing agents) • Scrap metal • HDD cuttings • Campsite wastes (putrescibles, paper, timber and plastic piping). • Hydrostatic test water, trench water, vehicle and equipment wash down. • Camp wastewater (e.g., grey water and sewage).	• Direct disturbance • Runoff from construction areas • Wind	Soil Surface water Vegetation.	Depending on the construction location, limited environmental receptors may be present.	Low sensitivity to change due pipeline mapping and permanence of pipeline location.	Yes – there is potential for impact if waste is managed inappropriately.
Waste Management	Operation, maintenance and decommissioning	WM02	Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline operation, maintenance and decommissioning activities.	• Waste hydrocarbons generated from maintenance activities (pigging, filter change) • Used chemicals and oils (oil, solvents, primer, rust proofing agents) • Packaging. • Hydrostatic test water, trench water, vehicle and equipment wash down. • Camp wastewater (e.g., grey water and sewage).	• Direct disturbance • Runoff from the easement • Wind	Soil Surface water Vegetation.	The occurrence of the identified environmental receptors may change depending on the section of the pipeline undergoing maintenance works.	Low sensitivity to change due pipeline mapping and permanence of pipeline location.	Yes – there is potential for impact if waste is managed inappropriately.

5.11.3 Control Measures

Control measures to reduce the risk and impact to waste management are detailed in Table 5-34, including environmental objectives and criteria.

Table 5-34: Control Measures, Environmental Objectives and Criteria –Waste Management

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	WM01	Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline construction and commissioning activities.	- Remove all waste material from worksites on completion of construction activities, as specified in the CSEMP. - Comply with Abrasive Blasting and Painting Procedure (OHSE-PR-022) and Washdown Procedure (OHSE-PR-008) in relation to waste management during construction. - Comply with waste management strategies developed for each waste stream prior to the commencement of any waste producing activities, based on the principles of the Waste Management Hierarchy of Control (refer to SEA Gas Waste Hazard Standard (OHSE-ST(H)-014)). - Capture, transport and dispose of all condensate and hazardous waste as regulated waste by an EPA certified waste contractor and controlled waste tracking receipts will be retained. - Manage hazardous wastes, such as solvents, rust proofing agents and primer, in accordance with the requirements of relevant legislation and industry standards. - Ensure all bins are lidded and labelled and all waste collected by licensed contractor. - Cover bins to prevent access by fauna and the spread of rubbish by wind. - Maintain waste disposal records and chemical manifests.	High certainty that proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To avoid land or water contamination.	To ensure that construction waste is disposed of in an appropriate manner.	- Records of audits/inspections demonstrate no rubbish on ROW ¹ - Records of audits/inspections demonstrate that waste material is contained and disposed of in accordance with the Environment Protection Act.¹ - Records of audits/inspections show that waste at construction camps is stored and disposed of in an approved manner.¹	- Waste management requirements including removal of all waste is specified in the CSEMP. - Compliance with Abrasive Blasting & Painting Procedure (OHSE-PR-022) in relation to waste management. - Compliance auditing of ROW to validate rubbish removal, no spills, no soil discoloration or odour, no third party complaints. - Waste disposal records, chemical manifests maintained. - Appropriately licensed contractors used for any hazardous waste disposal and records maintained for all hazardous waste disposal.
						To prevent adverse impacts as a result of hydrostatic test water, trench water, vehicle and equipment wash down.	- Records of audits/inspections show no evidence of impacts to soil, water and vegetation as a result of water disposal (e.g. soil erosion, soil salinity, dead vegetation, water discolouration) as a result of construction activities. ¹ - Records show that discharge water complies with SA EPA Environment Protection (Water Quality) 2015 criteria.	- Water discharge conducted in a manner that prevents discharge or runoff to watercourses or environmentally sensitive areas. - Where practical water is recycled or discharged in a manner that does not result in erosion. - CSEMP to detail hydrostatic test water disposal management requirements. - Water quality testing to be conducted prior to in-situ release of waste water (including pre-excavation dewatering). - Containment and treatment of waste water on-site or removal off-site for appropriate treatment/disposal where water quality is unsuitable in-situ release. - Inspection of in-situ sites for evidence of unauthorised off-site, watercourse or environmentally sensitive area contamination. - Contaminated soil surveys to identify location, nature and extent of any pre-existing contamination that may influence waste water disposal. - Compliance with Washdown Procedure (OHSE-PR-008); - Where required, compliance auditing of ROW and construction camps.
						To ensure the safe and appropriate disposal of camp wastewater (e.g., grey water and sewage).	Records of audits/inspections demonstrate no evidence of impacts to soil, water and vegetation as a result of waste water containment or disposal (e.g. soil erosion, soil salinity,	- Containment and disposal of camp waste water in an approved manner (e.g. – Council or commercial waste treatment facility). - On site treatment of camp wastewater to appropriate water quality standards prior to discharge (e.g. – grey

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			- Where required, audit compliance against waste control measures along ROW. Wastewater Disposal - Dewatering of ground water undertaken in accordance with EPA guideline 1093/21 “Environmental management of dewatering during construction activities”				- dead vegetation, water discolouration).¹ - Records of audits show that discharge water complies with the requirements of South Australian Public Health (Wastewater) Regulations 2013 and On-site Wastewater Systems Code 2013.¹	- water and effluent) in a manner that prevents entry into water bodies or water courses. - Compliance with the relevant local Government regulations and sanitation regulations. - Treated sewage wastewater disposed onto land, well away from any place from which it is reasonably likely to enter any waters. - Where required, compliance auditing of ROW and construction camps.
Operations, maintenance and decommissioning	WM02	Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline operation, maintenance and decommissioning activities.	- Obtain an EPA licence for any water discharge into a waterway. - Conduct water discharge in a manner that prevents discharge or runoff to watercourses or environmentally sensitive areas. - Dispose of practical water and treated sewage water in a way that prevents entry into water bodies or water courses and does not result in erosion. - Dispose of hydrostatic test water as per CSEMP. - Conduct water quality testing prior to in-situ release of wastewater, including pre-excavation dewatering. - Contain and treat wastewater on-site or remove from site for appropriate treatment/ disposal where water quality is unsuitable for in-situ release. - Comply with relevant local Government regulations and sanitation regulations. - Inspect in-situ sites for evidence of unauthorised off-site watercourse or environmentally sensitive area contamination. - Utilise contaminated soil surveys to identify the location, nature and extent of any pre-existing contamination that may influence wastewater disposal.		To avoid land or water contamination.	To ensure that rubbish and waste material are disposed of in an appropriate manner.	- Records of audits/ inspections show no waste on easement, at other than designated storage areas within facilities, pending disposal.² - Records demonstrate waste is disposed of in accordance with approved protocols (Environment Protection Act).	- Waste management requirements met including removal of all maintenance related waste. - Where required, regular inspections of easement and maintenance areas to validate compliance (waste removed from easement, no spills, no soil discoloration or odour, no third party complaints). - Appropriately licensed contractors used and records maintained (e.g. – waste tracking certification, chemical manifests) maintained for all hazardous waste disposal.
						To prevent adverse impacts as a result of trench water, vehicle and equipment wash down and effluent disposal.	- Records demonstrate that wastewater meets relevant ANZECC / ANZG water quality guidelines criteria at the point of discharge and is disposed onto land, well away from any place from which its reasonably likely to enter any waters. - Records of audits/ inspections demonstrate no evidence of impacts to soil, water and vegetation as a result of water disposal (e.g. soil erosion, soil salinity, vegetation loss, water discolouration, impacts to aquatic fauna) as a result of operation and maintenance activities. ²	- Liquid waste is disposed in a manner which prevents discharge or runoff to watercourses or environmentally sensitive areas. - Water discharged on stable ground, with no evidence of erosion as a result of discharge. - Records maintained in relation to disposal/discharge method and location and any third party consultation. - Testing of salinity and/or water quality prior to release/disposal of trench water (including pre-excavation dewatering) and waste water. - Containment and treatment on-site or removal off-site for appropriate treatment/disposal where water quality is unsuitable for on-site disposal. - Inspection of water disposal sites for evidence of water entering a watercourse or environmentally sensitive area.
						To ensure the safe and appropriate disposal of facility wastewater (e.g., grey water and sewage).	- Records of audits show that wastewater complies with the requirements of South Australian Public Health (Wastewater) Regulations 2013 and On-site Wastewater Systems Code 2013. - Records of audits/inspections demonstrate no evidence of impacts to soil, water and vegetation as a result of wastewater discharge (e.g. soil erosion, soil salinity, dead vegetation, water discolouration).²	- Waste water disposal systems comply with legislative requirements. - Treated sewage wastewater disposed onto land, well away from any place from which it is reasonably likely to enter any waters. - Where required, facility and maintenance audits to validate compliance.

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5.11.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with waste management greenhouse gas is **Low** for all impact events. Control measures targeted at waste generation, storage, recycling and disposal ensure this is managed effectively. Potential impacts from the proposed activities are localised and limited scale and readily manageable using standard control measures.

Refer to Table 5-35 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-35: Environmental Significance Assessment – Waste Management

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
WM01	Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline construction and commissioning activities.	Yes – impacts can generally be avoided through the identified controls.	Rare – potential impact events are not expected to occur.	Long lasting – potential contamination of water and soils can last for years, but the impact can be reversed.	Localised to moderate – Impacts to waterbodies/courses may spread beyond the project site and immediate surrounds. Impacts to vegetation and soils are likely to be localised.	Low to moderate – It is unlikely that impacts would result in reference values or quality standards being exceeded but it is likely that the impacts would result in an increase in the occurring level of water and soil contamination.	Possible – Receptors may be impacted by other potential impact events.	Low - pipeline easement is generally over land that is largely cleared of native vegetation and used for agriculture, industry and urban development.	Magnitude of impact = Low to moderate Significance = Low
WM02	Contamination of soil and water and other environmentally sensitive values from waste generated during pipeline operation, maintenance and decommissioning activities.								

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5.12 Hazardous Storage, Spill and Emergency Response

5.12.1 Existing Environment

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.

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.

5.12.2 Impact Events

The impact event relevant to hazardous storage, spill and emergency response is:

- Contamination of soils, surface or groundwater as a result of spills during construction, commissioning, operation, maintenance and decommissioning activities.

Refer to Table 5-36 for details of the assessment of potential impact events and confirmation of impact events.

This is discussed in more detail below

Soil Contamination

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

- minor spills of fuel or chemicals;
- waste hydrocarbons from 'pigging' operations.

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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.

Water 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;

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.

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;

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.

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Table 5-36: Potential Impact Events and Confirmation of Impact Events – Hazardous Storage, Spill and Emergency Response

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Hazardous storage, spill and emergency response	Construction, Commissioning, Operation, Maintenance, Decommissioning	HER01	Contamination of soils, surface or groundwater as a result of spills during construction, commissioning, operation, maintenance and decommissioning activities.	- Fuel - Lube oils - Solvent - Pipeline rupture or emergency repair - Residual chemicals remaining in pipe - Rust proofing agents and primer - Waste hydrocarbons generated from maintenance activities (pigging, filter change).	Spill to ground Percolation to shallow groundwater Runoff to surface water	Soil quality Surface water quality Surface water users Groundwater quality Groundwater users Vegetation	Uncertainty on the extent of impact, however, area of a spill will generally be limited due to limited volume of fuels and chemicals on site.	Low sensitivity to change due to prior knowledge and experience.	Yes – potential for impact if an unplanned event occurs. Location may reduce SPR linkage.

5.12.3 Control Measures

Control measures to reduce the risk and impact associated with hazardous storage, spill and emergency response are detailed in Table 5-37, including environmental objectives and criteria.

Table 5-37: Control Measures, Environmental Objectives and Criteria – Hazardous Storage, Spill and Emergency Response

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction, commissioning, operation, maintenance and decommissioning	HER01	Contamination of soil, surface or groundwater as a result of spills during construction, commissioning, operation, maintenance and decommissioning.	- Develop standard operating procedures for correct use of equipment to minimise the potential for spills. - Ensure hazardous materials are not stored or drained onto the ground or into watercourses or floodplains. - Store 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); All hazardous materials stored in accordance with requirements listed in Safety Data Sheets (SDS). - Avoid vehicle refuelling in close proximity to watercourses (e.g. within 50 m). - Ensure that materials and equipment required to respond to a hazardous spill are readily available. - Implement clean-up / spill response procedures in the event of a spill. - Keep material Safety Data Sheets for each chemical used on-site at a location that is easily accessible 24 hrs per day. - Instruct all personnel in prevention, safety and response practices for spills as a component of the environmental induction process. - Where required, undertake regular inspection/auditing of ROW to assess soil or water discolouration and vegetation or fauna loss. - Manage spills in accordance with the <i>Spill Response Procedure (OHSE-PR-009)</i> by implementing: - Containment and reporting protocols	High certainty that the proposed control measures will be effective. Industry standard control measures that are well understood and that have been successfully implemented.	To avoid land or water contamination.	To prevent the occurrence of spills during construction and to have in place a spill management strategy.	- Records of audits/ inspections demonstrate no spills or leaks outside areas designed to contain them (e.g. bunded areas, or fenced facilities with respect to minor spills) that result in land or water contamination.^{1,2} - Records show that the EPA is notified of any contamination in accordance with Section 83 and 83A of the Environment Protection Act 1993. - Any uncontained spills with larger scale impact are assessed and remediated (where required) using a risk-based approach, consistent with the principles of the National Environment Protection (Assessment of Site Contamination) Measure 1999 and in accordance with the South Australian Guidelines for Assessment and Remediation of Site Contamination (November 2019), where appropriate. - Records (e.g. audits/inspections) demonstrate no spread of existing soil contamination as a result of pipeline construction activities.^{1,2}	- Where required, compliance auditing of ROW to assess soil or water discoloration and vegetation or fauna loss. - Compliance with AS 1940-2017 - The storage and handling of flammable and combustible liquids. - Spills managed in accordance with Spill Response Procedure (OHSE-PR-009): - Containment and reporting - Clean-up and site restoration - Root cause investigated and corrective/preventative actions are implemented; and - Monitoring initiated where necessary. - Engineering controls and administrative controls applied within environmentally sensitive areas along ROW. - Management of spill response/cleanup capability including: - Spill response training - Guidelines for containment of all hazardous substances and liquid waste in appropriate vessels and bunded areas - Compliance with fuel and hazardous waste standards (storage and use) - Use of drip trays, spill mats or bunded areas for refuelling of vehicles and plant.
					To avoid land or water contamination.	To prevent spills occurring during operation, maintenance and decommissioning, and should they occur, to minimise their impact.	- No spills or leaks outside areas designed to contain them (e.g. bunded areas, or fenced facilities with respect to minor spills) that result in land or water contamination. - Records demonstrate that the EPA is notified of any contamination in accordance with Section 83 and 83A of the Environment Protection Act 1993. - Records demonstrate that all minor spills within facilities reported, cleaned up and remediated as soon as is practicable.	- Where required, regular inspections for evidence of soil or water discolouration, vegetation or fauna death. - A spill contingency response plan to address fuels, lubricants and chemicals (refer Spill Response Procedure (OHSE-PR-009)). Chemicals to be stored in accordance with EPA guidelines. - Use of spill protection methods within or adjacent to environmentally sensitive areas. - Spill response/clean-up procedures, to ensure: - Reporting - Containment - Clean-up and restoration - Cause investigated and corrective and/or preventative action implemented.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
			○ Cleaning and site restoration protocols ○ Corrective/preventative actions based on investigation into root cause of spill ○ Monitoring initiated where necessary. ● Apply engineering and administrative controls within environmentally sensitive areas along the ROW. ● Manage spill responses by implementing: ○ Spill response training ○ Guidelines for containment of all hazardous substances and liquid waste in appropriate vessels and bunded areas ○ Compliance with fuel and hazardous waste standards (storage and use) ○ Use of drip trays, spill mats or bunded areas for refuelling of vehicles and equipment.				● Any uncontained spills with larger scale impact are assessed and remediated (where required) using a risk-based approach, consistent with the principles of the National Environment Protection (Assessment of Site Contamination) Measure 1999 and in accordance with the South Australian Guidelines for Assessment and Remediation of Site Contamination (November 2019), where appropriate.	● Ensuring that personnel are trained in spill response procedures. ● Containment of all hazardous substances and liquid waste in appropriate vessels and containment areas. ● Compliance with fuel and hazardous waste standards.

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5.12.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with hazardous storage, spill and emergency response is **Low**. Control measures targeted at compliance, monitoring and response ensure this is managed effectively. Potential impacts from the proposed activities are localised and limited scale and readily manageable using standard control measures.

Refer to Table 5-38 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-38: Environmental Significance Assessment – Hazardous Storage, Spill and Emergency Response

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
HER01	Contamination of soils, surface or groundwater as a result of spills onsite during construction/ operation/ maintenance/ decommissioning activities.	No – fuel and other chemicals required on site. Control measures will be in place however unplanned escapes or releases could occur.	Low – impact not expected to occur as controls ensure appropriate prevention and clean up measures.	Short term – impacts are expected to be remediated within a short timeframe from occurrence.	Localised – impacts would generally occur in a small, discrete location.	Low – short-term, infrequent impacts that can be remediated.	Possible – Receptors could be impacted by similar activities at some sites.	Low to moderate - pipeline easement is generally over land that is largely cleared of native vegetation and used for agriculture, industry and urban development. Some areas of higher sensitivity are present (e.g. watercourses).	Magnitude = Low Significance = Low

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5.13 Weeds, pests and pathogens

5.13.1 Existing Environment

Refer to 5.3.1, 5.4.1 and 5.5.1 for details.

5.13.2 Impact Events

The impact events relevant to weeds, pests and pathogens are:

- Introduction or spread of weeds, pests and pathogens during construction impacts land use or native vegetation and biodiversity.
- Introduction or spread of weeds, pests and pathogens during operations, maintenance and decommissioning impacts land use or native vegetation and biodiversity.

Refer to Table 5-39 for details of the assessment of potential impact events and confirmation of impact events.

This is discussed in more detail below.

Spread of Weeds

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.

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.

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

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present. The introduction or spread of weeds in agricultural land can affect land use and impair long-term productivity.

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 (DIT 2022). 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.

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.

The spread of diseases into non-contaminated areas has the potential to cause damage to remnant native vegetation and impact agricultural land use and long-term productivity. 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.

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Table 5-39: Potential Impact Events and Confirmation of Impact Events – Weeds, Pests and Pathogens

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Weeds, pests and pathogens	Construction and commissioning	WPP01	Introduction or spread of weeds, pests and pathogens during construction impacts land use or native vegetation and biodiversity.	- Spread of existing weeds, pests or pathogens between properties - Introduction of weeds, pests or pathogens on vehicles/equipment or in imported soils/materials.	- Vehicle, equipment and personnel movement - Imported soils / materials.	- Native vegetation and biodiversity - Landholders and land use.	Location of activity and levels of existing of weeds, pests or pathogens.	Moderate sensitivity to change. Future construction locations could potentially occur in areas with higher levels of weeds, pests or pathogens.	Yes – potential for impact to biodiversity and/or land use within and surrounding the project area.
Weeds, pests and pathogens	Operation, maintenance and decommissioning	WPP02	Introduction or spread of weeds, pests and pathogens during operation, maintenance and decommissioning impacts land use or native vegetation and biodiversity.	- Spread of existing weeds, pests or pathogens between properties - Introduction of weeds, pests or pathogens on vehicles/equipment or in imported soils/materials.	- Vehicle, equipment and personnel movement - Imported soils / materials.	- Native vegetation and biodiversity - Landholders and land use.	Location of activity.	Low sensitivity to change due to existing knowledge of sources and use of control measures.	Yes – potential for impact to biodiversity and/or land use within and surrounding the project area.

5.13.3 Control Measures

Control measures to reduce the risk and impact associated with weeds, pests and pathogens are detailed in Table 5-40, including environmental objectives and criteria.

Table 5-40: Control Measures, Environmental Objectives and Criteria – Weeds, Pests and Pathogens

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	WPP01	Introduction or spread of weeds, pests and pathogens during construction impacts land use or native vegetation and biodiversity.	- Undertake detailed site investigations to identify the presence of weeds and pathogens within the construction corridor. - Develop and implement site-specific pre-construction management procedures where required, taking the ELL and CSEMP into consideration. 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 - Implement management measures for the control of weeds and pathogens on the easement during maintenance activities. - Ensure site specific induction for workers on cleaning protocols for personnel, vehicles and equipment is undertaken. - Implement a landholder liaison program to identify changes to site specific requirements. - Conduct weed spraying in consultation with and after approval from the adjoining landholders. - Where required, undertake compliance auditing of ROW as per CSEMP, using photo point monitoring to validate compliance.	High certainty that proposed control measures will be effective. Industry Standard control measures that are well understood and that have been successfully implemented.	To avoid the introduction or spread of weeds, pests and pathogens.	To avoid the introduction or spread of environmental or proclaimed weeds, pests or animal/plant pathogens, by undertaking appropriate site-specific control measures where required.	- Records of audits / inspections demonstrate that the presence of weeds, pests and pathogens along the ROW is consistent with or better than pre-disturbance/ construction conditions and adjacent land. ¹ - Records of audits / inspections demonstrate no new outbreaks or spread of weeds, pests or pathogens in the construction area. ¹ - Records demonstrate no reasonable complaints received from landholders in relation to new outbreaks or spread of weeds, pests or pathogens during pipeline construction.	- Environmental assessment during the planning stage to identify the presence of weeds, pests and or pathogens and appropriate management measures. - Minimise spread of weeds, pests and pathogens along ROW, through pre-identification and implementation of management strategies prior to and during construction. - Vehicle and plant to minimise weed and pathogen spread (refer Washdown Procedure (OHSE-PR-008)) through inspection and washdown prior to entry into/departure from affected areas. - Where required, compliance auditing of ROW. - Where required, photo point monitoring to validate compliance.
Operation and maintenance	WPP02	Introduction or spread of weeds, pests and pathogens during operation, maintenance and decommissioning impacts land use or native vegetation and biodiversity.	- post-construction weed control if required - Implement management measures for the control of weeds and pathogens on the easement during maintenance activities. - Ensure site specific induction for workers on cleaning protocols for personnel, vehicles and equipment is undertaken. - Implement a landholder liaison program to identify changes to site specific requirements. - Conduct weed spraying in consultation with and after approval from the adjoining landholders. - Where required, undertake compliance auditing of ROW as per CSEMP, using photo point monitoring to validate compliance.		To prevent the introduction and spread of weeds, pests and pathogens.	To ensure that weeds, pests or animal and plant pathogens are managed in a manner that is consistent with the surrounding land parcels.	- Records of audits / inspections demonstrate presence of weeds, pests and pathogens on the easement is consistent with or better than that of adjoining land parcels. ² - Records of audits / inspections demonstrate no new outbreaks or spread of weeds, pests or pathogens in areas undergoing maintenance. ² - Records demonstrate no reasonable complaints received from landholders in relation to new outbreaks or spread of weeds, pests or pathogens during pipeline operation and maintenance activities.	- Maintenance activities include identification of weeds on the easement and triggering of management measures following identification. - Implementation of appropriate management measures for the control of weeds, pests and pathogens on the easement during maintenance activities (e.g. – cathodic protection and coating surveys, excavation, pigging). - Photo point monitoring at significant outbreak sites.



Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
						To ensure that vehicle and equipment washdown is conducted where appropriate along the easement.	- Records of audits / inspections demonstrate presence of weeds, pests and pathogens on the easement is consistent with or better than that of adjoining land parcels. ² - Records of audits / inspections demonstrate no new outbreaks or spread of weeds, pests or pathogens in areas undergoing maintenance. ² - Records demonstrate no reasonable complaints received from landholders in relation to new outbreaks or spread of weeds, pests or pathogens during pipeline operation and maintenance activities.	- Vehicles and machinery to be washed down and inspected prior to entry/departure from affected areas (Refer Environmental Line List (OHSE-PR-018)). - Vehicle and machinery wash down register to be maintained (Refer Vehicle Equipment Washdown Procedure (OHSE-PR-008)). - Where required, compliance auditing of easement.

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5.13.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with public health and safety is **Low** to **Moderate** for construction and **Low** for operations, maintenance and decommissioning activities. Potential impacts for construction activities are managed to ALARP by implementing control measures that are recognised as standard industry practice and are considered effective in minimising impacts.

Refer to Table 5-41 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-41: Environmental Significance Assessment – Weeds, Pest and Pathogens

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
WPP01	Introduction or spread of weeds, pests and pathogens during construction impacts land use or native vegetation and biodiversity.	No – control measures will generally prevent introduction or spread, however impact could occur.	Low – impact would only occur rarely to infrequently.	Short term to long lasting – impacts can generally be successfully managed in the short-term with the implementation of identified controls, however could have longer term effects in the worst case.	Localised – impacts not likely to extend beyond the project site and immediate surrounds.	Moderate – if the impact event occurs, it could result in an increase in the occurrence of weeds, pests or pathogens and may require a high level of management.	Possible – if the spread of weeds, pests or pathogens occurs on multiple occasions at the same site, or has occurred at nearby sites, the potential for cumulative impacts exists.	Low to Medium – pipeline would generally be located over land cleared of native vegetation, with minimal vegetation of high environmental. Weeds, pests and pathogens are a hazard to agricultural productivity and to livestock wellbeing.	Magnitude = Moderate Significance = Low to moderate ALARP assessment: Control measures identified are recognised as standard industry practice and are considered effective in minimising impacts.
WPP02	Introduction or spread of weeds, pests and pathogens during operations, maintenance and decommissioning impacts land use or native vegetation and biodiversity.	No – control measures will generally prevent introduction or spread, however impact could occur.	Rare – impact would only occur in exceptional circumstances.	Short term – impacts can generally be successfully managed in the short-term with the implementation of identified controls.	Localised – impacts not likely to extend beyond the project site and immediate surrounds.	Low to moderate – potential impact events would generally be low severity due to the nature of the existing easement and weed presence and control measures in place.	Possible – if the spread of weeds, pests or pathogens occurs on multiple occasions at the same site, or has occurred at nearby sites, the potential for cumulative impacts exists.	Low – pipeline is generally located over land cleared of native vegetation, with minimal vegetation of high environmental value. Weed, pests and pathogens status of existing pipeline easement is well understood.	Magnitude = Low to Moderate Significance = Low

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5.14 Third party infrastructure, landholders and land use (including visual amenity and socio economic)

5.14.1 Existing Environment

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 5-42.

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 5-42: Population centre statistics from the 2021 Census

Population Centre	Local Government Area	Population (2021 Census)
Naracoorte	Naracoorte Lucindale Council	8,686
Keith	Tatiara District Council	6,891
Tailem Bend	The Coorong District Council	5,463
Murray Bridge	The Rural City of Murray Bridge	21,644
Gawler ⁽¹⁾	Town of Gawler	24,988
Adelaide ⁽²⁾	Adelaide Metropolitan region (17 local councils)	1,387,290
⁽¹⁾ Urban Centre/Locality		
⁽²⁾ Greater Capital City Statistical Areas – inclusive of Gawler population statistics		

Source: ABS (2021)

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

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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.

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.

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 5-43 illustrates broad land uses representative of each environmental region and further information is provided in the discussion following the table.

Table 5-43: Representative land uses within each environmental region

Environmental Region	Representative Land Uses
Wimmera Plains	▪ Cattle and sheep farming and cereal cropping ▪ Plantations ▪ Viticulture

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Environmental Region	Representative Land Uses
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, pig and cattle farming and grape growing (ABARES 2022). 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 2025). Dairy production has declined over the years and there has been consolidation of producers in the industry. The value of farm production continues to increase however. 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.

Viticulture

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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.

Forestry

The majority of plantations are located in the South East of the state, with approximately 164,600 ha across South Australia during 2021-2022 (ABARES 2023). The Mount Lofty Ranges contains approximately 19,603 ha of proclaimed Forest Reserve and 4,013 ha of native forests (Forestry SA 2025). 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 5-44).

Table 5-44: 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.

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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 and Mawson Trail near Mount Crawford, 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 *Greater Adelaide Regional Plan* (DHUD 2025).

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.

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.

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.

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).

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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.

Transport Networks

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

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

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- 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.

5.14.2 Impact Events

The impact events relevant to third-party infrastructure, landholders and land use:

- Pipeline construction disturbs land use and landholders due to pipeline construction including:
 - Temporary loss of land utilisation for cropping/grazing
 - Reduction in long-term productivity
 - Restriction to stock movement
 - Impeded property access.
- Pipeline operations and maintenance disturb land use and landholders including:
 - Short-term disruptions during excavation
 - Access through properties to access the pipeline easement.
- Pipeline construction activities interrupt or damage third-party infrastructure.
- Pipeline operations and maintenance interrupt or damage third-party infrastructure.
- Inadequate reinstatement and rehabilitation following construction impacts post-construction land use and visual amenity.

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- Inadequate reinstatement and rehabilitation following operation / maintenance activities impacts ongoing land use and visual amenity.
- Decommissioning activities disturb land use, landholders or third-party stakeholders.

Refer to Table 5-45 for details of the assessment of potential impact events and confirmation of impact events

This is discussed in more detail below.

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

Construction 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 5.3) and weeds and diseases (see Section 5.13) are implemented, pipeline construction activities should not unduly contribute to losses of productivity post construction.

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Under the *Energy Resources Act 2000*, 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.

Visual Amenity

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.

Third Party Infrastructure

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.

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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.

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 Section 5.4.

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Table 5-45: Potential Impact Events and Confirmation of Impact Events – Third party infrastructure, Landholders and Land use

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Landholders and land use	Construction and commissioning	LTP01	- Pipeline construction disturbs land use and landholders due to pipeline construction including: - Temporary loss of land utilisation for cropping/grazing - Reduction in long-term productivity - Restriction to stock movement - Impeded property access.	- Earthworks required for construction (e.g., clear and grade operations, trenching, backfilling, reinstatement) - Vehicle and equipment movement along pipeline ROW.	Direct disturbance	- Landholders/ land users - Stock.	Location of construction activity and existing land use.	Low sensitivity to change – sources, land use types and controls are generally well known but may vary depending on location.	Yes – potential for impact.
Landholders and land use	Operations and maintenance	LTP02	- Pipeline operations and maintenance disturb land use and landholders including: - Short-term disruptions during excavation - Access through properties to access the pipeline easement.	- Earthworks required for maintenance (pipe repair or replacement) - Vehicle and equipment movement along pipeline ROW - Pipeline venting associated with maintenance activities.	Direct disturbance	- Landholders/ land users - Stock.	Location and scale of maintenance activities.	Low sensitivity to change – sources, receptors and controls are well known.	Yes – potential for impact.
Third-party infrastructure	Construction and commissioning	LTP03	Pipeline construction activities interrupt or damage third-party infrastructure.	- Excavations required for construction - Vehicle and equipment movement along pipeline ROW or access roads.	Direct disturbance including loss of road integrity; localised traffic congestion or disruptions; damage to utility infrastructure (via perforation, rupture, incision etc.); modifications to existing fences/ gates/ driveways on private property.	- Utility/ infrastructure owners or users - Road users - Landholders/ land users.	Location of construction activity and existing infrastructure.	Low sensitivity to change – sources, receptor types and controls are generally well known but may vary depending on location.	Yes – potential for impact. Siting may reduce SPR linkage.
Third-party infrastructure	Operations and maintenance	LTP04	Pipeline operations and maintenance interrupt or damage third-party infrastructure.	- Excavation required for maintenance (pipe repair or replacement) - Vehicle and equipment movement along pipeline ROW or access roads.	Direct disturbance including loss of road integrity; localised traffic congestion or disruptions; damage to utility infrastructure (via perforation, rupture, incision etc.)	Utility/ infrastructure owners or users Road users Landholders/ land users.	Location and scale of maintenance activities.	Low sensitivity to change – sources, receptors and controls are well known.	Yes – potential for impact.

ENVIRONMENTAL ELEMENT	PHASE	IMPACT ID	POTENTIAL IMPACT EVENT	SOURCE	PATHWAY	ENVIRONMENTAL RECEPTOR	UNCERTAINTIES & ASSUMPTIONS	SENSITIVITIES TO CHANGES IN ASSUMPTIONS	CONFIRMATION OF SOURCE-PATHWAY-RECEPTOR
Visual amenity	Construction and commissioning	LTP05	Inadequate reinstatement and rehabilitation following construction impacts post-construction land use and visual amenity.	- Vegetation clearance - Earthworks required for construction (e.g., clear and grade operations, trenching, backfilling, reinstatement) - Presence of construction vehicles and equipment.	Direct disturbance Line of sight	Landholders/ land users Passing traffic Local community.	Location of construction activity and existing land use.	Low sensitivity to change – sources, land use types and controls are generally well known but may vary depending on location.	Yes – potential for impact.
Visual amenity	Operations and maintenance	LTP06	Inadequate reinstatement and rehabilitation following operation / maintenance activities impacts ongoing land use and visual amenity.	- Maintenance of line of sight - Earthworks required for maintenance - Presence of vehicles and equipment during operations/maintenance.	Direct disturbance Line of sight	Landholders/ land users Passing traffic Local community.	Location and scale of maintenance activities.	Low sensitivity to change – sources, receptors and controls are well known.	Yes – potential for impact.
Landholders and land use	Decommissioning	LTP07	Decommissioning activities disturb land use, landholders or third-party stakeholders.	- Earthworks required for removal of above ground facilities - Vehicle and equipment movement along pipeline ROW - Pipeline venting/pigging/cleaning.	Direct disturbance	Landholders/ land users Stock.	Location and timing of activity.	Low sensitivity to change – sources, receptors and controls are well known.	Yes – potential for impact.

5.14.3 Control Measures

Control measures to reduce the risk and impact to third party infrastructure, landholders and lands use are detailed in Table 5-46, including environmental objectives and criteria.

Table 5-46: Control Measures, Environmental Objectives and Criteria – Third party infrastructure, Landholders and Land use

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
Construction and commissioning	LTP01	Pipeline construction disturbs land use and landholders due to pipeline construction including: - Temporary loss of land utilisation for cropping/grazing - Reduction in long-term productivity - Restriction to stock movement - Impeded property access.	- Work closely with land users to minimise conflict with existing land use activities. - Consider current and future land use during planning and design of pipeline construction. - Enter a formal easement agreement outlining the legal responsibilities of SEA Gas and the landowner. - Consult with landholders to avoid construction activities or major maintenance activities during key periods of land use. - Obtain pre-construction agreement regarding strategies and responsibilities for rectification of, or compensation for, damage - Limit operational activities to the pipeline easement, and approved access and work areas. - Rehabilitate construction ROW in consultation with landholders. - Monitor activities in close proximity to the easement to ensure pipeline integrity and no potential land use conflicts arise. - Implement site access agreements in accordance with the stakeholder engagement plan, prior to construction/ commissioning activities.	High certainty that proposed control measures will be effective.	To minimise disturbance to third party infrastructure, land holders and land use.	To minimise disturbance or damage to infrastructure or land use and to remediate where disturbance cannot be avoided.	- Records demonstrate that where disturbance is unavoidable or accidental, infrastructure or land use is restored to as near as practicable to the satisfaction of the stakeholder. - Records of audits/ inspections demonstrate no disturbance outside the ROW or approved access and work areas.¹ - Records of audits / inspections demonstrate that the duration of disturbance does not exceed agreed timeframe, without prior consultation with stakeholders.¹	- Easement agreements outlining legal responsibilities of SEA Gas and landholders. - Compliance with CSEMP to restrict disturbance along the ROW to approved access and work areas. - Stakeholder consultation prior to and during construction/commissioning activities. - Measures implemented to minimise visual impact where practicable.
						To minimise disturbance to landholders or land users.	- Records of audits / inspections show that pre-existing land use not restricted or impeded as a result of construction or commissioning activities unless by prior arrangement.¹ - Records demonstrate no reasonable complaints received in relation to asset disturbance or reinstatement during construction.	- Site access in accordance with stakeholder consultation plan prior to and during construction/commissioning activities. - Sites requiring management of hazards or restricted access to be detailed on the Environmental Line List. - Where required, photo point monitoring to validate compliance.
Operations and maintenance	LTP02	Pipeline operations and maintenance disturb land use and landholders including: - Short-term disruptions during excavation - Access through properties to access the pipeline easement.		High certainty that proposed control measures will be effective.	To minimise disturbance to third party infrastructure, landholders and land use.	To minimise disturbance or damage to infrastructure or land use and to remediate where disturbance cannot be avoided	- Records demonstrate that where disturbance is unavoidable or accidental, infrastructure or land use is restored to as near as practicable to the satisfaction of the landholder/owner. - Records of audits / inspections demonstrate no disturbance outside the easement or approved access and work areas without prior consultation.² - Records demonstrate that the duration of disturbance does not exceed agreed timeframe without prior consultation. - Records demonstrate no reasonable complaints received in relation to disturbance.	- Operational activities restricted to pipeline easement and approved access and work areas - Records of communications with landholders and third parties during maintenance activities. - Landholder contact database and liaison program maintained. - Measures implemented to minimise visual impact where practicable. - Incident reporting.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
						To minimise disturbance to stakeholders	- Records of audits / inspections demonstrate that pre-existing land use not restricted or impeded as a result of maintenance activities unless by prior arrangement. ² - Records demonstrate no reasonable complaints received in relation to disturbance.	- Communications with landholders and third parties prior to and during maintenance activities that have the potential to disturb stakeholders. - Any impact on landholder activities, as a consequence of maintenance, to be minimised, where practicable.
Construction and commissioning	LTP03	Pipeline construction activities interrupt or damage third-party infrastructure.	General - Use Before You Dig Australia asset referral system prior to earthworks activities. - Identify location of third-party utilities and infrastructure via SEA Gas Geographical Information System (GIS) and alignment sheets. Transport Network - Implement a traffic safety management plan where required. - Implement traffic management procedures for construction activities or major operational projects to minimise impacts.	High certainty that proposed control measures will be effective.	To minimise disturbance to third party infrastructure, land holders and land use.	To appropriately identify and locate buried third-party infrastructure prior to commencing any excavation activities.	- Records demonstrate no unauthorised disturbance of third-party utilities or infrastructure. - Records demonstrate no reasonable complaints received in relation to unauthorised disturbance of third-party utilities or infrastructure.	- The location of surface and underground telecommunication, water, wastewater and irrigation infrastructure to be identified during the survey of the proposed gas pipeline route. - Records of communications with landholders and third parties prior to and during construction / commissioning activities. - Construction workforce inducted / trained regarding CSEMP requirements. - Incident reporting.
Operations and maintenance	LTP04	Pipeline operations and maintenance interrupt or damage third-party infrastructure.	- Minimise disruptions to traffic by using boring or horizontal directional drilling if sealed roads need to be crossed by the pipeline. - Reinstate roads to the satisfaction of the relevant authority. - Notify/engage with DIT or local council prior to any works that may interface with or impact roads/existing infrastructure. - Ensure that project related traffic drives at slow speeds near residences. - Promptly address any damage caused to roads by construction or associated activities. - Erect temporary gates across easements at all roads to reduce illegal entry. Utility Services - Liaise with utility companies to identify existing overhead and buried cables, lines, pipes, watermains, and telecommunications lines. - Obtain standard clearance from services from relevant authorities. - Install flagging to mark the location of services and infrastructure. - Incorporate services onto ELL as per CSEMP.	High certainty that proposed control measures will be effective.	To minimise disturbance to third party infrastructure, landholders and land use.	To appropriately identify and locate third party infrastructure prior to commencing any excavation activities in the course of operational or maintenance activities.	- Records demonstrate no impact or unauthorised disturbance to third-party utilities or infrastructure. - Records demonstrate no reasonable complaints received in relation to unauthorised disturbance of third-party utilities or infrastructure.	- Use of Before You Dig Australia asset referral system. - Identification of third party utilities and infrastructure on alignment sheets and SEA Gas Geographical Information System (GIS). - Records of communications with landholders and third parties prior to and during maintenance activities which may impact third party infrastructure (e.g. excavation). - Incident reporting.
Construction and commissioning	LTP05	Inadequate reinstatement and rehabilitation following	Selecting the site or alignment to minimise visual impact as far as practicable.	High certainty that proposed control	To minimise disturbance to third party infrastructure,	To appropriately reinstate and rehabilitate the	Records of audits/ inspections show that vegetation along the ROW and at construction areas to be as near as	Site specific rehabilitation in consultation with stakeholders.

Phase	Impact ID	Impact Event	Control Measures	Uncertainties & Assumptions Sensitivity to Change of Assumptions	Proposed Environmental Objective	Goal	Assessment Criteria	Leading Performance Criteria
		construction impacts post-construction land use and visual amenity.	- Stockpile material and equipment/machinery in areas away from general public view where practicable. - Maintain work areas in a neat and orderly manner. - Restore, reinstate and rehabilitate the easement as soon as practicable following backfill, in consultation with landholders. - Plant screening vegetation around above ground infrastructure where necessary.	measures will be effective.	landholders and land use.	easement to as near as practicable, pre-construction conditions, to allow continuation of current land use activities post-construction.	practicable to adjoining areas in agreement with stakeholders. (Note: Assessment of consistency with surrounding areas will take into account that regrowth is a time and rainfall dependent process). ¹ Records of audits / inspections show that land has been rehabilitated, recontoured and revegetated, consistent with pre-existing conditions or agreements with stakeholders. ¹	- ROW to be rehabilitated with appropriate pasture, cover crops or plantings in consultation with stakeholders. - Induction of construction workforce in relation to CSEMP compliance expectations. - Where required, compliance auditing of ROW. - Where required, photo point monitoring to validate compliance.
Operations and maintenance	LTP06	Inadequate reinstatement and rehabilitation following operation / maintenance activities impacts ongoing land use and visual amenity.		High certainty that proposed control measures will be effective.	To minimise disturbance to third party infrastructure, landholders and land use.	To appropriately reinstate and rehabilitate the easement, such that it is as near as practicable to conditions prior to disturbance and allows stakeholder usage to continue.	- Records of audits/ inspections show that vegetative cover along the easement to be as near as practicable to adjoining areas, or as agreed with landholders. (Note: Assessment of consistency with surrounding areas will take into account that regrowth is a time and rainfall dependent process). ² - Records of audits / inspections show that land has been rehabilitated, recontoured and revegetated, consistent with pre-existing conditions or agreements with stakeholders. ²	- Site / property specific rehabilitation requirements specified in an agreement with landholders. - Re-seeding of the easement with appropriate pasture or cover crops in consultation with landholders. - Records of communications with landholders and third parties prior to and during maintenance activities. - Where required auditing of easement and photo point monitoring to validate compliance.
Decommissioning	LTP07	Decommissioning activities disturb land use, landholders or third-party stakeholders.		High certainty that proposed control measures will be effective.	To appropriately decommission the pipeline in accordance with regulatory requirements and accepted best practice environmental management.	To minimise disturbance to landholders and third-party stakeholders during decommissioning activities.	- Records demonstrate no reasonable landholder complaints arising from decommissioning activities. - Records of audits/ inspections demonstrate that land holder activities are not materially restricted or compromised as a result of decommissioning activities, unless by a prior arrangement. ²	- Approved decommissioning plan - Approved rehabilitation plan - Records of communications with landholders and affected third parties prior to, during and following decommissioning activities. - Landholder activities not materially restricted as a result of decommissioning activities. - Where required, auditing to validate compliance.

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5.14.4 Impact Assessment Outcomes

The impact assessment detailed in the assessment tables indicates the significance associated with third-party infrastructure, landholders and land use is **Low** and **Negligible**. Potential impacts from the proposed activities are localised and limited scale and readily manageable using standard control measures.

Refer to Table 5-47 for details of the environmental impact and significance assessment, including assessment outcomes.

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Table 5-47: Environmental Significance Assessment – Third party infrastructure, Landholders and land use

Impact ID	Potential Impact Event	Avoidance (Yes/No)	Frequency (High, Moderate, Low, Rare)	Duration (Permanent, Long lasting, Short term)	Extent (Widespread, Moderate, Localised)	Severity (High/Moderate/Low)	Cumulative Effects (Yes/Possible/No)	Sensitivity of Receiving Environment (High/Medium/Low)	Outcome
LTP01	Pipeline construction disturbs land use and landholders due to pipeline construction including: • Temporary loss of land utilisation for cropping/grazing • Reduction in long-term productivity • Restriction to stock movement • Impeded property access.	No – use of land is required for construction, resulting in some impact to land use.	Low to moderate – occurs at times during the construction phase.	Short term – impacts are generally reversible and last weeks to months.	Localised – impacts are limited to land in close proximity to the pipeline.	Moderate – impacts from construction are expected to result in impact beyond any normally occurring levels, however would be in accordance with easement agreement.	Possible – receptors could be impacted by similar activities depending on the location of construction relative to other activities.	Low – disturbance is subject to easement agreement and compensation.	Magnitude = Moderate Significance = Low
LTP02	Pipeline operations and maintenance disturb land use and landholders including: • Short-term disruptions during excavation • Access through properties to access the pipeline easement.	No – land access is required for maintenance of the pipeline.	Low – impacts to land use/landholders due to pipeline maintenance may occur numerous times during the pipeline lifespan.	Short term – impacts are generally reversible and last weeks to months.	Localised – impacts are limited to land in close proximity to the pipeline.	Low – impacts are generally very limited and in accordance with formal easement agreement.	Possible – receptors could be impacted by similar activities depending on the location of maintenance activities relative to other activities.	Low – disturbance is subject to easement agreement and compensation.	Magnitude = Low Significance = Negligible
LTP03	Pipeline construction activities interrupt or damage third-party infrastructure.	Yes – implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event, although very unlikely, remains a possibility.	Rare – impacts are only expected to occur in exceptional circumstances.	Short term – impacts are reversible and generally very short term.	Widespread – impacts to third party infrastructure could have impacts on a more regional scale.	Moderate – impacts could be beyond the ability of SEA Gas to resolve without help from third parties.	Possible – receptors could be impacted by similar activities depending on the location of construction relative to other activities.	Low to medium – third party infrastructure and its users could be sensitive to interruption / damage.	Magnitude = Moderate Significance = Low
LTP04	Pipeline operations and maintenance interrupt or damage third-party infrastructure.	Yes – implementation of controls should generally avoid impacts. However, impact due to an incident / unplanned event, although very unlikely, remains a possibility.	Rare – impacts are only expected to occur in exceptional circumstances. Location of third-party infrastructure within the SEA Gas easement is generally well understood.	Short term – impacts are reversible and generally very short term.	Widespread – impacts to third party infrastructure could have impacts on a more regional scale.	Moderate – impacts could be beyond the ability of SEA Gas to resolve without help from third parties.	Possible – receptors could be impacted by similar activities depending on the location of maintenance activities relative to other activities.	Low to medium – third party infrastructure and its users could be sensitive to interruption / damage.	Magnitude = Low to moderate Significance = Low
LTP05	Inadequate reinstatement and rehabilitation following construction impacts post-construction land use and visual amenity.	No – construction of the pipeline will have some impact on land use and visual amenity.	Low to moderate – may occur at times during the construction phase.	Short term – impacts are reversible and generally short term.	Localised – impacts are limited to land/ landholders in close proximity to the pipeline.	Low – impacts are generally very limited.	Possible – receptors could be impacted by similar activities depending on the location of construction relative to other activities.	Low - disturbance is subject to easement agreement and compensation. Typically located in land with limited visual amenity values.	Magnitude = Low Significance = Negligible
LTP06	Inadequate reinstatement and rehabilitation following operation / maintenance activities impacts ongoing land use and visual amenity.	No – maintenance of the pipeline may have some impact on land use and visual amenity.	Low to moderate – may occur at times during the pipeline lifespan.	Short term – impacts are reversible and generally short term.	Localised – impacts are limited to land/ landholders in close proximity to the pipeline.	Low – impacts are generally very limited.	Possible – receptors could be impacted by similar activities depending on the location of maintenance activities relative to other activities.	Low - disturbance is subject to easement agreement and compensation. Pipeline is generally located in land with limited visual amenity values.	Magnitude = Low Significance = Negligible

LTP07	Decommissioning activities disturb land use, landholders or third-party stakeholders.	No – land access is required for decommissioning of the pipeline.	Rare – decommissioning of the entire pipeline will only occur once, though components of the pipeline system may be decommissioned occasionally.	Short term – impacts are generally reversible and last weeks to months.	Localised – impacts are limited to land in close proximity to the pipeline.	Low to moderate – impacts are generally very limited and in accordance with formal easement agreement.	Possible – receptors could be impacted by similar activities depending on the location activity relative to other activities.	Low – disturbance is subject to easement agreement and compensation.	Magnitude = Low to moderate Significance = Negligible to low
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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 6.1.

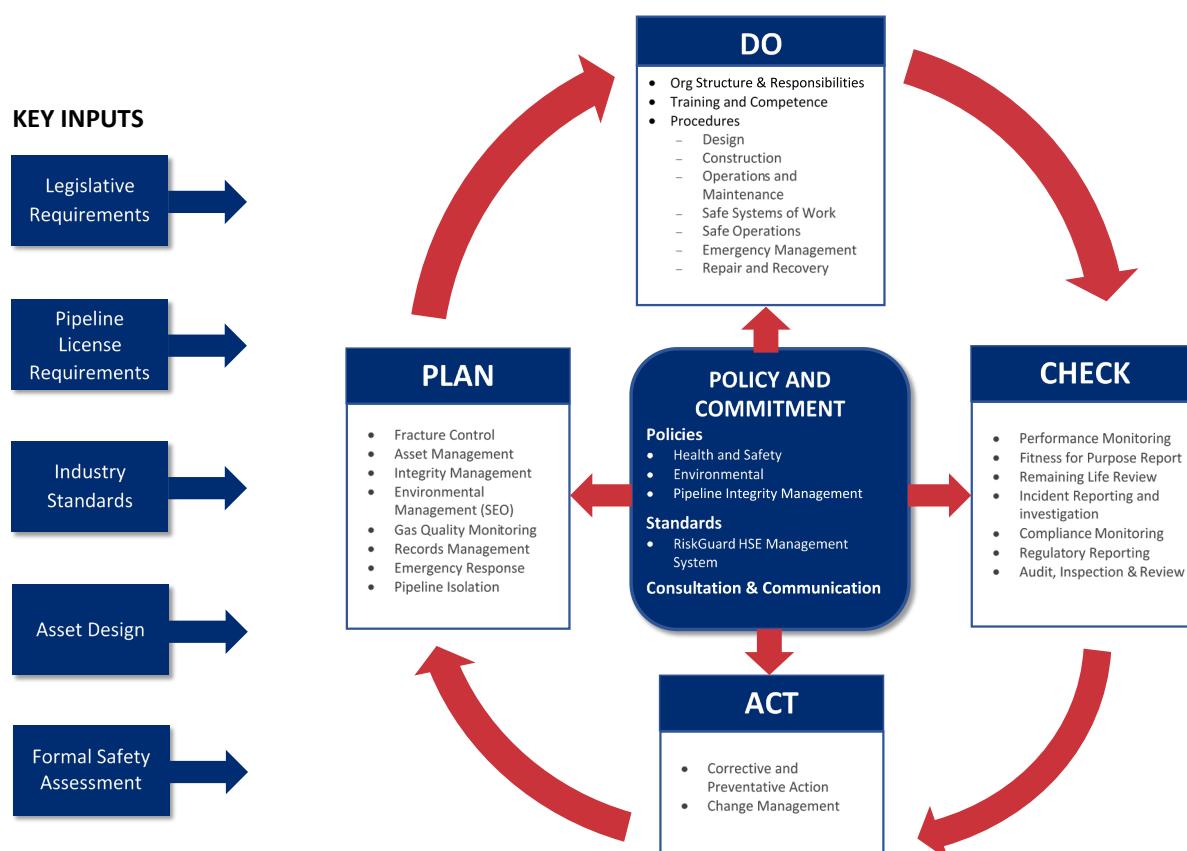


Figure 6-1: Components of the Pipeline Management System

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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 Operations.

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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 system in Section 3.4 of AS 2885.3-2022, 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 Environment Management System (RiskGuard) was introduced to the SEA Gas business in 2018 to provide a framework to ensure that SEA Gas meets its legislative obligations.

RiskGuard includes seven 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
- SST 01 Climate Change

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;

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- 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.
- Contractor Management Procedure; and
- Waste 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.

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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;

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- 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 *Energy Resources Regulations 2013*;
- Serious incidents are reported as soon as practicable, in accordance with Section 85(1) of the *Energy Resources 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 *Energy Resources 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 *Energy Resources Regulations 2000*; and
- A Fitness for Purpose Assessment is conducted every five years, in accordance with Regulation 30 of the *Energy Resources 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;

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- 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 2.1.1 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.

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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;
- Mineral tenement and exploration license holders;
- 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.

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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 A.

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 B.

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7.4 Consultation on 2025/2026 EIR Update

Stakeholder consultation was undertaken on the EIR (Rev 6a) and the SEO (Rev 12a) during the period 25 May 2026 to 6 July 2026. The consultation list included the following South Australian stakeholders:

- Landholders on which an easement has been granted.
- Native Title holders/claimants and Aboriginal Heritage groups
- Councils
- Government Departments (DEM, Renewal SA, DHUD, DIT, DEW, EPA, OTR, SafeWork SA, PIRSA)
- SA Water
- Landscape boards – Limestone Coast, Murraylands & Riverland, Hills & Fleurieu
- Mineral/Petroleum Tenement Holders
- Community Groups

A total of 346 stakeholders were included in this consultation program, of which 7 submitted a response. Feedback was received from:

- South Australian Arid Land Landscape Board
- Limestone Coast Landscape Board
- Department of Housing and Urban Development
- Environmental Protection Authority
- PIRSA
- Murraylands and Riverland Landscape Board
- Mid Murray Council

Details of the feedback is provided in Appendix C.

7.5 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.

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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 as required contact with the Department for Housing and Urban Development and local Government. Presentations detailing requirements for planning and development around pipelines are provided on a 3-5 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	3-5 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	Annual 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	Annual contact with offer of incident awareness training.

7.6 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

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Stakeholder	Typical consultation for a new construction or major operational project
	Provision of notices of entry as required Managing / minimising disturbance
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
DHUD	Department for Housing and Urban Development
DIT	Department for Infrastructure and Transport
DN	Nominal Diameter of pipe (e.g. a DN350 pipe has a nominal diameter of 350 mm)
DPTI	Department of Planning, Transport and Infrastructure (In 2020 became Department for Infrastructure and Transport and Department for Planning and Local Government (now Department for Housing and Urban Development)
DSD	Department of State Development
EER	Environment Effects Report
EIR	Environmental Impact Report prepared in accordance with Section 97 of the <i>Energy Resources Act 2000</i> and Section 10 of the <i>Energy Resources Regulation 2013</i> .
ELL	Environmental Line List
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
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

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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	<i>National Greenhouse and Energy Reporting Act 2007 (Cth)</i>
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 <i>Energy Resources Act 2000</i>
TJ	Terajoule

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10 Glossary

<i>bellhole</i>	An enlarged area of trench
<i>berms</i>	Banks of soil placed on slopes to prevent erosion.
<i>bund</i>	An earth, rock or concrete wall constructed to prevent the inflow or outflow of liquids.
<i>cathodic protection system</i>	Application of an electrical current to the pipeline exterior to prevent the electrochemical process of corrosion occurring.
<i>clear-and-grade</i>	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.
<i>compressor station</i>	Facility where gas is compressed and reinjected into the pipeline.
<i>easement</i>	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.
<i>Environmental Line List</i>	A list of sites along the easement that details site-specific environmental issues and/or site-specific environmental management measures that must be implemented.
<i>fugitive emissions</i>	Substances that escape to air from a source not associated with a particular process, such as leaks from equipment.
<i>grading</i>	Levelling of the right-of-way using graders, backhoes and bulldozers.
<i>ground level concentration</i>	Measured or estimated concentration of a pollutant at ground level.
<i>horizontal directional drilling</i>	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.
<i>hydrostatic testing (or hydrotesting)</i>	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.
<i>lateral</i>	Lateral pipelines are pipelines which branch off the main pipeline, and are usually smaller in diameter than the main pipeline.
<i>lunette</i>	A crescent-shaped dune formed on the shoreline of a lake or playa (ephemeral lake) by the interaction of wind, waves and currents.
<i>mainline valves</i>	Valves located in the pipeline at intervals along its length.
<i>meter stations</i>	Facility where the flow of gas is measured, particularly where gas is to be reticulated or transferred to local gas users.
<i>padding</i>	Fine grained soil placed in the trench to protect the pipeline coating from rock damage.
<i>pig</i>	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.
<i>pigging</i>	use of pipeline inspection gauges or 'pigs' to perform various maintenance operations on a pipeline, including cleaning and inspecting the pipeline.
<i>Pipeline System</i>	The Port Campbell to Adelaide Pipeline associated laterals as described in PL 13 (SA).
<i>pipeline alignment</i>	The exact position of the pipeline (or easement) within the corridor.
<i>regulated activity</i>	Defined by Section 10 of the Energy Resources 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.

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

Appendix A – 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 (<i>Delmar impar</i>) (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 Endangered) 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.

No.	Date Received	Document	Department	Comment	SEA Gas Response
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 through 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 – 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 <i>Aboriginal Heritage Act, 1988</i> (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 Minister 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.

No.	Date Received	Document	Department	Comment	SEA Gas Response
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 10th 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 <i>Aboriginal Heritage Act 1988</i>.'; 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.

No.	Date Received	Document	Department	Comment	SEA Gas Response
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 <i>Aboriginal Heritage Act 1988</i> (AHA) it is necessary to ensure there is no damage, disturbance or interference to <i>any</i> 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 <i>Aboriginal Heritage Act 1988</i>. 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 Aboriginal site or object can apply under the relevant paragraphs 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) <u>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.</u> 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.

No.	Date Received	Document	Department	Comment	SEA Gas Response
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 B – 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 <i>Environmental Objective 20: To minimise the risk to public health and safety – Goal 20.1 To adequately protect public safety.</i> · 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.

No.	Date Received	Document	Department	Comment	SEA Gas Response
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 <i>Environment Protection Act 1993</i> 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.

No.	Date Received	Document	Department	Comment	SEA Gas Response
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 – <i>Construction environmental objectives, measures and targets</i> 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.

Appendix C - Comments from Regulation 11 Consultation 2026

No.	Date Received	Document	Stakeholder	Feedback	SEA Gas Response
1	22/05/2026	EIR/SEO	South Australian Arid Lands Landscape Board	SAAL advised that they have reviewed the EIR and SEO and have determined that it does not impact on the SAAL region and will not be providing feedback on this basis.	Noted
2	25/05/2026	EIR/SEO	Limestone Coast Landscape Board	The report has done a good job identifying the water affecting activities under Section 104(3) of the <i>Landscape South Australia Act 2019</i> that require a permit. We encourage SEA GAS to continue engaging with each relevant Landscape Board as project planning and works progress further, noting that each Board’s Water Affecting Activity Control policy differs. Ongoing consultation will help ensure that any region-specific water affecting activity considerations are appropriately addressed as the project develops.	Noted
3	17/06/2026	EIR/SEO	Department for Housing and Urban Development	The Department for Housing and Urban Development (DHUD) raises no fundamental concern with the draft documentation, noting that the construction of the pipeline commenced in 2002, and commenced operation in January 2004. External interference from construction activities and/or land use changes over the pipeline have the potential to adversely impact infrastructure. In this regard the pipeline is spatially identified in the Planning and Design Code, established under the <i>Planning, Development and Infrastructure Act 2016</i> (PDI Act), through the: - Gas and Liquid Petroleum Pipelines Overlays - Gas and Liquid Petroleum Pipelines (Facilities) Overlay - The Desired Outcome of these overlays is the ‘management of risk to public safety, the environment and security of energy supply from the encroachment of development on strategic gas and liquid petroleum pipelines and facilities’. As part of the development assessment process under the PDI Act, development applications lodged into the planning portal will be referred to DEM in accordance with the referral triggers specified in the overlays. The referral process allows DEM to provide expert advice in relation to potential safety issues relating to proposed development; and to identify potential impacts to the pipeline and/or associated facilities. It is noted that the <i>Planning, Development and Infrastructure Act 2016</i> is not listed under Section 2.2 (other legislation) of the EIR. This is not considered fundamental to the EIR; however SEA Gas is reminded of its obligations under the PDI Act to seek approval (where required) for activities that are defined as ‘development’ for the purposes of the Act.	Section 2.2 updated to reflect feedback.

4	23/06/2026	EIR/SEO	Environmental Protection Authority	Groundwater Should dewatering be required, as a minimum, the EPA’s guideline “Environmental management of dewatering during construction activities” EPA 1093/21 should be considered and referred to, to ensure all reasonable and practicable measures are taken to prevent environmental harm. The discharge of more than 100kL of water, with suspended sediment levels exceeding 25 mg/l, over the life of the project will require an EPA earthworks drainage licence. Compressor Stations Please liaise with the EPA to discuss licence updates prior to construction of additional compressor stations. Surface Water Information is required to explain how watercourses will be protected from boring/horizontal drilling while laying pipework across those watercourses. A detailed description should be included on how the watercourses will be protected from sediment transport downstream or pollutants entering the watercourse during the drilling operations. The measurement of success associated with ‘Objective 4: To minimise and manage impacts to water resources’ (in the Statement of Environmental Objectives (SEO)) should not be based on the number of complaints received, particularly as most of the creek crossings etc will be in remote areas. All reasonable and practicable measures must be taken to prevent sediment entering the watercourses. Success should be measured as visibility of the water (e.g. turbidity measurements remaining the same downstream of work sites versus upstream of the sites). Any digging in the bed of the watercourse at creek crossings will be considered dredging if there is water present in the creek. A dredging licence is required to undertake those works and a dredge management plan must be submitted to the EPA for approval before the works can begin. Works that are not considered to be dredging may require a water affecting activity permit from the Landscape Boards. Thought should be given to how discharge testing (identified as a leading performance objective against Objective 4 of the SEO) will be conducted and where the water will be discharged to. The water should not be allowed to enter any waterbody or stormwater system unless testing demonstrates it is of suitable quality (refer Environment Protection (Water Quality) Policy 2015). Water should be either discharged to land nearby and allowed to infiltrate through the soil provided this does not pose a risk to groundwater or cause secondary environmental impacts such as erosion or sediment mobilisation. If testing identifies contamination or if the water does not meet discharge criteria, it must be trucked away to an appropriate EPA licenced facility. The Best Practice Erosion and Sediment Control Guidelines (IECA, 2008) are recognised as the current and most applicable standard for erosion and sediment control in South Australia. These guidelines provide current, performance-based measures for managing soil disturbance, sediment transport, and stormwater quality during construction activities. The Stormwater Pollution Prevention – Code of Practice for the Building and Construction Industry (EPA, 1999) is now outdated and no longer considered a relevant reference for modern erosion and sediment control planning. Acid Sulphate Soils Effective management of the impacts of acid sulphate soil exposure should have regard for EPA guidelines 638/07 Site contamination —acid sulfate soil materials Air Quality Reference to, and consideration of the <i>Environment Protection (Air Quality) Policy 2016</i> should be made. The EPA requests the EIR, SEO and other relevant documentation is updated to incorporate these comments.	Groundwater Control measures at WM01, Table 5-34, updated to include EPA 1093/21 Compressor Stations Noted – Referenced as a Control Measure and a Leading Performance Criteria in Table 5.24, Impact ID AQ04. Surface Water Additional text has been included in sections 3.8, 5.4.2 and Table 5-11. Noted. The following assessment criteria for Objective 4 (originating from WR01) addresses this: <i>Records of audits/inspections demonstrate no deterioration of surface water quality resulting from construction activities when compared with adjacent areas.</i> A reference to turbidity measurements has been added. Noted. A reference to dredge licensing has been added to the control measures at WR01, Table 5-11 and reference to the Dredge Guideline also added to Table 5-5. A specific reference to WAA permits and EPA dredge licensing has also been added to leading performance criteria for WR01 and WR02 in Table 5-11 and to Objective 4. Noted. This detail is covered under waste management impact event WM02 and Objective 19 (To avoid land or water contamination). The reference to discharge testing has consequently been removed from Objective 4 and WR02 to avoid confusion. Added Deleted and replaced with IECA 2008. Acid Sulphate Soils EPA 638/07 referenced in table 5-5. Added as a Control Measure to Table 5-7, Impact ID ST01 and ST02. Air Quality Policy referenced in Sections 2.2, 5.2, 5.8.2 and 8. Added as a Control Measure to Table 5-25, Impact ID AQ03 & AQ04
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No.	Date Received	Document	Stakeholder	Feedback	SEA Gas Response
5	1/07/2026	EIR/SEO	PIRSA	PIRSA have no comments on the Environmental Impact Report and Statement of Environmental Objectives associated with the South Australian portion of the natural gas transmission pipeline.	Noted
6	3/07/2026	EIR/SEO	Murraylands and Riverland Landscape Board	The landscape board have previously provided minor feedback on earlier reviews; the presentation of the new documents helps clarify the impact assessment and mitigation approach and has highlighted some areas where updates may be helpful. Water resources The Landscape South Australia Act 2019 requires the consideration of Water Affecting Activities (WAAs). It is recommended that the EIR includes consideration of WAAs throughout, addressing all potential WAA situations to watercourses and floodplains. The Energy Resources Act is not exempt from the requirements for a WAA permit. The SOE mentions temporary water course crossings etc in Table 3.2 on page 15 (row 4.4) but does not mention the need for a permit. This is a list of WAAs which can be added into the documents to ensure consideration of the Landscape South Australia Act requirements: • Water diversion and storage - erection, construction, modification, enlargement, or removal of a dam, wall or other structure that will collect or divert, or collects or diverts, water flowing in a watercourse or flowing over land • Building a structure in a watercourse, lake or floodplain • Drainage or discharge of water into a watercourse or lake • Depositing objects or solid material in a watercourse or lake • Destroying vegetation growing in a watercourse or lake, or growing on the floodplain of a watercourse • Excavation or removal of rock, sand or soil in a watercourse, lake or floodplain. Ecological values The landscape board appreciates that the construction of the pipeline generally avoided existing trees and vegetation where possible, mitigating initial impacts of its constructions. As the pipeline is 23 years old this year, some of the existing vegetation may now be eligible for enhanced protection under the transition from the Native Vegetation Act to the new Biodiversity Act 2025 (Regulations being drafted). While routine maintenance to existing infrastructure is generally exempt under the Native Vegetation Act 1991, it is recommended that SEA Gas note this potential legislation change for native vegetation over 20 years old. The Department for Environment and Water should be able to provide guidance on the proposed change as part of any future works. The landscape board note that significant maintenance or repair works would be referred to relevant agencies, and request to be included in any future consultations, where relevant. Since the last review of the report, there are a number of species and threatened ecological communities which have had their status updated and there are also new protections in place under the EPBC Act 1999. It is recommended that SEA Gas check and update the State, National Parks and Wildlife Act 1972 and EPBC listings to bring the ecological section up to date. Some of the newer listings that are relevant include: • River Murray downstream of the Darling River, and associated aquatic and floodplain systems (Critically endangered) • Mallee Bird Community of the Murray Darling Depression Bioregion (Endangered) • There is also the potential for southern hairy nosed wombat to be present through much of the pipeline route west of the river. This is an iconic species which is likely to have impact on works and should be included in the EIR and SOE. It is already a protected species under the National Parks and Wildlife Act, with protection extended to their burrows by amendment in 2023.1 Conclusion In determining this response, the landscape board has had regard to and sought to further the objects, principle, and general statutory duties of the Landscape South Australia Act 2019. This information is provided for the purpose of this referral submission at this time. Please keep the landscape board informed of the outcome of this consultation.	Water resources Noted. There are numerous references to water affecting activities permits including in the impact assessment tables (e.g. in control measures and assessment criteria for WR02 in Table 5-11 and assessment criteria for Objective 4 in the SEO); an additional reference has been added in the leading performance criteria for WR02 and Objective 4. These WAA activities are listed in Section 2.2.4 of the EIR. Wording on dams and discharges in this section has been updated to more closely reflect the Act’s wording. Ecological values The transition to the Biodiversity Act 2025 is noted. SEA Gas intends to update internal processes and procedures to ensure compliance with the Biodiversity Act 2025 and is awaiting information on timing of implementation and supporting regulations. Noted References updated to align with species listed under the EPBC Act 1999 and National Parks and Wildlife Act 1972. Conclusion Noted

No.	Date Received	Document	Stakeholder	Feedback	SEA Gas Response
7	6/07/2026	EIR/SEO	Mid Murray Council	Council notes that the pipeline traverses the Mid Murray Council area and requests early consultation on any proposed upgrades, maintenance, construction, decommissioning or access works that occur within, or may affect, the Council area. SEA Gas are also requested to consult with Council before any works that may involve, cross, use or affect Council owned or managed roads, road reserves, drainage infrastructure, bridges, culverts or other public infrastructure. Council seeks assurance that these assets will not be heavily impacted and that, where impacts cannot be avoided, suitable traffic management, asset protection, community notification and reinstatement arrangements will be agreed with Council before works commence as they may be subject to a permit to work requirement, if not relevant under the Energy Resources Act 2000. Any relevant Construction Safety and Environmental Management Plan, Traffic Management Plan, Access Plan or project-specific documentation for works within the Mid Murray Council area should be provided to Council for review and comment prior to works commencing. Subject to the above, Council has no further comments and asks to be recorded as a stakeholder for future pipeline works or operational changes within the Mid Murray Council area.	Noted: SEA Gas will continue to engage with council for construction activities and maintenance/inspection activities that impact on council owned land and infrastructure. All activity associated with the pipeline license is notified to DEM through an Activity Notification. Mid Murray council are included in SEA Gas Third-Party Contact and Consultation Procedure for three yearly Pipeline Awareness and three yearly Planning & Development presentations.