



Tasmanian
Gas Pipeline

Offshore Environment Plan Summary

TGP-698-PA-HSE-004

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1. INTRODUCTION

1.1 Environment Plan (EP) Summary

This document provides a summary of the Tasmanian Gas Pipeline (TGP) Offshore Environment Plan (EP) (TGP-698-PA-HSE-003, Revision 16), which was accepted by Department of Energy, Environment and Climate Action on 4 June 2026, as required under Regulation 13E (4) of the Victorian Offshore Petroleum and Greenhouse Gas Storage (OPGGS).

The TGP Offshore EP has been prepared for the operational phase of the TGP. It identifies the environmental aspects of offshore TGP operations with the potential to have a significant effect on the physical, biological, social and cultural aspects of the environment. The Offshore EP focuses on the Bass Strait subsea section of the TGP from the low water mark at Ninety Mile Beach, about one kilometre (km) east of Seaspray, Victoria, to the low water mark at Five Mile Bluff on the coast of Tasmania, including a portion of the drilled crossings at the Victorian and Tasmanian landfalls.

1.2 TGP Management

Commissioned in 2002, the TGP is the only pipeline supplying natural gas to Tasmania. The pipeline extends from Longford in Victoria, across Bass Strait to Bell Bay in north-east Tasmania. The offshore section of the TGP is approximately 301 km in length with a maximum water depth along the route of 77 m. Additional onshore pipelines extend from Bell Bay to Port Latta in north-west Tasmania and to Bridgewater in the south.

In July 2011, Palisade Investment Partners Ltd (Palisade) acquired Tasmanian Gas Pipeline Pty Ltd and its asset, the TGP. Palisade has kept the asset ownership and licence title “Tasmanian Gas Pipeline Pty Ltd” (TGPPL). Palisade is a specialist, independent infrastructure manager that focuses on assets that are essential to the efficient functioning of the communities and economies they serve.

An Asset Management Agreement (AMA) is in place between Palisade Integrated Management Services (PIMS) and TGPPL. Through the AMA, PIMS take on key roles within the TGPPL organisation structure. While TGPPL itself does not have any direct employees, for the purpose of this EP, PIMS personnel allocated to the TGPPL organisational structure are considered TGPPL employees.

TGPPL is the Facility Operator of the offshore section with responsibility for the ongoing operation and integrity, safety, and environmental management. TGPPL have an in-house operations team (via the AMA with PIMS) and utilise specialist consultants and contractors to provide expert advice and engineering assistance when required. TGPPL does not directly employ field staff to manage, operate or maintain the pipeline. Instead, it has several field service agreements in place to ensure the continued operation of the pipeline.

A Field Services Agreement is in place between Zinfra Group (Zinfra) and TGPPL to perform maintenance activities on the TGP. Zinfra carry out certain onshore maintenance functions and provide emergency response for TGPPL if the subsea section requires isolation.

Zinfra Group is a leading service provider to the utility infrastructure sector. They deliver a comprehensive range of engineering, operations, maintenance, and construction services nationally. Their services include asset management, engineering, design, project management, construction, maintenance, and asset operations.

TGP has a remote monitoring service agreement (RMSA) with Worley Power Services (WPS). The Remote Monitoring Centre (RMC) is responsible for monitoring the pipeline’s condition and performance through remote sensors on a 24 hours per day, 365 day per year basis. Services provided by WPS primarily relate to the operation of the Supervisory Control and Data Acquisition (SCADA) system for the TGP in addition to assisting with the management of any emergency event arising on the TGP.

These reporting structures are shown in the organisation structure for TGPPL in Figure 1-1 below.

TGPPL Organisation

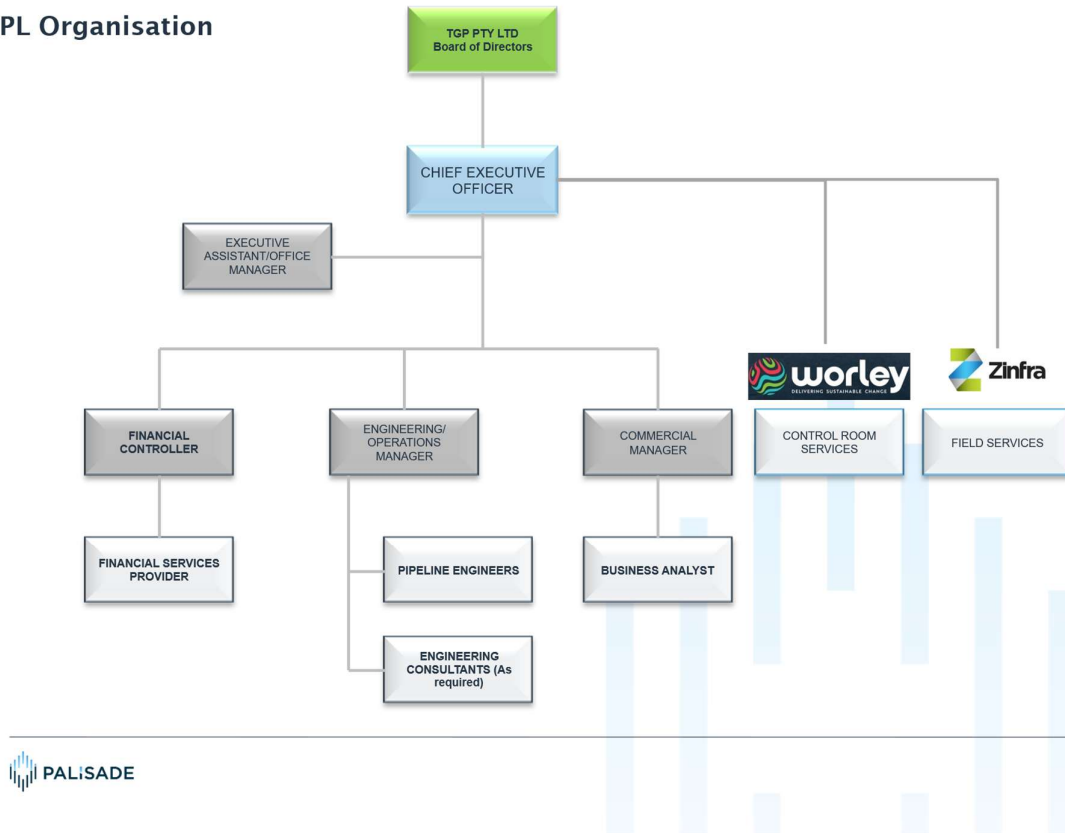


Figure 1-1: TGPPL Organisation Chart

2. SUBSEA PIPELINE ROUTE AND ACTIVITY LOCATION

The TGP is a DN 350 (14 inch) pipeline with the key function of supplying sales quality natural gas from the LCS in Victoria, across the Bass Strait to Tasmania. The pipeline was commissioned in 2002 and has a capacity of 47 PJ per year.

The TGP offshore section commences at the high-water mark along Ninety Mile Beach, Seaspray and crosses Bass Strait to the low water mark at Five Mile Bluff, Tasmania where it continues onshore. The Offshore TGP is approximately 301 km in length, with maximum water depth along the route of approximately 77 metres (m). The TGP route is shown in Figure 2-1. The Offshore TGP route was selected to minimise pipeline length and avoid adverse seafloor conditions and on bottom obstructions, identified during the pre-construction survey.

There are two drilled crossings where the pipeline meets the Victorian and Tasmanian landfalls, which were constructed using horizontal directional drilling (HDD). The Victorian HDD section is 1080 m long, commencing at Kilometre Point (KP) – 0.265 and exiting the seabed at KP 0.815, at approximately 10 m water depth. The Victorian shore approach was trenched and backfilled naturally from KP 0.806 to KP 4.0, and the maximum depth of the trench is 0.6 m (Lowest Astronomical Tide (LAT)) to the top of the pipeline. The Tasmanian HDD section is some 859 m long, entering the seabed at KP 300.181 in 10.5 m (LAT) water depth. Delineation of the Victorian and Tasmanian state waters can be seen Figure 2-1

The rest of the offshore component of the TGP sits on the Bass Strait seabed. The seabed along the Offshore TGP route across Bass Strait is mostly flat and featureless with the steepest slopes occurring between KP 289 and KP 290, where the seabed rises approximately 14 m over 90 m (slope angle 9°). Many sections of the Offshore TGP have partially or fully self-buried over time.

Earth Resources Regulator is responsible for administering the EP in Victorian state waters, which stretch from the Victorian high tide mark out to 3nm (refer to Figure 2-1).

Mineral Resources Tasmania is responsible for administering the EP in Tasmanian state waters, which stretch from the Tasmanian high tide mark out to 3nm (refer to Figure 2-1).

NOPSEMA is responsible for administering the EP in commonwealth waters.

2.1 Key Coordinates and Interfaces

The Offshore TGP route co-ordinates (grid and geographic) are provided below. The route length is defined by KP. The pipeline route curves are defined by length Intersection Points (IP) and associated Tangent Points (TP).

Table 2-1: TGP Offshore Route Co-ordinates (Grid and Geographic)

Feature	KP	WGS 84 (Zone 55)		AMG 66 (Zone 55)		Geographic WGS 84	
		Eastings (m)	Northings (m)	Eastings (m)	Northings (m)	Latitude	Longitude
Victoria End							
HDD Entry	21.647	517,842.2	5,753,741.4	517,730.0	5,753,558.0	-38.125157	147.121525
HDD Exit	22.735	518,167.2	5,752,703.4	518,055.0	5,752,520.0	-38.222522	147.122873
IP 1A		518,645.3	5,751,176.5	518,533.1	5,750,993.1	-39.231473	147.124858
IP 1B		520,368.0	5,749,364.1	520,255.8	5,749,180.7	-38.241339	147.135978
IP 1		526,271.2	5,738,832.4	526,159.0	5,738,649.0	-38.295452	147.180459
IP 2		502,979.2	5,631,602.4	502,867.0	5,631,419.0	-39.275455	147.020468
IP 3		491,100.2	5,462,000.4	490,988.0	5,461,817.0	-40.593526	146.533908
IP 3A		491,244.7	5,460,138.7	491,132.5	5,459,955.3	-41.003564	146.534517
HDD Exit	322.344	491,082.2	5,458,505.2	490,970.0	5,458,321.8	-41.012861	146.533813
HDD Entry	323.303	490,997.1	5,457,650.4	490,884.9	5,457,467.0	-41.015633	146.533444
Tasmania End							

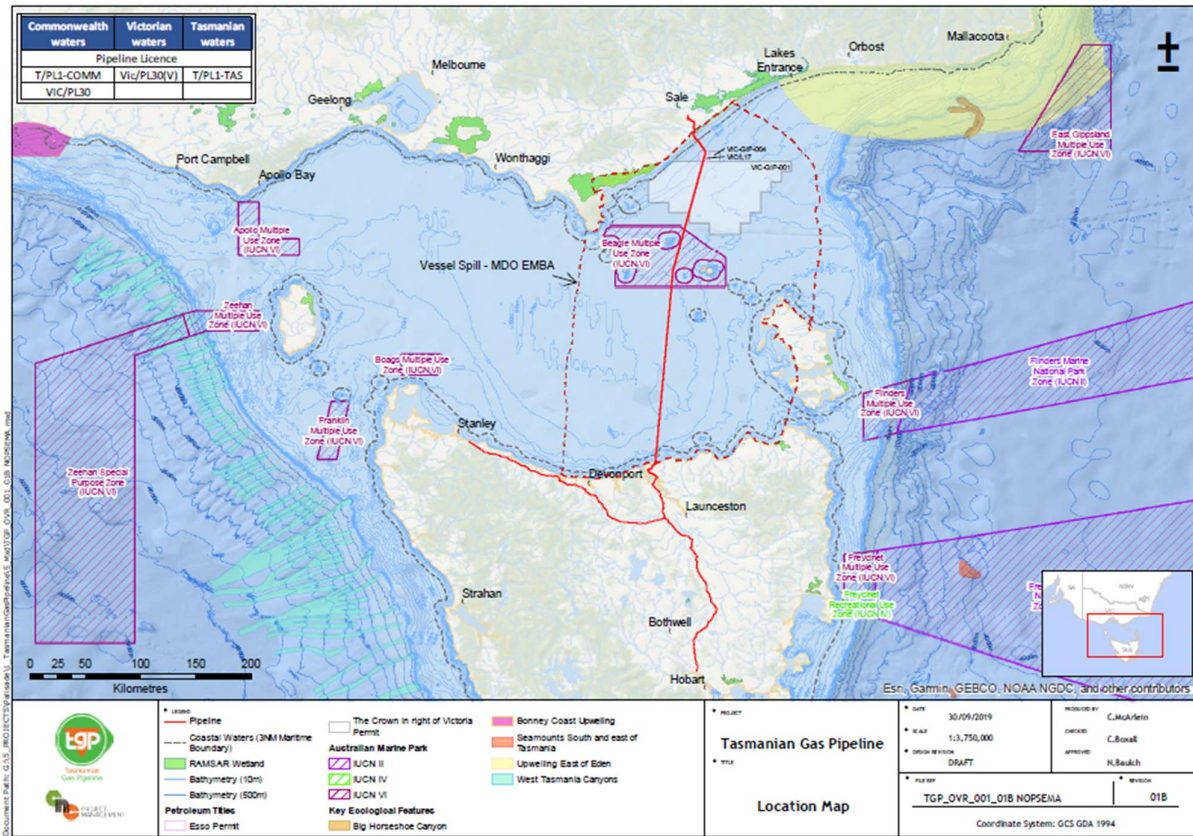


Figure 2-1: TGP Offshore Route Overview

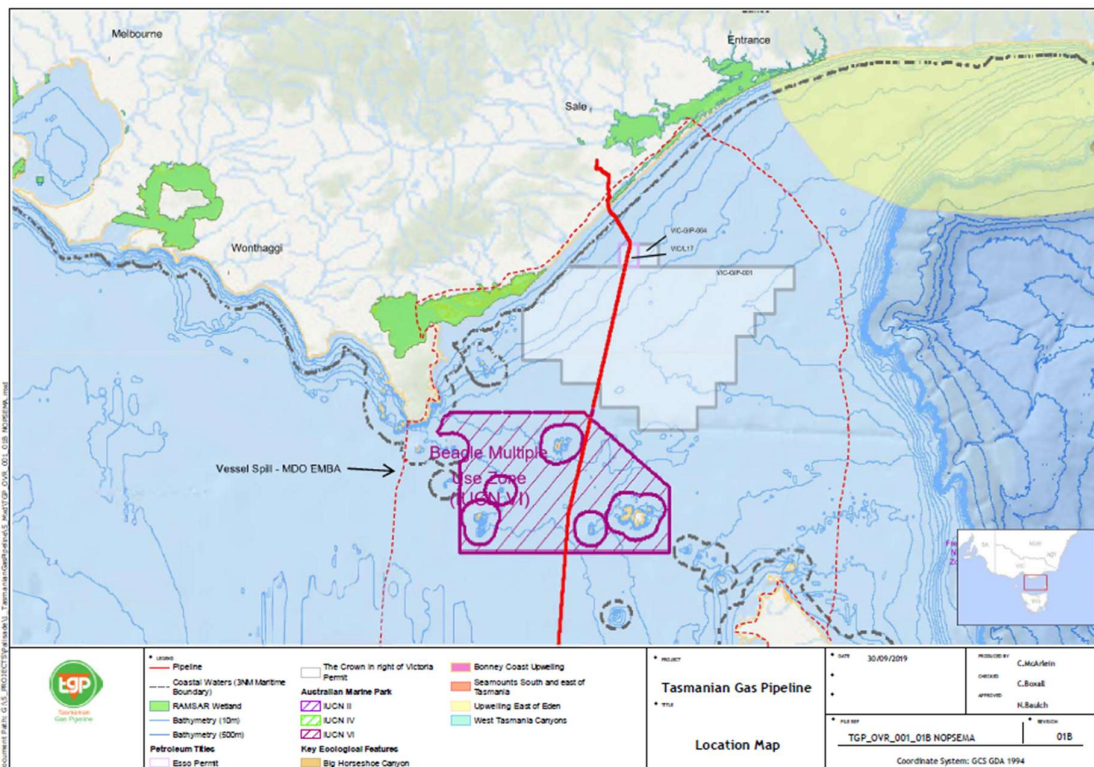


Figure 2-2: TGP Environment that May Be Affected (EMBA) – Victoria

3. DESCRIPTION OF THE ACTIVITY

The TGP is an operating pipeline transporting natural gas from Victoria to Tasmania and, therefore, there are no daily activities on the pipeline itself apart from continuous monitoring of pipeline flows and pressures by the Control Room.

Surveys of the pipeline, to assess pipeline integrity and any maintenance requirements, are undertaken on a periodic basis and occur approximately every 2 to 5 years. Consequently, temporary facilities are only on location during subsea survey and emergency repair works if, and when, they arise.

3.1 Pipeline Design and Operating Parameters

Made of carbon-manganese steel, the TGP has been designed and constructed in accordance with ASME B31.8: Gas Transmission and Distribution Piping Systems (1995 Edition) design code, applicable Australian Standards (e.g. AS 2885.2 Welding) and regulations of the Commonwealth, Victoria and Tasmania. Design parameters and operating conditions for the Offshore TGP are summarised below.

Parameter	Unit	Value
Pipeline Length	km	301.6
Size	NB	350
Outside Diameter	mm	355.6
Pipe Wall Thickness	mm	11.1
Wall Thickness (shore crossing) ¹	mm	12.7
Grade		X65
Maximum Allowable Operating Pressure (MAOP)	MPa(g)	15.3
Offshore Pipeline Average Design Temperature	° C	13

The Offshore TGP has been designed in accordance with a pipeline integrity study to ensure it can withstand conditions expected in Bass Strait, including currents, temperature, sedimentation, marine growth and seabed conditions. This is outlined in the TGP Design Basis Manual – Offshore Pipeline (TGP-698-DG-DN-003) and further details are also provided in the TGP Offshore Safety Case (TGP-698-SC-HSE-004).

The Offshore TGP has fully welded joints along its entire length and has no tees. As a result there are no flanges, with the exception of the HDD tie-in flanges offshore at the Victorian and Tasmanian ends.

The Offshore TGP is protected externally by a 0.4 mm fusion bonded epoxy anti-corrosion coating, with reported service life of more than 75 years. In addition, the subsea section is further protected by a nominal 38 mm concrete weighted coating, which also serves to stabilise the pipe and act as an effective barrier between any third-party impacts and the pipe wall. The Offshore TGP also has a cathodic protection (CP) system comprising sacrificial aluminium anodes attached at approximately every 12 to 15 field joints (approximately every 180 m).

The Victorian and Tasmanian HDD sections are protected by 38 mm thick sacrificial anodes installed on every pipe joint through the bore hole. A galvanic anode CP system and onshore anode ground bed was installed on the Victorian HDD section during construction but was subsequently disconnected following commissioning of the pipeline.

3.2 Pipeline Operation

The TGP transports sales quality Natural Gas from Longford, Victoria to Tasmania. TGP Natural Gas comprises largely methane (approximately 91.14%) and ethane (5.21%) and is dry and free from significant impurities under normal operating conditions. Other components include carbon dioxide

(2.26%), nitrogen (0.74%), propane (0.5%) and minor quantities of oxygen, butane, pentane and hexane (in quantities less than 0.1%).

The pipeline is monitored 24 hours per day, 7 days per week, 365 days a year via the Master SCADA system and a remote operations centre.

The SCADA system monitors flow in the pipeline and provides information on, and remote management of, the CP system, pressures, temperatures, valve status, metering selections, alarms, gas quality, flow rates, condition monitoring and site entry monitoring. The status of the entire system can be determined and operators can respond to changing conditions, faults and emergencies.

The SCADA system ensures that all relevant alarms and protective systems are in place so that pipeline integrity, and safety of personnel and the public, is not compromised and that security of supply is maintained. Remote shutdown, opening and closing of mainline valves (MLVs) and other ancillary functions are all conducted from the Control Room using SCADA.

Gas pressure in the pipeline is monitored continuously from the Control Room.

Smoke, flame, and/or gas detection systems have been installed in onshore pipeline facility control huts and are also monitored by the Control Room via SCADA. There are no offshore facilities and accordingly no smoke, flame and/or gas detection systems are installed on the offshore pipeline. The SCADA system provides real time flow and pressure data which is modelled to enable abnormal operating conditions, pipeline leak, to be alarmed.

3.3 Field Inspection and Maintenance Activities

Field inspections and maintenance activities for the offshore TGP are performed in accordance with the TGP 'Offshore Operations and Maintenance Management Plan' (TGP-600-OM-MO-002) and include:

- Periodic subsea surveys using remotely-operated vehicles (ROV) / autonomous underwater vehicle (AUV), side scan sonar (SSS), Unmanned Surface Vehicle (USV) and diver inspections to detect existing or potential pipeline damage, and for the determination of maintenance and operational requirements
- An intelligent pipeline pigging activity, whereby an electronically-equipped device (pig) is inserted into the pipeline to detect metal loss in the pipeline wall; and
- Maintenance activities conducted on an as-needs basis following surveys or identified issues.

Major event driven inspections and maintenance may be conducted in a similar fashion to the regular surveys to determine damage from physical impact or adverse weather and will be undertaken as required (refer to Section 3.3.3 below).

Inspections and maintenance activities are performed by specialist contract organisations that are required to supply an environmental management plan (EMP) and risk assessment as part of TGP's contractor engagement process. Any inspection and maintenance work must also be carried out in a manner that matches the objectives set down in the TGP Offshore EP.

Offshore pipeline activities are discussed in detail in subsequent sub-sections. Where the offshore TGP joins the terrestrial component of the pipeline, operations and maintenance activities undertaken in the coastal areas are discussed in more detail in TGP 'Onshore Environment Management Plan' (TGP-698-PA-HSE-001).

3.3.1 Support Vessels

Maintenance and inspection of the Offshore TGP is undertaken with the aid of support vessels. Vessels are contracted from international or national suppliers, when required, and will vary depending on the proposed activity and vessel availability. Vessels supporting the TGP operations will be specified and operated in accordance with international and Australian regulatory requirements. The vessels will be subject to a marine assurance program and will be certified as compliant with international maritime legislative requirements by a Classification Society registered with the International Association of Classification Societies (IACS).

Vessels range in weight (300 – 1500 tonnes (t) - gross tonnage) and fuel capacity (35 - 530 cubic metres (m³)). An example vessel, is the *Bhagwan Samson Explorer* and the *Outer Limit*.

Support vessels will primarily operate on dynamic positioning (DP) when performing activities at the worksite. However, vessels equipped with anchors may be deployed in an emergency. DP uses multiple sources of positioning data (i.e. satellite navigation and radio transponders) to maintain the position of the vessel at a required location.

All Support Vessels are required to undergo a pre-mobilisation inspection to confirm compliance with maritime legislation and TGPPL's safety and environment requirements. Vessels may mobilise from an Australian port or international waters, in accordance with biosecurity and marine assurance requirements.

Depending on inspection and maintenance activities required, vessels are at sea for 1 to 4 weeks. Given their greater fuel capacity, large vessels can remain at sea for these time periods, however, smaller vessels may require port visit to refuel or for maintenance. No vessel refuelling is undertaken at sea.

Vessels use global positioning system (GPS) coordinates to remain within the Offshore TGP route.



Figure 3-1: The "Bhagwan Samson Explorer" - typical vessel for pipeline surveys



Figure 3-2: The "Outer Limit" - typical vessel for pipeline surveys

3.3.2 Pipeline Inspection Activities

As per the TGP *Offshore Pipeline Operations and Maintenance Management Plan* (TGP-600-OM-MO-002), maintenance activities include periodic inspections to provide assurance of the pipeline integrity. Specialised geophysical surveys are used to inspect the condition of the offshore component of the pipeline. Pipeline anomalies or span inconsistencies from as-laid data are identified in these operations, along with pipeline orientation and the condition of coatings, field joints and anodes.

Each survey will use offshore support vessels. Equipment used in the surveys includes ROV / AUV mounted cameras, single and multi-beam echo sounders or SSS (refer to Section **Error! Reference source not found.**below). The vessel will also be equipped with deck handling facilities and survey positioning equipment.

Offshore vessels involved with Offshore TGP inspections have their own communications system for use between the vessel, land base and emergency services should they be required. The communication system is made available to visiting TGPPL personnel, visitors, representatives, consultants, etc. at all times during the surveys and in emergency situations.

Inspection of the Offshore TGP is normally scheduled once every 5 years (unless a risk assessment or unplanned event triggers a survey). TGPPL are continuously reviewing the risk profile of the asset using a risk-based inspection (RBI) approach to future surveys, with a view to extending the inspection intervals out to possibly every 7 years.

3.3.2.1 Side Scan Sonar (SSS) & Multibeam Echo (MBES) or other Digital Capture

SSS is a hydro-acoustic technique that involves towing a torpedo shaped 'towfish' behind the survey vessel. The tows are typically conducted at 3 to 5 knots with a maximum swath width of 150 m per side depending on resolution and water depth. The towfish is normally located about 10-15 m above the seabed and at an approximate distance of 150-200 m behind the vessel. There are no fluids contained within the towfish.

These surveys do not use airguns and are considered less intrusive than surveys for oil exploration where air gun penetration is expected to be in the range of 3 to 4 km. Systems used in the geophysical surveys of the Offshore TGP typically penetrate the seabed only to 10 m and the source noise level of sub-bottom profile equipment is approximately 170-230 dB re 1µPa@1 m.

The SSS survey is conducted over the majority of the Offshore TGP length (excluding inshore portions) and is used to: determine if the pipeline has moved; identify any objects that may have impacted the pipeline; and identify any spans that exceed the maximum allowable length. Information gathered during the SSS survey is used to plan and determine if further visual inspection or intervention is required.

MBES is also commonly used by TGPPL for inspection of the TGP, the echo sounder determines the distance between the survey vessel and seabed at any given instance, using GPS location to map the data. The technology works on the principle that water is an excellent medium to transmit sound waves, they are sent from a transmitter as a pulse that then bounces or reflects from the seabed or other features, such as a pipeline, then returns as an echo to the

3.3.2.2 Remotely Operated Vehicle (ROV) / Autonomous Underwater Vehicle (AUV) Survey

Where required, visual inspections of sections of the Offshore TGP identified during the SSS or MBES surveys, undertaken using a ROV or AUV. This allows additional information to be gathered including confirmation of the pipe stability and weight coating integrity, confirmation of any locations where the approved free span lengths are exceeded, and checks for external damage, debris and marine growth.

ROVs / AUVs are also used to inspect the CP system and may use probes to determine electrical potential differences at fixed points. Sacrificial anodes, placed about every 180 m along the Offshore TGP, are also inspected as are field joint coatings applied in the gaps of concrete between individual pipe joints. These surveys will include the inspection of as many anodes as possible, with estimates of the amount of anode depletion and the collection of potential readings, to identify any areas of the Offshore TGP that may be susceptible to external corrosion.

ROV surveys are undertaken in line with the IMCA R004 February 2024 Rev. 6 - Code of practice for the safe and efficient operation of remotely operated vehicles. ROVs are generally mounted with a camera in pressure proof housing and may have robotic arms to allow completion of small tasks. Small amounts of hydraulic oil may therefore be present. A cable connects the ROV / AUV to the surface and the image of the seabed can be viewed and recorded on the vessel. Coordinates are recorded via GPS to have an automated permanent record of the location of the camera drop or tow. Where spans are confirmed to be beyond the maximum allowable limit, maintenance works will be undertaken on the same voyage to correct the deficiency.

3.3.2.3 Diver Inspections

The tie-in flanges at the HDD sections of the Offshore TGP lie in relatively shallow water and it was anticipated that the flanges would be inspected manually using divers. However, during the 2013 ROV survey, the ROV unit was able to inspect the tie-in flanges to such an extent that the need for diving operations is no longer required for this inspection work.

Diver inspections are not normally carried out during the major surveys. However, in the event of extreme damage, if metrology is required, or for repair/maintenance work, divers may be employed to both inspect and accurately map the pipeline in the relevant area.

3.3.2.4 Internal Inspections (Pigging)

Pigs are devices inserted into the pipeline using 'pig traps' (launchers) that are fitted with doors (closures). Pigs enter the pipeline via a launcher and exit via a receiver, both of which are onshore devices. When inserted, pigs travel throughout the length of a pipeline driven by the gas flow.

There are two types of pigs which perform different maintenance functions:

- Utility pigs - are used to perform functions such as cleaning or sealing a pipeline; and
- Intelligent ('smart') pigs - provide information on the internal condition of the pipeline, as well as locating problem areas

The frequency of pipeline pigging using utility pigs is determined based on operational history and the annual integrity risk assessment and review. Cleaning pig runs are scheduled in accordance with the annual *Onshore Asset Management Plan*. The timing of subsequent cleaning pig runs will be determined subject to pig retrieval and inspection of the nature and amount of debris collected.

Intelligent pigging is also included as part of the TGP inspection and maintenance programme. A planned intelligent pigging run has been included in the *Offshore Pipeline Operations and Maintenance Management Plan* (TGP-600-OM-MO-002) every 10 years. The frequency is reviewed every year as part of the annual integrity risk review. As at the submission of this EP, the last inspection was completed in February 2021, with the next routine intelligent pigging run scheduled for 2031.

3.3.3 Pipeline Maintenance Activities

Maintenance work to repair potential or existing damage consists of specific tasks required to rectify deficiencies found during Offshore TGP inspections, and their frequency will therefore depend on the results of the inspection surveys. It is anticipated that maintenance activities could comprise the following:

- Rectification of unsupported pipeline spans that are greater than the maximum allowable span, to ensure compliance with the allowable design length and reduce the likelihood of vortex induced vibrations (VIV). Span correction generally involves the installation of supports, in the form of grout-filled bags, underneath the centre of the span (jetting to remove high points is considered unlikely once the pipeline has been laid). Each bag, with dimensions of about 1800 mm x 1200 mm, is placed under the subsea pipeline using a ROV and inflated with grout (concrete) via a hose connection to the support vessel. Each operation is monitored by the ROV to ensure smooth operation.
- Removal of dropped objects (such as containers) from passing vessels (including survey vessels) that may settle on or near the Offshore TGP is a conceivable requirement and, depending on the object, is likely to be achieved with the assistance of a ROV (objects of up to 300 kg in weight can be removed by ROV).
- Repair of concrete coating which, depending on the severity, may simply involve placing a concrete mattress over the damaged area to prevent possible damage to the subsea pipeline from further impacts. Concrete itself is considered environmentally benign and the mattress installation is undertaken in accordance with IMCA D042, R016 2011 - Diver and ROV Based Concrete Mattress Handling, Deployment, Installation, Repositioning and Decommissioning. Concrete mattresses, of dimensions 150 mm x 2.2 m x 5 m, will be lowered onto the subsea pipeline via a specialised crane on-board support vessel (maximum on-board weight of 3.5 t). Final placement is assisted using ROVs and/or divers.
- Replacement of sacrificial anodes (possibly expected during the design life). This will be undertaken using an ROV, which will remove and replace the anode (attached via a bracket).
- Removal of marine growth from the subsea pipeline is not expected to be required over the life of the pipeline.

4. DESCRIPTION OF THE ENVIRONMENT

4.1 Physical Environment

Bass Strait was formed approximately 12,000 years ago by the inundation of a land bridge that had once connected Tasmania and Victoria. It is a comparatively shallow sea (depths of up to 80 m) with the western and eastern entrances defined by the continental shelf that extends between King Island and Cape Otway in the west and between Flinders Island and Wilsons Promontory in the east. Beyond the continental shelf the seabed declines sharply to depths over 3,000 m.

The seabed along the direct route between Seaspray and Five Mile Bluff is reasonably featureless. Near the pipeline the seabed consists primarily of fine and medium grained quartzose sands with a mean grain size of 0.12 to 0.25 mm. Coarse sands and gravels are present to a lesser extent in the proximity of the Victorian shore crossing. Seabed current manipulations have formed some sand waves.

Circulation, or mixing of water, in Bass Strait is mainly dependent on tidal currents, but wind-driven currents, coastal trapped waves, barometric pressure-induced currents, density-driven flows and ocean-scale circulation patterns also contribute. The current speeds ultimately depend on the proximity to the eastern entrance of Bass Strait, with lower current speeds expected to the west. Current speeds between 0.30 m/s and 0.79 m/s occur during 5-year return period storms, while current speeds of 0.41 m/s to 1.03 m/s occur during 100-year return period storms.

The average annual rainfall is 716.7 mm (recorded at Deal Island in the Kent Group), with the highest rainfall and most rainy days occurring from May through to August. Winds are typically strongest during spring and weakest during the winter: 50-60% of winds are under 10 knots, with 30-37% of winds occurring between 10 and 20 knots. Strongest winds (greater than 20 knots) mainly originate from the west. Average temperatures range from 8.2°C in winter to 20.5°C in summer.

Protection of the region from westerly and south-westerly swells is provided by Wilsons Promontory, Tasmania and King Island. However, during 5 and 100 year storm events, wave heights may range from 4.5 m to 5.5 m and 6.8 m to 7.5 m, respectively. Although the Offshore TGP was originally laid on the surface of the seabed, strong current and wave activity may result in shifting sands and periodical burial of pipeline sections. Seismic activity along the pipeline route was considered during the design phase of the pipeline and was confirmed to be of minimal risk.

The Offshore TGP route does not lie within any significant terrestrial features, with the closest landform 10 km away, but does pass within the vicinity of several small islands or island groups. These include (in order from north to south):

The Hogan Island Group - straddles the border between Victoria and Tasmania and is located about 10 km to the west of the Offshore TGP and about 45 km east of Wilsons Promontory, Victoria. It is made up of one main island: Hogan Island and several islets including Boundary Islet, East Islet, Long Islet, Twin Islet, Round Islet and Seal Rock. Boundary Islet is the land boundary between Victoria and Tasmania

The Curtis Island Group - lying about 25 km west of the pipeline and made up of Curtis Island, Cone Island, Sugarloaf Rock and Devils Tower

The Kent Group - an archipelago of six islands and offshore rocks situated approximately halfway between Wilsons Promontory and the northern end of Flinders Island. The main groups of islands (incorporating Deal, Dover and Erith Islands) lie about 23 km east of the Offshore TGP. Two minor islets, Northeast and Southwest are within the vicinity of this group, however, Judgement Rocks, a small granite island with an area of 0.39 hectares (ha) lies to the south-west of the main islands of the Kent Group and about 10 km east of the pipeline

The Bass Pyramid Group - made up of Craggy Island, Wright Rock and Bass Pyramid and lying between Flinders Island and the Kent Group. Bass Pyramid is a small, steep-sided granite island with an area of <1 ha and lies about 20 km east of the pipeline

Tenth Island - part of the Waterhouse Island Group off the northern coast of Tasmania, lies approximately 9 km east of the pipeline

All islands, apart from Boundary Islet within the Hogan Island Group, are under the jurisdiction of Tasmania and are located at least 8 km from the Offshore TGP.

4.2 Biological Environment

The biological environment section considers the flora, fauna, and species identified within the EPBC as vulnerable or endangered. The Bass Strait is an area of relative high faunal diversity and supports a number of species of high conservation and commercial value. This is partly due to its unique biogeographical location at the convergence of three marine biogeographical regions: the Peronian (New South Wales), Maugean (Tasmania) and Flindersian (southern Australia).

There are many different temperate ocean habitat types represented in Bass Strait, from open beaches and rocky reefs (both exposed and sheltered) to offshore islands, soft bottom habitats (sand, mud and seagrass) and open sea.

The main marine species and communities present within, and immediately surrounding, the Offshore TGP route primarily comprises:

Benthic infauna and epifauna (fauna living within and on the seabed) - Include brittlestars, urchins, sponges, lamp shells, crabs, sea squirts, polychaete worms, bivalves and molluscs. Bass Strait as a whole has a relatively heterogeneous benthic habitat and has one of the highest biodiversities of benthic fauna in the world. The substrate along the pipeline route itself, however, represents a largely homogenous habitat type and is not significantly diverse from other regions within Bass Strait (Hydro Tasmania 2001). While a number of species that occur in south-east Australian waters are endemic to the area, most of these species are widely distributed throughout the region (Phillips et al, 1984). Any impacts will be localised and unique faunal elements are unlikely to be disturbed

Birds - Include resident seabirds and migratory species crossing Bass Strait. Large breeding seabird colonies exist around the Kent Group, particularly on Deal and Erith Islands and two small islets known as North East and South West Islands. Species include Common Diving Petrels, Short-tailed Shearwaters, Little Penguins, Pacific Gulls, Sooty Oystercatchers and cormorants (Kent Management Plan, 2005). Species listed under the EPBC Act also breed within islands of the Kent Group, including the Vulnerable Fairy Prion (*Pachyptila turtur subantarctica*) and Cape Barren Goose (*Cereopsis novaehollandiae grisea*).

A foraging BIA has been identified for a number of albatross, petrel and shearwater species: Antipodean, Buller's, Shy, Black-browed, Campbell, Wandering and Indian Yellow-nosed Albatross, Common Diving and White-faced Storm Petrels and Short-tailed Shearwater, in Bass Strait and along the edge of the continental shelf (DoEE 2015a). The Australian populations of both the Common Diving and White-faced Storm Petrels account for a significant proportion of the global populations and breeding BIAs have been identified around the Kent Group and Furneaux Group respectively. Bass Strait has the largest proportion of Little Penguin breeding colonies in Australia at approximately 60% and foraging and breeding BIAs have been identified for the Little Penguin around both the Kent and Furneaux Island groups (DoEE 2015a).

Up to 60 threatened species listed under the EPBC Act may occur, or are likely to occur, within the EMBA throughout the year (**Error! Reference source not found.**). Many of these species are protected under international agreements (e.g. CAMBA, JAMBA and ROKAMBA – refer to Section **Error! Reference source not found.**) and may be observed passing through Bass Strait on their way to or from mainland Victoria and Tasmania. This includes land-based species such as the endangered Swift Parrot (*Lathamus discolor*), which migrates from southern Tasmania to Victoria every winter.

Cetaceans - About 15 species of whales and dolphins have been observed in Bass Strait, although only a minority are resident or have been observed frequently. The most freely seen are the Common (*Delphinus delphis*) and Bottle-nosed (*Tursiops truncatus*) dolphins. Several whales also visit the region during annual migrations to and from their breeding grounds (mostly during the winter months). These include the Blue Whale (*Balaenoptera musculus*) and Southern-right Whale (*Eubalaena australis*), which are listed as Endangered under the EPBC Act, and the Humpback Whale (*Megaptera novaeangliae*) is listed as Vulnerable. All cetaceans are susceptible to direct disturbance from shipping operations, including seismic or acoustic surveys, collision

with large vessels, and pollution from plastics, oil spills and dumping of industrial wastes which can lead to bioaccumulation of toxins in cetacean body tissues.

Sightings of Blue Whales in Bass Strait are reasonably rare, though they may be encountered year-round. A BIA for the Pygmy Blue Whale for distribution and possible foraging has been identified in Bass Strait extending west to South Australia waters to the Bonney Upwelling, a known Pygmy Blue Whale feeding aggregation area. Pygmy blue whales tend to have a more seasonal distribution and this was supported by a passive acoustic study that found pygmy blue whales were often detected in late summer to autumn in the east of southern Australia.

Southern-right Whales migrate west along the southern Australian coastline to calving aggregation areas in western Victoria waters. BIAs for migration and distribution have been identified in Victorian coastal waters and in Bass Strait respectively.

The main migration route of the Humpback Whale is along the east coast of Australia however some whales may migrate through Bass Strait.

Macroalgae - A detailed survey of the north-eastern Bass Strait Islands identified up to 40 species of macroalgae surrounding the Kent and Hogan Groups, an indicator of the nutrient rich waters and diversity of habitats available

One fish species potentially occurring within the EMBA was listed as vulnerable under the EPBC Act (Appendix MNES list): the Australian Grayling (*Prototroctes maraena*). The Australian Grayling is a migratory species that inhabits estuarine waters and coastal seas as larvae/juveniles, but spends most of its life in rivers and streams as an adult

Pelagic and demersal species (ocean dwelling species and those species that live close to the seafloor) - A number of important commercial fish and invertebrate species, with a relatively high diversity in fish species, have been recorded around the Kent Group. It is estimated that over 500 species of fish, including approximately 50 species of elasmobranchs (sharks and rays), are found in Bass Strait. There are no endemic species to the area, with most species being widely dispersed throughout the region

Pinnipeds - Pinnipeds, principally the Australian Fur Seal (*Arctocephalus pusillus*), frequent Bass Strait (Appendix MNES list). Many of the islands in Bass Strait are important breeding or haul-out sites for the Australian Fur Seal, there are 10 established breeding colonies of the Australian Fur-seal, which are restricted to islands in the Bass Strait; six occurring off the coast of Victoria and four off the coast of Tasmania, these are including large breeding colonies at Judgement Rocks and Tenth Island. Australian Fur Seals generally breed around November to December with the majority of pups suckled for about 8 months.

Plankton - There have been few studies of plankton populations in the Bass Strait region, however a key study by Watson and Chaloupka (1982) recorded over 170 species of zooplankton during sampling of eastern Bass Strait waters, half of which were marine copepods. These are a key biomass component of the ocean food chain

Reptiles - There are several reptile species that are occasional vagrants to the eastern part of Bass Strait, including three species of marine turtle: the Loggerhead (*Caretta caretta*) and the Leatherback (*Dermochelys coriacea*), both of which are listed as Endangered and the Green Turtle which is listed as Vulnerable under the EPBC Act.

Two migratory species which may be found in Bass Strait are listed as vulnerable under the EPBC Act (Appendix MNES list): the Great White Shark (*Carcharodon carcharias*) and the Whale Shark (*Rhincodon typus*). Ninety Mile Beach provides important feeding grounds for juvenile Great White Sharks, effectively representing nursery habitat. A Biologically Important Area (BIA) for breeding (nursery ground) has been established in the coastal region extending east from Wilsons Promontory. The Great White Shark moves seasonally along the Australian coast moving north in Autumn and Winter along the east coast and returning to southern Australian waters by early Summer. Sharks are known to congregate around seal colonies within the Kent and Hogan Group looking for food and these waters have been established as a foraging BIA for the Great White Shark. Whale Sharks generally occur in warmer oceanic waters off northern Australia and are not likely to be found in Bass Strait

It is also important to understand the community of introduced pests that are present in the area:

Introduced Pests – In the South-East marine region 115 species have been introduced and an additional 84 have been identified as cryptogenic. It is likely that many of these species have been introduced by ballast water discharged from international shipping or attached to the many private and commercial vessels traversing Bass Strait. Key marine pests observed in northern Tasmania, Bass Strait and southern Victorian waters include the northern Pacific Seastar (*Asterias amurens*), European Green Crab (*Carcinus maenas*), Asian Date Mussel (*Musculista senhousia*), European Clam (*Corbula gibba*), European Fan Worm (*Sabella spallanzanii*), New Zealand Screw Shell (*Maoricolpus roseus*), Japanese Kelp (*Undaria pinnatifida*) and Long-spined Sea Urchin (*Centrostephanus rodgersii*). All marine pests are considered a threat to the marine environment as they compete directly with native species for habitat and food.

A detailed list of threatened species that may occur near the TGP is included in Section 6.3.1 of the EP.

4.3 Cultural Environment

A number of studies were undertaken prior to construction of the Offshore TGP to identify:

- The potential for the presence of submerged terrestrial sites dating from the period prior to the creation of Bass Strait (prehistoric)
- Potential and actual submerged archaeological remains associated with European period sites situated close to or on the coast near the proposed landfalls
- Known and potential shipwrecks within 5 nautical miles (nm) of the Offshore TGP route

The potential for impact of the Offshore TGP on submerged terrestrial sites is considered low, partly because of physical factors on surface deposits as sea levels rose, but also due to the subsequent sedimentation and burial of submerged terrestrial sites that would have occurred following inundation. No submerged terrestrial sites were identified during construction of the Offshore TGP.

The coastal zone of both Tasmania and Victoria potentially contains numerous heritage sites, predominantly of recent formation (last 1,000 years). However, archaeological surveys conducted prior to construction found little evidence within the pipeline route of sites of either Aboriginal or non-Aboriginal origin. All potential sites within the foreshore landform of the alignment were nonetheless avoided via use of directional drilling under the coastal zone.

4.3.1 Indigenous Culturally Significant Environments

The Bass Strait was not always covered by water, it was a plain or land bridge that used to extend from south-east Victoria to the north-east of Tasmania, populated by indigenous peoples first used approximately 40,000 years ago. After the ice-age ended and sea levels rose, the Bass Strait filled and became impassable by foot around 12,000 years ago.

It is important to understand that Indigenous people make no distinction between land and sea. They see themselves as having responsibilities and rights across the land and sea boundaries that have been put in place over the last 200 years. This corresponds to the idea that there is an unbroken custodianship with both the land and seas for many indigenous communities that value the health of the environment and connection with areas of cultural significance. Some of the major concerns when it comes to the South-East commonwealth marine environment are Coastal and marine resources remain very important to Indigenous people, particularly in relation to hunting and gathering. Protection of marine and land resources also fall within this, as these are often used in trade or other bargaining practices. The connection with land and sea, resources and environmental wellbeing is a holistic relationship, which remains frequently overlooked by non-Indigenous people.

These connections to land and sea remain the primary reasons for ensuring adequate consultation is conducted to best support and recognise any cultural impacts that activities within the Operating Area (OA) may have on the local indigenous communities. This is considered through community consultation.

Within Tasmania, there are currently no native titles, but there are many community groups. Currently, there has been funding granted by the Australian Government to create a Tayaritja/Bass Strait Islands Sea Country Indigenous Protected Area (IPA), the area surrounds Tayaritja/Bass Strait

Islands and the northeast waters of Lutruwita/Tasmania. The aims of creating the IPA are to support the Palawa Community to connect with milaythina muka / Sea Country, and partner with others to understand, protect and manage milaythina muka. This will be the first IPA project in Lutruwita, and as of writing the EP is in the stage of community consultation.

The Gunai-Kurnai native title determination area in Victoria covers approximately 45,000 hectares and extends from west Gippsland near Warragul, east to the Snowy River and north to the Great Dividing Range. The area includes 10 parks and reserves that are jointly managed by the State government and the Gunai-Kurnai people. Areas within and adjacent to the Ninety Mile Beach Marine National Park are considered culturally and spiritually significant to the relevant indigenous communities. Additionally, an IPA has been created from Nanjit to Mallacoota, the coastal waters of the Gippsland region in Victoria. The area comprises numerous marine and coastal parks and includes the Ramsar listed Gippsland Lakes and Raymond Island, a highly significant cultural site.

Although this Offshore EP applies to the offshore component of the TGP pipeline, the native title determination area is relevant given that the boundary extends to 200 m offshore between Lakes Entrance and Marlo. At the time of writing a Native Title Claimant Application was registered by the Gunai-Kurnai people for an area covering Wilsons Promontory.

There are no native title determination areas in Tasmania however there are seven Indigenous Protected Areas on the islands of the Ferneaux Group in Bass Strait.

4.3.2 Shipwrecks and other Historical Environments

Data on shipwrecks in the region indicates a significant number are present throughout Bass Strait and coastal Victoria and Tasmania. Exact resting places for many wrecks in the region are unknown, some of these include:

- The wreck SS Glenelg - reported to be situated in close proximity to the pipeline, although estimates of its location vary from close to Lakes Entrance to being 40 nm west of Lakes Entrance
- The Norfolk, which also has conflicting locations (one report has it situated 30 nm from Lakes Entrance, while another records a location between Seaspray and Woodside). Several wrecks have been listed as 'lost Ninety Mile Beach'
- Beagle Marine Park contains two shipwrecks within its Multiple Use Zone, the SS Cambridge (1940) and the SS Queensland (1876)
- The wrecks Fear Not and Oberlin situated close to the shore at Hogan Island
- The wreck of Bulli lies almost intact in West Cove, Erith Island within the Kent Group
- A number of wreck locations in the Five Mile Bluff region, including an unidentified coaster (1843) and the Royal Oak

4.4 Socio-Economic Environment

A wide range of human activities occur in the waters of Bass Strait, including commercial oil and gas fields, shipping, commercial and recreational fishing, and other recreational activities.

Commercial Fisheries - Several commercial fisheries operate in the general vicinity of the Offshore TGP depending on the season, including the: Southern Bluefin Tuna Fishery, Eastern Tuna and Billfish Fishery, Eastern Skipjack Tuna Fishery, Small Pelagic Fishery, the Bass Strait Scallop Fishery (Central Zone) and the Southern Squid Jig Fishery. School whiting (*Sillago bassensis* and *S. flindersi*) and flathead (*Platycephalus* and *Neoplatycephalus spp.*) are the most significant commercial species.

Commercial shipping - Bass Strait is one of Australia's busiest shipping areas, with passengers and freight being transported between the mainland and Tasmania as well as New Zealand. The highest volumes of shipping traffic travel in an east-west direction, with connections to Melbourne and Geelong. Substantial volumes of shipping traffic also occur between Melbourne/Geelong and Tasmania moving in a north-south direction.

Recreational activities - Most recreational activities occur in nearshore environments, including fishing, boating and diving, whale watching and are often controlled by conditions within the open waters of the Strait. Several of the islands in the region are also available for visiting, although access may be controlled by permit systems managed by the Tasmanian Parks and Wildlife Service. Popular recreational activities offered by the Bass Strait islands include birdwatching, fishing and diving around reefs and shipwrecks.

Oil and Gas Infrastructure - The Gippsland Basin has been producing significant oil and gas resources since the 1960s and includes several operating fields. Petroleum permits have been issued for exploration and production within the central Bass Strait region, with the closest operating field located at least 3 km to the east of the Offshore TGP.

Other infrastructure - The Victorian shore crossing of the Offshore TGP is adjacent to existing pipeline easements or infrastructure, including EAPL/BHP pipeline, BASSLINK Interconnector and Indigo Cable. In pursuit of renewables, there is also area being proposed for offshore wind turbines that could intersect with the TGP.

Due to the depth and location of the Offshore TGP, and periodic nature of inspection and maintenance activities, Offshore TGP activities should pose minimal hindrance to socio-economic activities in Bass Strait.

4.5 Environmentally Significant Areas

4.5.1 Matters of National Environmental Significance (MNES)

TGPPL reviewed the contents of MNES report by identifying the MNES and other matters protected by the EPBC Act that could reasonably be considered to be within or near to the TGP route and OA, or potentially impacted within the EMBA shown in the oil spill modelled shown in Figure 2-1 and 2-2.

4.5.2 Wetlands of International Importance (Ramsar Wetlands)

4.5.2.1 Corner Inlet

The Corner Inlet Ramsar Site is located on the south-east coast of Victoria. It is bounded to the west and north by the South Gippsland coastline, in the south-east by a series of barrier islands and sandy spits lying end to end and separated by narrow entrances, and to the south by the hills of Wilsons Promontory.

Corner Inlet is a very good example of a wetland enclosed by barrier islands in Victoria and contains the most extensive intertidal mudflats in Victoria. The area contains the only extensive bed of the Broad-leafed seagrass in Victoria. The islands of Corner Inlet, although not rich in plant diversity, are of high biogeographical significance as a result of their geological history and connectivity to the mainland during ice ages. The islands also contain significant areas of saltmarsh and mangroves, both of which are communities of very limited distribution. These communities filter pollutants, stabilize sediments and protect the shoreline from erosion.

West Gippsland Catchment Management Authority issued a *2014-2022 West Gippsland Waterways Strategy* that included the Corner Inlet site and created the *Corner Inlet Water Quality Improvement Plan 2013*. These work in with the federal EPBC Act for managing Ramsar sites.

4.5.2.2 East Coast Cape Barren Island Lagoons

The East Coast Cape Barren Island Lagoons (ECCBIL) Ramsar site is located on the east coast of Cape Barren Island, one of the Furneaux Group of islands which lie in Bass Strait to the north-east of Tasmania. The site extends from just north of Tar Point down to Jamieson's Bay and extends westwards from the coast for a distance varying from one to four kilometres.

ECCBIL has a significant place in recent history of the Tasmanian Aboriginal community Cultural Heritage and is of spiritual and religious significance and is a regional example of a near natural coastal wetland. The sandy soils and low relief create a context for the development of wetlands and

numerous shallow saline lagoons. The largest lagoon is Thirsty Lagoon located in the southern sector. It is a barred estuary connected by a narrow neck to Little Thirsty Lagoon. Most of the remaining lagoons are small un-named ephemeral water bodies that are not connected to the sea.

4.5.2.3 Flood plain lower Ringarooma River

Located in the far north-east coast of Tasmania as show in between Cape Portland and Waterhouse Point. The site is situated on the sandy flood plain of the Lower Ringarooma River which encompasses extensive marshlands and a few shallow lagoons including Shantys Lagoon, Blueys Lagoon and Bowlers Lagoon. The Ringarooma River drains out into Ringarooma Bay which is located within the EMBA. The wetlands extend over 3500 hectares and vary in wetland type across this area.

The site has been included as the hydrology of this site is influenced by tidal flows, river flows and local groundwater. However, the bulk of the wetland area is above the tidal limit and is largely controlled by inflows from the Ringarooma River. Birds and wetland dependent species, including migratory and threatened species use the wetlands as a habitat.

4.5.2.4 Gippsland Lakes

The Gippsland Lakes Ramsar Site is located in Victoria, south of the Eastern Highlands and to the east of the La Trobe Valley. Covering a vast area, the lakes are a series of large, shallow, coastal lagoons approximately 70 km in length and 10 km wide, separated from the sea by sand dunes. The surface area of the lakes is approximately 364 km² and the three main water bodies are Lakes Wellington, Victoria and King.

The Gippsland Lakes is a particularly good representative example of a natural or near-natural wetland, characteristic of the biogeographical region. It forms one of the largest coastal lagoon systems in the Drainage Division and contains a distinctive landscape of wetlands and flat coastal plains. The site supports a broad range of wetland types in close proximity to each other, including periodically inundated palustrine marshes, permanently inundated palustrine marshes, shallow lacustrine (lake) features, deep lacustrine features, lagoons with narrow inlets, and broad embayments. The site supports several nationally threatened wetland fauna species at various stages of their life cycle including two nationally threatened frog species, the vulnerable Australian Painted Snipe, a vulnerable fish species (the Australian Grayling) and three nationally vulnerable and endangered wetland-associated flora species.

The Lakes are protected as a Ramsar site by the Lakes National Park and the Gippsland Lakes Coastal Park. In the context of the TGP operations and predicted extent of the EMBA, critical components (C)/ processes (P)/ services (S) that may be affected by a diesel spill event include marine sub-tidal aquatic beds (C1), waterbird breeding (P2), threatened species (S1) and fisheries resource values (S2). The greatest threat identified that relates to the activities of TGP is vessel oil spill impact to direct oiling of wildlife. Oil spill management is discussed in Section 7.

4.5.2.5 Logan Lagoon

Logan Lagoon is part of an extensive eastern Flinders Island parallel dune-coastal barrier system, stretching across 2257 hectares, the Ramsar site is located in the south-east corner of Flinders Island in Bass Strait, Tasmania, approximately six kilometres north-east of the township of Lady Barron. Like the East Coast Cape Barren Island Lagoon, the site falls just outside the scope of the EMBA as it is situated on the east coast of the Tasmanian Bass Strait islands.

When full, the lagoon provides feeding and resting habitat for several migratory waders including the Red-necked Stint, Common Greenshank, Eastern Curlew, Bar-tailed Godwit and Double-banded Plover. The wetland is an important part of the East Asian - Australasian Flyway, and twenty migratory bird species listed under internationally agreements use the site. Currently, the primary use of the site is for conservation, education, research, and recreation such as walking, sightseeing, bird watching, off-road vehicle driving and beach fishing.

4.5.3 Threatened Ecological Communities

The communities described in detail below are more likely to be encountered or impacted by TGP activities, however a comprehensive list is also included in the EP.

- **Giant Kelp Marine Forests of South East Australia** – As of August 2012, these areas have been protected under the EPBC Act, as a threatened ecological community (TEC). Giant kelp (*Macrocystis pyrifera*) is the foundation species of the community, with other components including a large range of algae, reef associated fish and numerous invertebrates that shelter, feed and reproduce within the kelp. Remaining populations occur along coastal Tasmania and Victoria and in small patches around the Kent Group. Giant kelp marine forests favour temperate southeast waters on rocky reefs, where conditions are cool and relatively nutrient rich. The Offshore TGP route passes through deeper waters and does not impact directly on any known populations.

There is currently no threat abatement plan for this ecological community.

- **Littoral Rainforest and Coastal Vine Thickets of Eastern Australia** - is listed as a critically endangered TEC under the EPBC Act. The ecological community is a complex of rainforest and coastal vine thickets on the east coast of Australia influenced by its proximity to the sea; and provides habitat for over 70 threatened plants and animals and provides important stepping stones along the eastern Australian coast for various migratory and marine birds.

Littoral Rainforest is comprised of a complex of wet or monsoon tropical to warm temperate rainforests and coastal vine thickets, and notably it differs from other types of rainforest (such as lowland or upland rainforest) due to its location, typically located within two kilometres of the coast or adjacent to a large salt water body, such as an estuary.

The rainforest is highly valued by Indigenous Australians, and a number of sites across the Littoral Rainforest are located within recognised Native Titles. Cultural artefacts have been found within parts of the forest and in Victoria, a women's sacred site and birthing place have been discovered.

Key threats to the rainforest are increased fragmentation from clearing of vegetation, degradation of abiotic factors (such as water, nutrients or soil, introduction and establishment of invasive species, and pollutants entering the ecological community that kill or inhibit growth of local species.

The Offshore TGP route does not impact directly on the closest occurrence of this TEC at Lakes Entrance, and offshore activities will not impact the ecological community directly.

- **Subtropical and Temperate Coastal Saltmarsh** - Is listed as a vulnerable TEC under the EPBC Act, and its known distribution includes the southern and eastern coasts of Australia. The Subtropical and Temperate Coastal Saltmarsh ecological community occurs within a relatively narrow margin along the Australian coast, within the subtropical and temperate climatic zones; and includes coastal saltmarsh occurring on islands within these climatic zones. The physical environment for the ecological community is coastal areas under regular or intermittent tidal influence.

The ecological community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges, rushes and shrubs. Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats. The ecological community is inhabited by a wide range of infaunal and epifaunal invertebrates, and temporary inhabitants such as prawns, fish and birds (and can often constitute important nursery habitat for fish and prawn species). Insects are also abundant and an important food source for other fauna, with some species being important pollinators. The dominant marine residents are benthic invertebrates, including molluscs and crabs that rely on the sediments, vascular plants, and algae, as providers of food and habitat across the intertidal landscape. The key threats affecting the ecological community include: clearing and fragmentation, invasive species, damage from

recreational activities and pollution (including oil spills). The Offshore TGP route does not impact directly on any known communities.

4.5.4 Commonwealth Marine Areas

Six marine regions have been identified in Commonwealth waters around Australia. The EMBA lies within the South-east Marine Region. The 2025 South-east Commonwealth Marine Reserves Network Management Plan expired on 30 June 2023, during the renewal process of the EP, Parks Australia is preparing a new management plan for the South-east Network.

The key conservation values of the South-east Marine Region are:

- Features with high biodiversity and productivity, such as the east Tasmania subtropical convergence zone, Bass Cascade, Upwelling East of Eden, Seamounts south and east of Tasmania and Bonney Upwelling.
- Breeding and resting areas for Southern-right Whale.
- Migration areas for Blue, Fin, Sei, Southern-right and Humpback Whales. Foraging areas for Australian Sea-lion, White Shark, Harrison's Dogfish, Killer and Sei Whales, Australasian Gannet, Fairy Prion, Black-faced Cormorant, Little Penguin, Crested Tern, and several species of seal, albatross, petrel, shearwater and gull.
- Wrecks of MV City of Rayville, SS Cambridge and ketch Eliza Davies.
- 10 provincial bioregions and 17 seafloor types are represented in the network

4.5.5 Australian Marine Parks

Beagle Australian Marine Park (AMP) - Declared in June 2007, covers 2,928 km² of Commonwealth Ocean territory, and incorporates the Kent Island Group, Hogan Island Group and Curtis Island Group. It is situated within shallow topography, mostly at depths of 46 m to 77 m, with the north-western edge abutting Victorian waters to the south-east of Wilson's Promontory. The Offshore TGP is oriented between the Hogan and Kent Island Groups, traversing the entire marine reserve in a north-south direction. The Marine Reserve is traversed by the Offshore TGP between KP 110 and KP 170. The Reserve is zoned for 'Multiple Use' (category VI under the classification system established by the International Union for Conservation of Nature (IUCN) and adopted by the Commonwealth government), however it should be noted that at the time of the EP the South-East marine park zoning is under review as the 2013 [South-east Commonwealth Marine Reserves Network Management Plan](#) expired on 30 June 2023, therefore zones may change in the next update. This should have minimal impact on the activities or processes that TGPPL currently follow to initiate activities in the region due to approvals given prior to the plan as the pipeline is a prior use right.

The Reserve is effectively a managed resource protected area that is administered to ensure long-term protection and maintenance of biological diversity, but with a sustainable flow of natural products and services to meet community needs. The general zoning allows for a number of activities including mining exploration and development activities, select commercial fishing methods, recreational and charter fishing, shipping and general transit, scientific research and commercial tourism. Demersal trawl, scallop dredging, mesh netting and Danish seine commercial fishing methods, however, are not permitted.

4.5.6 National Parks and Reserves

Several areas adjacent to or within Victorian and Tasmanian State waters have been declared as National Parks or Marine Protected Areas. These include the following reserves within the vicinity of the Offshore TGP:

The Lakes National Park (Tatungalung Country) - One of the jointly managed parks with Parks Victoria and the Gunaikurnai people and recognised as an internationally significant wetland for migratory bird species. For the indigenous community, many of these species are considered totem species, and there are many rare or endangered species found throughout

the year. The Lakes National Park is a bushland that covers 2389 ha located in central Gippsland with prominent geographical features of the peninsula of Sperm Whale Head, Rotamah and Little Rotamah Islands. The main lakes of the park are Lake Victoria and Lake Reeve. The area is managed to support recreational activities, such as walking trails, kayaking, sailing, bird watching and educational group camping.

The far south-western boundary of the park is located approximately 100 m north-east of the Offshore TGP commencement point.

Ninety Mile Beach Marine National Park – Is located 550 m southwest of Seaspray, Victoria and is managed by Parks Victoria. The Park covers 2750 ha and stretches south-west along 5 km of coastline and 3 NM offshore to the boundary of Victorian waters. The park is recognised as an internationally significant sandy environment recognised for the high diversity of marine invertebrates.

Marine habitat consists of sandy beach, sub tidal soft sediment and 8 ha of low profile calcarenite reef offshore that support the variety of invertebrates including colourful sponge gardens. The long sandy beach of the the Park is frequented by a number of threatened shorebird species including the Hooded Plover (*Thinornis rubricollis*), Little Egret (*Egretta garzetta*), Little Tern (*Sterna albifrons sinensis*), Royal Spoonbill (*Platalea regia*) and Whiskered Tern (*Chlidonias hybridus*). The area contains diverse fish species, with schools of pelagic fish including pike, school whiting and snapper common to the area. The area is also a nursery and feeding ground for Great White Sharks (*Carcharodon carcharias*).

The park is commonly used for a variety of recreational activities, including boating and water sports, diving and snorkelling, dog walking, horse riding, tourism and walking.

The Park is located approximately 2 km west of the Offshore TGP.

Corner Inlet and Nooramunga Marine and Coastal Parks - Corner Inlet Marine and Coastal Park is part of an Aboriginal cultural landscape that includes the traditional Country of the Gunaikurnai Peoples. Nooramunga Marine and Coastal Park is approximately 20,170 ha and Corner Inlet Marine and Coastal Park covers around 28,500 ha and are situated 200km southeast of Melbourne. These Parks are protected from Bass Strait by sand barrier islands and Wilsons Promontory. Corner Inlet and Nooramunga consist of shallow marine waters, intertidal mudflats and a series of sand islands. The park includes one of 64 wetland areas in Australia listed under the Ramsar Convention. This internationally listed wetland protects 67,186ha of diverse habitats, including coastal woodland, vast mangrove communities, saltmarsh areas, intertidal zones and unique marine values such as Broadleaf Seagrass forests. (Parks Victoria, 2024a). Seaward of the mangroves are extensive areas of intertidal mud and sand flats which provide food for thousands of migratory wading birds each year.

The parks are used for several recreational activities, notably fishing and boating, hunting and camping.

Wilsons Promontory Marine and National Park - Is Victoria's largest Marine Protected Area at 15,550 ha and is located around the southern tip of Wilsons Promontory. There is a diversity of marine life including octopus, sharks and rays. It is a popular location for recreational divers particularly around the sponge gardens. The offshore islands support many colonies of fur seals and oceanic birds such as Little Penguins, Fairy Prions, Silver Gulls and Pacific Gulls.

Wilsons Promontory Marine National Park is assigned the International Union for the Conservation of Nature and Natural Resources (IUCN) Category II of the United Nation's List of National Parks and Protected Areas. Category II areas are managed primarily for ecosystem protection and recreation. This terrestrial park is important for its range of plants and animals, including many threatened species including the New Holland Mouse, Ground Parrot and White-bellied Sea Eagle. Coastal features include expansive intertidal mudflats, sandy beaches and sheltered coves interrupted by prominent headlands and granite cliffs in the south, backed by coastal dunes and swamps.

The avifauna recorded for Wilsons Promontory includes around half of all Victorian bird species. Significant species of migratory wading birds feed on the tidal mudflats of Corner Inlet within

and adjoining the park. The offshore islands have breeding and roosting sites for sea birds, including multiple species of Short-tailed Shearwaters.

The Kent Group National Park and Marine Reserve – A terrestrial park managed by the Parks and Wildlife Service of Tasmania. The islands were part of the original land bridge that connected what we now know as Tasmania and Victoria, allowing the movement of people and animals over 10,000 years ago. There are three major islands (Deal, Dover and Erith), two minor islands (North East and South West) and Judgement Rocks incorporated into the national park. The Offshore TGP is oriented in close proximity to South West Island and Judgement Rocks, with KP 130.7 positioned approximately 10 km west of the park boundary. Breeding seabird colonies are large, particularly on the two small islets known as North East and South West islands. Common Diving Petrels, Short-tailed Shearwaters, Little Penguins, Pacific Gulls, Sooty Oystercatchers and cormorants are the primary inhabitants as are the Little Tern (*Sterna albifrons sinensis*), endangered under Tasmanian legislation, and the Fairy Prion (*Pachyptila turtur subantarctica*) listed as vulnerable under the EPBC Act. Judgement Rocks is also an important Australian Fur Seal (*Arctocephalus pusillus*) breeding colony, being the largest within Tasmanian waters. However, the distance of approximately 10 km is expected to buffer nesting sites from Offshore TGP activities.

The Marine Reserve lies 23 km east of the Offshore TGP.

Several other islands lying about 10 km to 25 km from the Offshore TGP are listed as nature reserves under the Nature Conservation Act 2002 (Tasmania). They include: West Moncoeur Island, East Moncoeur Island, Bass Pyramid, Curtis Island, Devils Tower, Tenth Island and Wright Rock. The islands not only provide resting sites from foraging, but also serve as breeding sites for some species of birds and, in some cases, for seals.

All wildlife is protected by State or Commonwealth laws within declared nature reserves. The Offshore TGP route was originally chosen to minimise impacts on these sensitive areas, with the only area in direct contact with the Offshore TGP being the Beagle AMP.

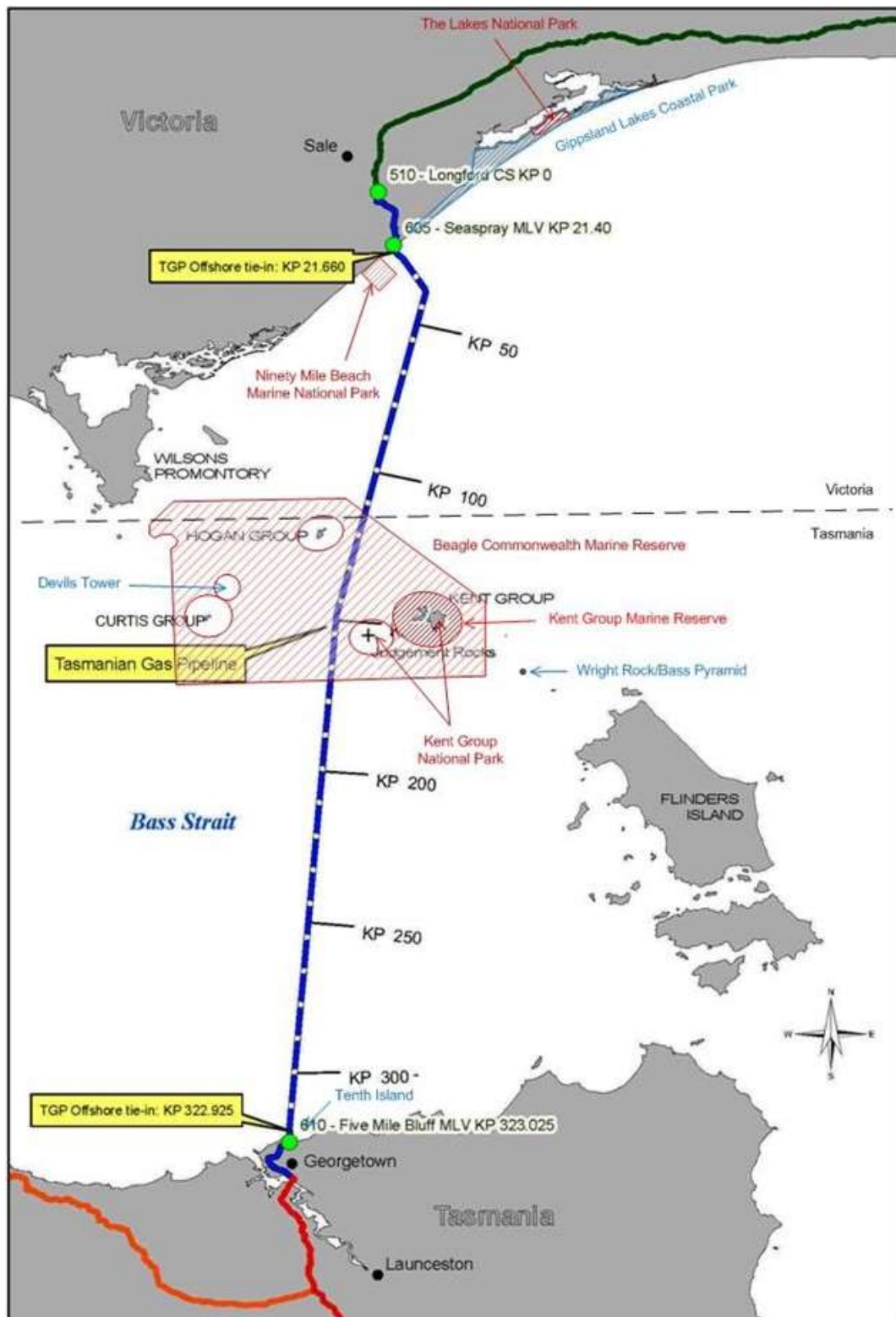


Figure 4-1: Environmentally Significant Areas along the Offshore TGP route

5. ENVIRONMENTAL RISKS AND CONTROLS

TGPPL has undertaken an environmental risk assessment (ERA) to identify potential environmental risks associated with operation, inspection and maintenance of the Offshore TGP to ensure that identified risks are reduced to ALARP and will be of an acceptable level consistent with TGPPL and industry standards. The environmental risk management process is outlined in Section **Error! Reference source not found.**

5.1 Environmental Risk Management Process

5.1.1 Environmental Risk Management Model

Environmental risk assessment and management for the TGP Offshore EP has been undertaken using a methodology that is consistent with the approach outlined in the following standards and guidelines:

- AS/NZS ISO 14001 - Environmental Management Systems- Requirements with Guidance for Use;
- AS 2885.1 - Pipelines - Gas and Liquid Petroleum, Part 1 – Design and Construction;
- AS/NZS 31000 - Risk Management – Principles and Guidelines; and
- HB 203 – Managing environment-related risk.

The model used to evaluate and manage environmental risks potentially resulting from TGP operation and associated inspection and maintenance activities comprises the following main components:

- **Risk identification** - Identification of the environmental aspects of operations (i.e. elements of those activities carried out on the TGP that can interact with the environment) and potential impacts or changes to the environment resulting from these environmental aspects.
- **Risk analysis** – Developing and understanding of the risks and controls in place, i.e. analysing risks in terms of controls, consequences and likelihood to determine an estimated level of risk of the impact from each aspect.
- **Risk evaluation** - Assessment of the environmental risk according to the allocated likelihood and consequence to rate or rank the risk, and identify those aspects with risks considered to be significant. An Environmental Risk Matrix was used to determine risk ratings and identify significant risks that require further treatment.
- **Risk treatment** - Reviewing the proposed management controls for each of the significant risks identified and proposing additional controls or recommending further actions or treatments to mitigate the risk to a level that is deemed to be ALARP.

Although the TGP Offshore EP focusses on the environmental risk management process, the overall TGP Risk Management process is a whole of life process conducted during the three project phases of design, pre-commissioning, post-commissioning and continuing through ongoing operations and eventually de-commissioning. The process incorporates a range of activities to ensure that all risks to people, the facilities, environment and continuity of supply are identified and managed to be ALARP.

5.1.2 Environmental Risk Assessment (ERA) Process

The ERA process applied is a detailed and systematic assessment of the risk associated with each identified hazard, including an assessment of the consequences and likelihood of each potential incident. The process is summarised as follows:

- ERAs are undertaken as structured workshops facilitated by an independent facilitator, with involvement from members of the workforce (where appropriate) and other external personnel with experience and knowledge appropriate to issues being considered
- The identified hazards or potential incidents are reviewed, and the associated risks (without controls) are analysed in terms of the likelihood of their occurrence and the consequences that

would result if they did occur. Based on the combination of likelihood and consequences, a resultant risk ranking (inherent risk) is attributed using the Risk Matrix

- Controls and mitigation measures in place to prevent, mitigate or recover from the potential risk are then analysed and the likelihood and consequences of the risk, following the application of these controls and consideration of any assumptions and uncertainties, is re-evaluated. Relevant legislation, policy and management / threat abatement plans are also considered in the measures where applicable.
- This results in a residual risk ranking, which is also assigned using the Risk Matrix. Where the risk assessment is a review of previous risk assessments, only the existing residual risk ranking is reviewed in consideration of any new information relevant to the hazard being considered
- Risks that are rated as “Low” are considered “Acceptable”, whereas residual risks classified as “Critical” are considered “Intolerable” risks that must be managed immediately to reduce the risk
- “High” and “Medium” level risks are considered “Tolerable”, however, they must be subject to an ALARP assessment to determine whether the risks can be further reduced by implementing additional controls and mitigation measures
- ALARP assessments are reviewed for relevance and consistency as part of the ERA review process (refer below)
- Matters requiring action are recorded in an Action Plan. It is a requirement that these action plan items are followed up and closed out in a timely manner
- The TGP Offshore ERA / Environmental Aspects and Impacts Register is updated as part of the ERA process

It should be noted that the TGP Offshore ERA/Environmental Aspects and Impacts Register is a “live” document that is used and continually updated, as required, during operation, inspection and maintenance of the Offshore TGP to facilitate the appropriate management of all identified environmental risks. The environmental risk associated with Offshore TGP activities will be continually assessed as part of the “continual improvement” component of the environmental management process. The TGP Offshore ERA / Environmental Aspects and Impacts Register will be reviewed and updated, where required, whenever a review and amendment of the Offshore EP is required.

5.2 Sources of Environmental Risk

5.2.1 Planned Activities

The main sources of environmental risk associated with the Offshore TGP relate to activities which are planned and undertaken on a periodic basis only (approximately every 5 years). Examples of these sources of environmental risk include:

- Routine inspection surveys, including the timing, location, use and presence of vessels and inspection equipment.
- Pipeline maintenance activities, such as span correction and anode replacement.
- Storage, handling and disposal of waste and chemicals on board vessels during inspection and maintenance activities.

Generally, the potential environmental impacts associated with planned activities are less significant than those potentially resulting from unplanned activities or incidents. However, as these sources of risk relate to planned activities occurring on a routine basis, this Offshore EP contain controls and mitigation measures to ensure environmental impacts and risks are reduced to ALARP and are of an acceptable level.

For further details regarding potential environmental impacts from Offshore TGP activities and the proposed controls and mitigation measures to minimise these impacts, refer to the EP

5.2.2 Unplanned Activities

Unplanned activities or events that could potentially impact on the Offshore TGP are largely related to management of pipeline integrity. TGPPL has additional documented measures to manage such issues are that addressed in the *TGP Offshore Pipeline Integrity Management Plan* (TGP-698-PA-IP-002).

The TGP is licensed to carry natural gas only, i.e. it contains no liquid hydrocarbons or contaminating compounds. Therefore, in the event of loss of pipeline integrity, the Offshore TGP is not considered a credible source of liquid hydrocarbon spills. A subsea gas leak due to loss of pipeline integrity is not expected to have any adverse environmental impacts.

During the ERA process, a number of unplanned activities or environmental incidents that could potentially result in environmental impacts were also identified, including: vessel collision with marine fauna, potentially resulting in injury or death; small scale chemical spills from vessel decks and inspection/maintenance equipment; introduction of invasive marine species from vessel ballast water discharge or biofouling and relatively large scale fuel spills caused by vessel accidents.

Response requirements in the event of an emergency or incident are discussed in Section **Error! Reference source not found.** of the Offshore EP, and oil spill response requirements are detailed in Section **Error! Reference source not found.** Oil Pollution Emergency Plan (OPEP) of the EP.

5.2.3 Assessment of Identified Environmental Risks

As discussed in Section 5.1.2 above, the rating of environmental risks identified for the offshore component of the TGP were assessed at two levels:

- Inherent (untreated) risk (before any controls are put in place);
- Residual (treated) risk (after controls and treatments have been put in place).

Within the TGP Offshore EP, for each of the identified environmental issues, the following information is provided:

- Identification of aspects or activities and potential incidents that could result in environmental impacts;
- Description of the key environmental risks or impacts associated with each identified activity or incident and their significance;
- Details of the controls and mitigation measures that are implemented to ensure the identified environmental risk is reduced to ALARP;
- A summary of the environmental risk assessment related to each environmental issue; and
- A summary of the ALARP evaluation.

As shown in the 'Summary of Environmental Impacts and Controls' Table in Appendix A of this EP Summary, all environmental risks identified for pipeline operational, inspection and maintenance activities have been assessed as 'Low' following the application of controls and mitigation measures. Given the control measures in place and the infrequent nature, relatively small scale and short duration of pipeline inspection and maintenance activities, all identified environmental risks were considered to be ALARP.

6. ENVIRONMENTAL MANAGEMENT APPROACH

All employees and contractors working for the TGP are required to work in line with the TGP environmental policies, their EMS and EP requirements. All TGP activities will be conducted in accordance with the approved EP as well as relevant international, Commonwealth and State legislation, regulations, conventions and guidelines.

6.1 Environmental Responsibilities

Overall responsibility for environmental management of the TGP rests with TGPPL. The General Manager TGPPL is responsible for implementation of this Offshore EP and conducting operational, inspection and maintenance activities in line with Offshore EP requirements; including coordination of contractors offshore.

External contractors are engaged for all Offshore TGP operations, inspection and maintenance activities. Contractor supervisors manage on the ground activities, with the TGPPL Asset Engineer providing direct environmental management support for Offshore TGP inspection, maintenance and operations.

As described previously in the EP, the RMC is managed by Worley Power Services as shown also in Figure 1-1. The RMC reports to TGPPL for all environmental matters.

Environmental support is provided by the corporate HSE and technical compliance groups in TGPPL, as well as specialised environmental consultants engaged by TGPPL. All personnel are responsible for ensuring their work complies with this Offshore EP. Figure 1-1 shows the organisational relationships and roles between all TGP parties. Specific Environmental Responsibilities are listed in the EP.

6.2 Environmental Performance Monitoring

6.2.1 Environmental Objectives, Performance Standards and Measurement Criteria

The TGP Offshore EP details specific environmental performance objectives, performance standards and measurement criteria for offshore TGP operation, inspection and maintenance activities. TGP accepts and is committed to implementation of these environmental requirements. The environmental performance standards, performance criteria and documentation listed in the TGP Offshore EP are used to assess TGP's overall environmental performance against stated environmental objectives.

The environmental performance objectives listed in the TGP Offshore EP are directly linked to the identified risks and impacts from the ERA and the controls and mitigation measures implemented to reduce risks and impacts to ALARP. TGP's representative will conduct audits of the defined environmental performance standards and measurement criteria, both prior to and during inspection and maintenance activities, to verify the responsibilities and commitments of the TGP Offshore EP are carried out.

6.2.2 Monitoring of Legislation

TGPPL is required to identify changes to codes and standards, review applicable procedures and ensure the knowledge is transferred to the relevant areas. The TGPPL Engineering/Operations Manager is responsible for ensuring that this monitoring occurs.

TGPPL regularly reviews legislation (Acts and Regulations) to ensure that TGP policies, plans and procedures are current and legally compliant. TGPPL is also responsible for maintaining legislative compliance knowledge in the business. These functions are achieved by:

- Subscribing to Standards Australia and appropriate legislative change alert service
- Assigning responsibilities for monitoring changes to standards, codes and legislation
- Ensuring that changes are communicated to all parts of the business in an effective manner
- Regular reviews of critical legislation, codes and standards; and

- Participation on industry and government committees and workshops on proposed changes
- Assigning actions related to legislation or standards to the Compliance Management System (currently Maintenance Connection)

Compliance requirements are captured in compliance management system and assigned to the appropriate personnel. Upon the receipt of a notification of a change in legislation relevant to the business, the change management procedure is followed in accordance with the TGP *Change Management Plan* (TGP-698-PA-CM-001). This includes a risk assessment process which may result in the addition of compliance measures to the Compliance Plan.

Changes to legislation are to be communicated to all relevant TGPPL personnel and contractors.

6.2.3 Regulatory Audits

Regulatory audits will be conducted as required by regulatory authorities. Generally, this is anticipated to be annually by NOPSEMA. All regulatory audit schedules are subject to change based on the requirement of the authority and the occurrence of environmental incidents.

6.2.4 Audits, Assessments and Inspections

Environmental performance assurance of the TGP operations activities will be undertaken in a number of ways. Performance assurance is undertaken to ensure that:

- Controls are implemented in accordance with EPSs to achieve the EPOs
- Non-compliances and opportunities for improvement are identified
- Environmental monitoring and reporting requirements are met

6.3 EP Review and Amendment

The TGP Offshore EP will be reviewed and resubmitted for approval by the Regulatory Authority (NOPSEMA and DEECA) in the following circumstances:

Every five (5) years from the date of last acceptance, as required under the relevant legislation

- In the event that a new or increased environmental risk is identified;
- In the event that there is any change or proposed change in circumstances or operations that results in a significant additional or modified risk not provided for in the existing EP;
- When requested by NOPSEMA or DEECA

Other examples of changes that may require the TGP Offshore EP to be revised and resubmitted include:

- Change in permit titleholder or operator in relation to an activity;
- Significant change in timing or location;
- Introduction of a new stage of an existing activity, new facilities or activities or modification of existing facilities or activities that fall outside the accepted EP;
- Following an event which highlights that environmental impacts or risks of an activity are greater than those predicted and agreed to in the accepted EP (e.g. major chemical spill).

Revision of the TGP Offshore EP will include a re-evaluation of the ERA, environmental performance objectives and implementation strategy, as well as a review of the TGP OPEP.

7. OIL POLLUTION EMERGENCY PLAN (OPEP)

7.1 TGP OPEP

In the event of a hydrocarbon spill, the response, notification and reporting will be in accordance with the TGP 'Oil Pollution Emergency Plan (OPEP)' as described in Section 9.4 of the TGP EP, which has been prepared in line with regulatory requirements. The OPEP outlines special requirements for oilspill management, including loss of oil, fuel and other hydrocarbons. All contractors are to adhere to the measures outlined in the OPEP.

The TGP OPEP includes detailed information on the following aspects of oil spill contingency planning and response:

- Objectives and scope of the OPEP
- Regulatory requirements, and relevant legislation and international conventions
- Integration with government and other agencies, including details of the National Plan, OPEP interfaces and review
- Criteria for selection of contractors and vessels
- Overview of TGP operations and inspection / maintenance activities
- Description of the Project area and existing environment
- Properties of the hydrocarbons that could potentially be spilled
- Identified spill scenarios, mitigation measures and oil spill modelling
- Response management, including response priorities, response team structure and responsibilities, and statutory responsibilities (e.g. identification of Statutory Authorities and Combat Agencies)
- Initial spill response actions and notifications, including spill response tier levels
- Detailed spill response strategies for Level 1 spills ('monitor and evaluate' response) and Level 2 escalation (including escalation requirements and notification requirements)
- Spill reporting requirements
- Termination and recovery procedures, including incident termination and debrief, environmental monitoring and evaluation, and waste management
- Response readiness, including training and spill response exercises

8. CONSULTATION

As per the regulation, in the course of preparing an EP or a revision of an EP, the titleholder must consult each of the following (a “relevant person”):

- each Department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant;
- each Department or agency of a State or Territory to which the activities to be carried out under the EP may be relevant;
- the Department of the responsible State or Territory Minister;
- a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP;
- any other person or organisation that the titleholder considers relevant.

Consultation with the community and key stakeholders has been a feature of the TGP from its inception and will continue for the duration of the life of the TGP. Initial consultation prior to construction and during pipeline operations from 1999 to 2012 were undertaken by the previous TGP operator, Tas Gas Networks. During this period most stakeholders indicated they did not have major concerns during construction or operation of the TGP and no issues were recorded.

TGP is continuing environmental consultation on an as-needs basis. TGP has developed a ‘Consultation Plan’ (TGP-698-PA-GEN-001) to regularly assess stakeholder expectations and answer enquiries as they arise.

The purpose of the TGP Consultation Plan is to:

- Keep key stakeholders up to date with TGP activities;
- Ensure timely response to stakeholder issues; and
- Maintain dialogue with regulatory authorities.

A diverse range of stakeholders has been identified as having potential interest in the management of operations along the pipeline. A full Relevant Persons list is included in appendix E of the TGP EP.

9. CONTACT DETAILS

For the purposes of the TGP Offshore EP, the titleholder and nominated liaison person is:

Wacek Lipski
Chief Executive Officer
Tasmanian Gas Pipeline Pty Ltd
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Melbourne,
Vic 3000
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Email: wacek.lipski@palisadeims.com.au

Appendix A – Summary of Environmental Impacts and controls

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
ACTIVITY - OFFSHORE PIPELINE OPERATION					
Presence of operating subsea pipeline	Loss of pipeline integrity as a result of: - Physical damage (e.g. dropped objects, dropped / dragged anchors, sinking ships); - Fatigue damage (free spans) due VIV or subsea currents; - Internal corrosion of the pipeline.	Subsea gas release.	Injury to, or death of, marine fauna in the immediate vicinity of the release (particularly in the event of ignition resulting in a flash fire). Scouring / physical damage to benthic communities; and generation of a sediment plume in the water column, potentially leading to smothering of, or reduced light penetration to, benthic communities. Emission of greenhouse gases to the atmosphere.	- Basis of design (pipe material selection, wall thickness and concrete coating) to minimise potential damage to the subsea pipeline from external sources. - Continuous monitoring of pipeline integrity via the SCADA system. - In the event of detection in pressure drop through the SCADA system, the pipeline will be immediately isolated by closure of the onshore MLVs. This will automatically limit the volume of gas released (maximum 20TJ). - Periodic inspection of the internal condition of the pipeline using internal pigging devices. - Periodic inspection of the external physical condition of the subsea pipeline. - Any maintenance requirements identified during pipeline inspections (e.g. span correction, removal of dropped objects, repair of concrete pipeline coating and replacement of sacrificial anodes). - All pipeline inspection and maintenance activities are performed in accordance with the 'Offshore Operations and Maintenance Management Plan' - Maintenance of pipeline integrity is specifically addressed in the 'Pipeline Integrity Management Plan' - Gas is filtered and is transported as "sweet dry" gas containing no liquid hydrocarbons or contaminating compounds. Maintenance of dry gas seals at Longford CS will prevent entry of liquid hydrocarbons (seal oil) into the pipeline. - Compliance with standard operating and maintenance procedures. - Pipeline route selection to avoid areas of significant benthic habitat. - No recognised aggregation areas (nesting, resting, breeding and feeding areas) for protected whales or dolphins within the area. - TGP included on AMSA Marine Navigation Charts to minimise the potential for anchoring in the vicinity of the offshore pipeline. - Training and induction for all relevant TGP personnel on relevant environmental issues. - Activation of Emergency Response Management Plan in event of loss of pipeline integrity.	LOW
	Pipeline spans (unsupported) causing vortex induced vibrations (VIV) along the pipeline.	Underwater noise.	Low level, localised underwater noise in the vicinity of the VIV. Marine fauna within the demersal zone expected to use avoidance behaviour and move away from the immediate area.	- Ongoing pipeline inspection surveys. In the event that a span with potential to lead to VIV is located, it will be scheduled for correction during the next maintenance activity. - Unsupported lengths of pipeline ("spans") are to be maintained to a maximum allowable length to reduce the likelihood of VIV. Rectification of span intervals to a maximum of 20 to 30 m (using grout bags in known free span locations to provide pipeline support). - Compliance with standard industry operating procedures. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Basis of design (pipe material selection and wall thickness). - Regular maintenance surveys to detect lengths of unsupported pipeline with increased inspection in vulnerable locations.	LOW
ACTIVITY - USE OF VESSELS DURING PIPELINE INSPECTION / MAINTENANCE					
Presence of vessel	Vessel movements	Vessel strike.	Injury or death to listed marine fauna (as protected under State or Commonwealth legislation or International conventions).	- Appropriately qualified / trained and experienced vessel personnel. Vessel Masters trained in appropriate vessel stand-off distances and other vessel-marine megafauna interaction management requirements. TGP to ensure appropriate training has been provided during vessel audits. - Peak migration and breeding seasons avoided where possible. - Marine Fauna Observer (MFO) present during inspection and maintenance activities to visually monitor for marine megafauna (e.g. cetaceans, seals and turtles). - Training and induction for all relevant TGP personnel on relevant environmental issues. - Works conducted in compliance with standard industry operating procedures and in adherence with all relevant international, national and state legislation, guidelines and conventions. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - The Director of National Parks will be notified prior to conducting any inspection and maintenance works within declared Commonwealth marine reserves.	LOW
	Vessel movements / timing and location of activities	Interaction of vessel and marine fauna.	Disturbance to marine fauna (including altered feeding, nesting, nursing, mating or migrating behaviour).		LOW
Presence of vessel	Vessel movements / timing and location of activities.	Interaction of vessel and other marine users.	Disruption to other marine users (e.g. recreational vessels, fishing vessels and commercial shipping traffic).	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Appropriately qualified / trained and experienced vessel personnel.	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
			Collision with other marine users (e.g. recreational vessels, fishing vessels and commercial shipping traffic), potentially leading to fuel spills (refer below).	- Vessels remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Appropriate consultation and effective liaison maintained with relevant stakeholders, which will be recorded in the consultation log. This will include providing a daily schedule of location of activities to affected parties (e.g. commercial fishing operators) and Notice to Mariners issued prior to departure. - Vessels equipped with full complement of navigation equipment, including GPS, navigation lights and continuous radio and radar watch. - Vessels will maintain a 500 m safety zone.	LOW
	Vessel lighting.	Artificial light.	Disturbance to marine fauna (including altered feeding, nesting, nursing, mating or migrating behaviour).	- Vessels remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Lighting on survey vessels is not above that of normal commercial shipping traffic in Bass Strait. - Vessels used generally smaller than most commercial shipping traffic and will be undertaking inspection and maintenance activities during daylight hours. - While vessels may be lit at night, no additional lighting above that of normal safe vessel operation will be required. - Although some of the islands in the vicinity of the TGP offshore route are known breeding colonies for seals and seabirds, there are no recognised aggregation areas (nesting, resting, breeding and feeding areas) for protected whales, dolphins or turtles within the area. - Peak migration and breeding seasons avoided where possible.	LOW
	Vessel movements / operation.	Noise (underwater and airborne).	Disturbance to marine fauna (including altered feeding, nesting, nursing, mating or migrating behaviour).	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Level of noise generated by inspection and maintenance vessels similar to that of, or less than, commercial vessels expected in the area. Vessels used are generally smaller than most commercial shipping traffic. - No vertebrate fauna populations known to inhabit the immediate area of the pipeline outside the coastal zone, with inspection and maintenance activities confined to areas located at least 8 km from the nearest onshore breeding or home habitat. - All contracted vessels and equipment used in operations associated with the offshore pipeline shall be fit for purpose and operated in accordance with regulations and manufacturer specifications. Vessels and equipment will also be compliant with all relevant international, Commonwealth and State legislation, guidelines and conventions. - All equipment inspected and operational prior to commencing work and serviced in accordance with manufacturer specifications. TGP will audit contractor vessels and marine equipment to ensure that it is fit for purpose and satisfies relevant regulatory, statutory and Contract requirements. - Vessels adhere to a planned maintenance system that ensures engines and thrusters are maintained for optimum performance during survey activities. - Appropriately qualified / trained and experienced vessel personnel. Vessel Masters trained in appropriate vessel stand-off distances and other vessel-marine megafauna interaction management requirements. - Works conducted in compliance with standard industry operating procedures - Peak migration and breeding seasons avoided where possible. - MFO present during inspection and maintenance activities to visually monitor for marine megafauna. - Vessels remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location.	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
	Vessel anchoring.	Anchor dragging along the seabed.	Disturbance / damage to sensitive benthic marine fauna and ecosystems.	- Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Inspection and maintenance vessels will avoid anchoring (unless in an emergency). Use of anchors will be avoided in marine protected areas unless sufficient steps are taken to avoid dragging. - Pipeline route selection to avoid areas of significant benthic habitat. - The Director of National Parks will be notified prior to conducting any inspection and maintenance works within declared Commonwealth marine reserves. - Vessels equipped with full complement of navigation equipment, including GPS. Navigation charts will be referred to ensure avoidance of reefs and habitats in marine protected areas.	LOW
Presence of vessel	Vessel anchoring.	Anchor dragging along the seabed.	Interference to commercial fishing activities (including damage to fishing equipment).	- Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Inspection and maintenance vessels will avoid anchoring (unless in an emergency). - Appropriate consultation and effective liaison maintained with relevant stakeholders, which will be recorded in the consultation log. This will include providing a daily schedule of location of activities to affected parties (e.g. commercial fishing operators) and Notice to Mariners issued prior to departure. - Vessels equipped with full complement of navigation equipment, including GPS, navigation lights and continuous radio and radar watch. - Vessels maintain a 500 m safety zone.	LOW
			Damage or disturbance to known, or previously unidentified, cultural heritage sites.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Inspection and maintenance vessels will avoid anchoring (unless in an emergency). - TGP pipeline route was selected to avoid known heritage sites, and no sites of Aboriginal or non-Aboriginal significance (including shipwrecks) were evident along the pipeline route during pre-construction surveys. - Known sites of cultural heritage significance have been recorded in the GIS for reference by contractors prior to any work in the vicinity of such sites. The GIS maintains details of known cultural heritage sites and, where possible, includes not only information to identify the location, but also details regarding the significance and management measures specific to each identified site. - Vessels equipped with full complement of navigation equipment, including GPS, to assist in identifying the location of known cultural heritage sites.	LOW
	Vessel biofouling.	Inappropriate biofouling management.	Introduction of exotic marine pests, potentially displacing native species, altering ecosystem function and affecting biodiversity.	- Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Appropriately qualified / trained and experienced vessel personnel. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Adherence to guidelines for biofouling management e.g. "National biofouling management guidance for the petroleum production and exploration industry". - Biofouling management documentation on board, available to all relevant personnel. - Where required, vessel hull cleaned prior to exiting port. Record of hull cleaning certificate. - Where required, visual inspections for fauna attached to vessels. Records kept.	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
	Vessel ballast water.	Inappropriate ballast water management.	Introduction of exotic marine pests, potentially displacing native species, altering ecosystem function and affecting biodiversity.	- Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Appropriately qualified / trained and experienced vessel personnel. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Compliance with the Australian Ballast Water Management Requirements - Maintenance of ballast water log and submission of ballast water report in accordance with Department of Agriculture requirements. - Ballast water management documentation on board, available to all relevant personnel.	LOW
	Vessel deck drainage / bilge water.	Uncontrolled or inappropriate disposal of oily wastewater to the marine environment.	- Very minor, localised, short-term contamination of the marine environment, no impact on marine ecosystems or marine fauna expected. - Very minor, localised, short-term visible pollution / reduction of visual amenity.	- Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Appropriately qualified / trained and experienced vessel personnel. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Drainage from vessel decks with potential for oil, grease or hydrocarbon contamination either be collected and processed through an appropriately maintained oil/water separator prior to discharge, or stored onboard for onshore disposal by a licensed waste subcontractor. - Bilge water directed to an oil/water separator prior to discharge, or stored onboard for onshore disposal by a licensed waste subcontractor. - Where provided on-board, oil / water separation equipment will be regularly maintained and records kept. - Oil in water instrumentation certified (IMO) and calibration records maintained. - Spill kits provided on board vessels for clean-up of any spills to deck and vessel personnel trained in their use. - Waste chemicals and oils from the inspection and maintenance vessels taken directly from the vessel by licensed waste contractors.	LOW
Presence of vessel	Vessel sewage / grey water.	Inappropriate disposal of sewage / grey water (i.e. nutrient rich wastewater, potentially containing pathogens and some domestic chemicals) to the marine environment.	- Very minor, localised, short-term contamination of the marine environment, no impact on marine ecosystems or marine fauna expected. - Very minor, localised, short-term visible pollution / reduction of visual amenity.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Appropriately qualified / trained and experienced vessel personnel. - All contracted vessels and equipment used in operations associated with the offshore pipeline fit for purpose and operated in accordance with regulations and manufacturer specifications. Vessels and equipment compliant with all relevant international, Commonwealth and State legislation, guidelines and conventions (including MARPOL). - TGP audit contractor vessels and marine equipment to ensure that it is fit for purpose and satisfies relevant regulatory, statutory and Contract requirements, including requirements related to waste management. - Works conducted in compliance with standard industry operating procedures. - All sewage and grey water treated and discharged in accordance with MARPOL requirements, i.e. sewage will not be discharged within 3 nm of land, unless the vessel has an IMO approved sewage treatment system certified to meet the operational requirements in Regulation 9.1.1 of MARPOL Annex IV; only treated sewage (macerated to fragment diameters less than 25 mm) will be discharged between 3 and 12 nm of land; untreated sewage may be discharged beyond 12 nm from land. - GPS records to confirm discharges are greater than 3 nm or 12 nm from land, as applicable. - Documented waste management procedures and disposal records (including for sewage).	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
	Solid wastes from vessel.	Uncontrolled or inappropriate disposal of solid wastes (e.g. plastic) from vessel to the marine environment.	- Injury to, or death of, marine fauna through entanglement in, or ingestion of, plastic and other solid wastes. - Very minor, localised visible pollution / reduction of visual amenity.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Appropriately qualified / trained and experienced vessel personnel. - All contracted vessels and equipment used in operations associated with the offshore pipeline fit for purpose and operated in accordance with regulations and manufacturer specifications. Vessels and equipment compliant with all relevant international, Commonwealth and State legislation, guidelines and conventions (including MARPOL). - TGP audit contractor vessels and marine equipment to ensure that it is fit for purpose and satisfies relevant regulatory, statutory and Contract requirements, including requirements related to waste management. - Works conducted in compliance with standard industry operating procedures. - Wastes managed in accordance with an approved Vessel Waste (Garbage) Management Plan prepared in accordance with the requirements of MARPOL Annex V. The Waste Management Plan includes written procedures for minimising, collecting, storing, processing and disposing of waste, including the use of the equipment on board. - No disposal of wastes overboard, except for macerated food waste, which may be disposed of at sea at least 12 nm from the nearest land in line with MARPOL requirements. - Appropriate, clearly labelled waste receptacles of sufficient capacity provided on board vessels to enable effective segregation and storage of wastes. Waste receptacles provided with lids / covers to prevent loss of containment of wastes. - All solid wastes (including non-macerated food wastes) contained on board in appropriate containers for onshore disposal in accordance with the relevant State regulations. - Volumes of all wastes generated recorded and the disposal path tracked in a Vessel Waste (Garbage) Record Book. - Temporary and localised activity along pipeline with no activity of long-term duration at any one location.	LOW
	Vessel operations - engine exhaust emissions.	Increased levels of atmospheric pollution (NO _x , SO _x and particulates) and greenhouse gases.	- Localised reduction in air quality. - Reduced visual amenity (e.g. black smoke and particulates). - Disturbance to shore based fauna (e.g. colonies of seals and seabirds).	- Training and induction for all relevant TGP personnel on relevant environmental issues. - All contracted vessels and equipment used in operations associated with the offshore pipeline fit for purpose and operated in accordance with regulations and manufacturer specifications. - Vessels and equipment compliant with all relevant international, Commonwealth and State legislation, guidelines and conventions (including MARPOL Annex VI). TGP will audit contractor vessels and marine equipment to ensure that it is fit for purpose and satisfies relevant regulatory, statutory and Contract requirements. - Vessels adhere to a planned maintenance system that ensures engines and thrusters are maintained for optimum performance during inspection and maintenance activities. Regular maintenance of vessels ensures fuel efficiency and minimises exhaust emissions, thereby reducing greenhouse gas emissions and air pollution. - Vessels remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Sulphur content of fuel oil used not to exceed 0.50% m/m - Fuel consumption monitored to ensure fuel efficiency. Records kept by vessel contractor.	LOW
Presence of vessel	Storage and use of chemicals onboard vessel.	Loss of containment of chemicals onboard the vessel (maximum total storage 75 L), potentially leading to chemical spill to the marine environment.	- Very minor, localised, short-term contamination of the marine environment, no impact on marine ecosystems or marine fauna expected. - Very minor, localised, short-term visible pollution / reduction of visual amenity.	- Spills contained and recovered, where practical, in accordance with the approved vessel SOPEP/OPEP. - Appropriate spill response equipment, including containment and recovery equipment, available on-board and personnel trained in their use. - Regular spill response exercises will be conducted to test the effectiveness of the approved vessel SOPEP / OPEP. - The maximum volume of liquid chemicals stored on-board vessels will be no greater than 75 L. - Where practicable, contractors will select chemicals with low environmental impact (i.e. lowest toxicity, lowest bioaccumulation potential and highest biodegradability). TGP will review contractor's chemical selection process during vessel audits. - Hydraulic oils, lubricants and chemicals stored and, where practicable, handled within containment facilities, designed in accordance with relevant Australian / international codes and standards, to prevent the release of spilt substances to the marine environment. - Chemicals stored with appropriate segregation, in accordance with the IMDG code, to minimise the potential for reaction of incompatible chemicals. - Training and induction for all relevant TGP personnel (including contractors) on chemical handling, use and storage. - Where possible, vessel activity will avoid peak migratory and breeding seasons which will minimise impacts to marine megafauna in the event that a spill occurs.	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
				- Material Safety Data Sheets (MSDS) obtained when purchasing chemicals and are available on-board vessels for all chemicals stored and handled. MSDS provide important information regarding hazardous properties of the chemical, first aid treatment, spill clean-up instructions and PPE requirements. - All containers compatible with the chemical stored and clearly labelled. Chemical containers securely closed after use. - Waste chemicals are collected and stored in closed containers for onshore disposal. - Securing and restraining of loads on-board the vessel. - Temporary and localised activity along pipeline with no activity of long-term duration at any one location.	
	Vessel movements.	Vessel collision / accident (e.g. grounding during extreme weather event) leading to vessel fuel tank rupture and spill (maximum volume of 40,000 L).	- Contamination of the local marine environment leading to degradation of marine ecosystems and potential toxicity impacts on marine biota (e.g. death, injury). - Disturbance to marine fauna including mammals, birds, reptiles and other organisms (i.e. altered feeding, nursing, mating or migrating behaviour). - Oiling of marine animals and coastlines / Visible pollution / reduction of visual amenity. - Disruption to other marine users such as commercial fishing and recreational users.	- Vessels contracted compliant with all relevant international, Commonwealth and State legislation, guidelines and conventions, including IMO / MARPOL requirements. TGP audits contractor vessels and equipment to ensure it is fit for purpose and satisfies relevant regulatory/statutory/ Contract requirements. - All Vessels have a SOPEP (or equivalent OSCP appropriate to size and class) in accordance with MARPOL 73/78 Annex I (Regulation 37). TGP OPEP also implemented in the event of a vessel fuel spill. - Appropriately qualified / trained and experienced vessel personnel. - Regular spill response exercises conducted to test the effectiveness of the approved SOPEP / Vessel OSCP and TGP OPEP. - Where possible, vessel activity to avoid peak migratory and breeding seasons which will minimise impacts to marine megafauna in the event of spills. - MFO present to visually monitor for marine megafauna (e.g. cetaceans, seals and turtles). In the event of a hydrocarbon spill, the MFO assesses any potential impacts on marine megafauna and, where possible, take appropriate action to minimise potential for fauna to come into contact with the spill. - Appropriate consultation and effective liaison maintained with relevant stakeholders to minimise the risk of accidental collisions and other incidents that may lead to a breach of fuel storage tanks. Daily schedule of location of activities to affected stakeholders and Notice to Mariners issued prior to departure. - Operations to occur only in appropriate weather windows. Maximum distance a vessel working near the pipeline could be from a safe mainland harbour is only 160 km. If weather conditions are predicted to deteriorate, vessels will terminate activities and seek refuge. - Vessels equipped with full complement of navigation equipment, including GPS, navigation lights and continuous radio and radar watch. - Vessels will maintain a 500 m safety zone. Vessels remain along the pipeline route (and within designated route to and from pipeline location). - MSDS available on-board for all fuels used. - Vessels & equipment operated and regularly maintained in accordance with regulations and manufacturer's instructions. Records kept & audited by TGP. - Temporary and localised activity along pipeline with no activity of long-term duration at any one location.	LOW
Presence of vessel	Dropped objects from vessel (including inspection / maintenance equipment).	Physical damage to the seabed.	Disturbance / damage to sensitive benthic marine fauna and ecosystems.	- Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Pipeline route selection to avoid areas of significant benthic habitat. - Vessels equipped with full complement of navigation equipment, including GPS. Navigation charts will be referred to ensure avoidance of reefs and habitats in marine protected areas. - Securing and restraining of loads on-board the vessel to minimise potential for dropped objects.	LOW
ACTIVITY - PIPELINE INSPECTION					
Internal inspection of pipeline	Pigging.	Underwater noise.	Transitory, temporary underwater noise as the pig moves through the pipeline. Marine fauna within the demersal zone expected to use avoidance behaviour / move away	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Adherence to standard operational and maintenance procedures. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Pig runs are on a 10 year cycle and noise emissions within each run are transitory and temporary (next scheduled 2020). - Concrete coating provides buffer from internal noise. - Underwater noise emissions transitory and temporary as the pig moves through the pipeline. - Operations internal to pipe with no external effects expected.	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
ROV / AUV inspection	Use of ROV / AUV equipment / timing and location of activities.	Interaction of ROV / AUV equipment and marine fauna. <i>NOTE – Any underwater noise associated with ROV / AUV operation is considered insignificant when compared to vessel noise (refer above) and, hence, it was not addressed separately.</i>	Disturbance to marine fauna (including altered feeding, nesting, nursing, mating or migrating behaviour).	- Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Where possible, pipeline inspections to avoid peak migratory and breeding seasons which will minimise impacts to marine megafauna in the event of spills. - MFO present to visually monitor for marine megafauna (e.g. cetaceans, seals and turtles). - Works conducted in compliance with standard industry operating procedures (including IMCA R 004). - All ROV / AUV personnel hold valid and appropriate qualifications for their nominated roles and are assessed for competence. The ROV contractor ensures full details of personnel (qualifications, experience, medicals, training, etc.) are available to TGP. - Inspections on 5 year cycle unless other events occur or annual risk assessment requires remedial work to be performed.	LOW
ROV / AUV inspection	Use of ROV / AUV equipment / timing and location of activities.	ROV / AUV equipment dragging along the seabed.	Disturbance / damage to sensitive benthic marine fauna and ecosystems.	- Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Works conducted in compliance with standard industry operating procedures (including IMCA R 004). - All ROV / AUV personnel hold valid and appropriate qualifications for their nominated roles and are assessed for competence. The ROV contractor ensures full details of personnel (qualifications, experience, medicals, training, etc.) are available to TGP. - Pipeline route selection to avoid areas of significant benthic habitat. - Vessels equipped with full complement of navigation equipment, including GPS. Navigation charts will be referred to ensure avoidance of reefs and habitats in marine protected areas. - Position of ROV / AUV above pipeline ensures no disruption to seabed or epibenthos. - Inspections on 5 year cycle unless other events occur or annual risk assessment requires remedial work to be performed.	LOW
			Damage or disturbance to known, or previously unidentified, cultural heritage sites.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - TGP pipeline route was selected to avoid known heritage sites, and no sites of Aboriginal or non-Aboriginal significance (including shipwrecks) were evident along the pipeline route during pre-construction surveys. - Known sites of cultural heritage significance have been recorded in the GIS for reference by contractors prior to any work in the vicinity of such sites. The GIS maintains details of known cultural heritage sites and, where possible, includes not only information to identify the location, but also details regarding the significance and management measures specific to each identified site. - Vessels equipped with full complement of navigation equipment, including GPS, to assist in identifying the location of known cultural heritage sites. - Position of ROV / AUV above pipeline would ensure no disruption to cultural heritage sites on the seabed. - Inspections on 5 year cycle unless other events occur or annual risk assessment requires remedial work to be performed.	LOW
ROV / AUV inspection	Use of ROV / AUV equipment / timing and location of activities.	ROV / AUV equipment dragging behind the vessel.	Disruption to other marine users such as commercial fisheries (including damage to fishing equipment) and recreational users.	- Appropriately qualified / trained and experienced vessel personnel. - Vessels remain along the pipeline route (and within designated route to and from pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Appropriate consultation and effective liaison maintained with relevant stakeholders, which will be recorded in the consultation log. This will include providing a daily schedule of location of activities to affected parties (e.g. commercial fishing operators) and Notice to Mariners issued prior to departure.	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
				- Vessels equipped with full complement of navigation equipment, including GPS, navigation lights and continuous radio and radar watch. - Vessels maintain a 500 m safety zone. - Towed surface inspection equipment visible by flagging. - Inspections on 5 year cycle unless other events occur or annual risk assessment requires remedial work to be performed.	
		Rupture of, or leak from, hydraulic hose on a ROV / AUV (maximum spill volume 100 L).	- Very minor, localised, short-term contamination of the local marine environment, no impact on marine ecosystems or marine fauna expected. - Very minor, localised, short-term visible pollution / reduction of visual amenity.	- Due to the size of the ROV / AUV equipment used, the maximum volume of any potential spill of hydraulic oil will be 100 L. - Hydraulic oils used in ROVs / AUVs are environmentally friendly oils with low toxicity, which will break down rapidly posing minimal threat to the environment. - Any hydraulic oil spills will be contained and recovered, where practical, in accordance with the approved vessel SOPEP/OSCP. - Appropriate spill response equipment, including containment and recovery equipment, available on-board and personnel trained in their use. - Regular spill response exercises will be conducted to test the effectiveness of the approved vessel SOPEP / OSCP. - Works conducted in compliance with standard industry operating procedures (including IMCA R 004). - Inspections on 5 year cycle (FY2018) unless other events occur or annual risk assessment requires remedial work to be performed. - All ROV / AUV personnel hold valid and appropriate qualifications for their nominated roles and are assessed for competence. The ROV contractor ensures full details of personnel (qualifications, experience, medicals, training, etc.) are available to TGP - Where possible, pipeline inspections will avoid peak migratory and breeding seasons which will minimise impacts to marine megafauna in the event that a spill occurs. - MSDS available on-board vessels for all chemicals stored and handled. MSDS provide important information regarding hazardous properties of the chemical, spill clean-up instructions and PPE requirements. - Equipment will be operated and regularly maintained in accordance with regulations and manufacturer's instructions. Records are kept and audited by TGP.	
Use of SSS for subsea pipeline surveys	Operation of SSS equipment.	Underwater noise.	- Potential injury to marine megafauna. - Disturbance to marine fauna (including altered feeding, nesting, nursing, mating or migrating behaviour).	- All contracted vessels & equipment used to be fit for purpose and operated in accordance with regulations and manufacturer specifications. Vessels & equipment also compliant with all relevant international, Commonwealth / State legislation, guidelines & conventions. - All equipment will be inspected and operational prior to commencing work and serviced in accordance with manufacturer specifications. TGP will audit contractor vessels and marine equipment to ensure that it is fit for purpose and satisfies relevant regulatory, statutory and Contract requirements - Appropriately qualified / trained and experienced vessel personnel. Vessel Masters shall be trained in appropriate vessel stand-off distances and other vessel-marine megafauna interaction management requirements. TGP to ensure appropriate training has been provided during vessel audits. - Peak migration and breeding seasons will be avoided where possible. - MFO present during inspection and maintenance activities to visually monitor for marine megafauna (e.g. cetaceans, seals and turtles). Any unintended marine megafauna encounters will be managed in accordance with EPBC Policy Statement 2.1 and Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000. - Vessels to remain along the pipeline route (and within designated route to and from the pipeline location). - Temporary and localised activity along pipeline with no activity of long-term duration at any one location. - Where required (although unlikely for the SSS equipment used), soft-start procedures will be implemented. - Inspections on a 2 to 5 year cycle (FY2018) unless other events occur or annual risk assessment requires remedial work to be performed. - No acoustic surveys undertaken where whales are observed breeding, calving, resting or feeding (as identified by MFO). - Discharge of acoustic services exceeding 140dB are not to commence unless no whales are found within a minimum distance of 3 km of the survey vessel. - Start-up procedures will be delayed if whales are encountered within the 3km radius until they are observed to be travelling beyond this zone	LOW

Environmental Aspect	Source of risk	Environmental risk	Potential environmental impacts	Controls & Mitigation Measures	Residual risk
				- Vessels will not travel within 100m of a seal colony if pupping season or within 50m of a seal colony at other times of year. - Avoidance of acoustic activity in close range of seals as a precautionary measure.	
ACTIVITY - PIPELINE MAINTENANCE					
Correction of spans outside specification	Jetting to remove high points.	- Physical damage to the seabed. - Increased turbidity from jetting process.	Disturbance / damage to benthic marine communities.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Compliance with standard industry operating procedures. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Pipeline route selection has minimised potential for span correction. - Pipeline route selection to avoid areas of significant benthic habitat. - Temporary and localised activity along pipeline with no activity of long-term duration at any one location (span correction only required in the event inspection identifies a problem).	LOW
		Underwater noise.	Any underwater noise associated with the jetting operation is considered insignificant when compared to vessel noise (<i>refer above</i>) and, hence, it was not addressed separately.		
	Placement and filling of grout bags.	Physical damage to the seabed.	Disturbance / damage to benthic marine communities.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Compliance with standard industry operating procedures. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Pipeline route selection has minimised potential for span correction. - Pipeline route selection to avoid areas of significant benthic habitat. - Disturbance highly localised and temporary. - Continuous monitoring of grouting operation by ROV, any loss of grout during filling of bags will be easily identified and rectified. - Shut off valves within grout pump system. - Due to its chemical properties, infrequent use and small volumes used, grout used in pipeline maintenance is not expected to have any adverse impacts on the marine environment.	LOW
Underwater noise.					
Repair of concrete coating	Placement of concrete mattress over damaged area.	Physical damage to the seabed.	Disturbance / damage to benthic marine communities.	- Training and induction for all relevant TGP personnel on relevant environmental issues. - Compliance with standard industry operating procedures. - Installation in accordance with IMCA Concrete Mattress guidelines. - Adherence to all relevant international, national and state legislation, guidelines and conventions. - Concrete considered environmentally benign. - Final placement is assisted by the use of ROVs and/or divers to minimise damage and ensure correct positioning. - Disturbance highly localised and temporary. - Continuous monitoring of operation by ROV.	LOW
Removal of dropped objects	Environmental impacts and risks associated with removal of dropped objects are no different from those related to use of vessels and ROV / AUV equipment assessed above. In the ROV and SSS surveys conducted to date, the objects observed on or near the pipeline has not warranted any removal activity as they were considered small and harmless to the integrity of the pipeline. Dropped objects are prioritised along with spanning issues in any inspection surveys.				
Replacement of anodes	Environmental impacts and risks associated with replacement of anodes are no different from those related to use of vessels and ROV / AUV equipment assessed above. Existing CP anodes are currently depleting in line with the original design established for TGP. Eventual anode replacement will need to be considered in the 2030s.				