Environment Plan Summary

BassGas Offshore Operations

Revision	Date	Reason for issue	Originator	Reviewer/s	Approver
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Review frequency	Revision frequency
Not required	Not required

THE THREE WHATS
What can go wrong?
What could cause it to go wrong?
What can I do to prevent it?

Document Information and History

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Abbreviations

Acronym	Definition
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
AMSA JRCC	Australian Maritime Safety Authority Joint Rescue Coordination Centre
ANZECC	Australian and New Zealand Environment and Conservation Council
APIA	Australian Pipeline Industry Association
APPEA	Australian Petroleum Production and Exploration Association
Bar(g)	Gauge pressure
BIA	Biologically important areas
BOD	Basis of Design
CAMBA	China-Australia Migratory Bird Agreement
CCPS	Critical Control Performance Standard
CCR	Central Control Room
CEFAS	Centre for Environment, Fisheries and Aquaculture Science

CERI	Collaborative Environmental Research Initiative
CFT	Critical Function Testing
CMMS	Computerised Maintenance Management System
CMR	Commonwealth Marine Reserve
CMT	Crisis Management Team
CO_2	Carbon dioxide
CoEP	Code of Environmental Practice
Cth	Commonwealth
CVI	Close Visual Inspection
DAWE	Department of Agriculture, Water and the Environment (Cth)
DC	Direct current
DCS	Distributed Control System
DJPR	Department of, Jobs, Precincts and Regions (Vic)
DELWP	Department of Environment, Land, Water and Planning (Vic)
DN	Nominal diameter
DNV	Det Norske Veritas
DoEE	Department of the Environment and Energy (Cth) (former)
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
EIS	Environmental Impact Statement
EMAC	Eastern Maar Aboriginal Corporation
EMBA	Environment that May Be Affected
EMT	Emergency Management Team
EP	Environment Plan
EPA	Environmental Protection Authority (Vic)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EPIRB	Emergency Position Indicating Radio Beacon
EPO	Environmental Performance Objectives
EPS	Environmental Performance Standard
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
ESD	Emergency Shutdown
ESDV	Emergency Shutdown Valve
FFG Act	Flora and Fauna Guarantee Act 1988 (Vic)
HSE	Health Safety and Environment
HSEMS	Health, Safety and Environment Management System
IAP	Incident Action Plan
IBC	Intermediate Bulk Container

ICS	Integrated Control System
IMCRA	Interim Marine and Coastal Regionalisation for Australia
IMO	International Maritime Organisation
ISO	International Standards Organisation
ISPP	International Sewage Pollution Prevention
JAMBA	Japan-Australia Migratory Bird Agreement
JSA	Job Safety Analysis
KEF	Key Ecological Features
KPI	Key Performance Indicator
LLGP	Lang Lang Gas Plant
LoC	Loss of Containment
LoWC	Loss of Well Control
LPG	Liquefied Petroleum Gas
MAOP	Maximum Allowable Operating Pressure
MARPOL	IMO International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
MEG	Mono-Ethylene Glycol
MMO	Marine Mammal Observer
MMSCFD	Million Standard Cubic Feet per Day
MNP	Marine National Park
MOC	Management of Change
MODU	Mobile Offshore Drilling Unit
MOV	Manual Operated Valve
MP	Marine Park
MSDS	Material Safety Data Sheet
NC	No contact
NNTT	National Native Title Tribunal
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administration
NP	National Park
OCNS	Offshore Chemical Notification Scheme
OIW	Oil In Water
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) & 2009 (Vic)
OPGGS(E)	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth)
OPGGS Regulations	Offshore Petroleum and Greenhouse Gas Storage Regulations 2011 (Vic)
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oslo and Paris Commission
OSRA	Oil Spill Response Atlas

OSTM	Oil Spill Trajectory Modelling
OWR	Oiled Wildlife Response
PA/GA	Public Address and General Alarm
PCM	Pipeline Corrosion Monitoring
PCS	Process Control System
PFW	Produced Formation Water
PIC	Person In Charge
PL	Pipeline licence
PMP	Primary Muster Point
PMS	Planned Maintenance System
PMST	Protected Matters Search Tool
PMV	Production Master Valve
PPE	Personal Protective Equipment
PPL	Petroleum Production Licence
PTS	Permanent Threshold Shift
PTW	Permit To Work
PSV	Pressure Safety Valve
PWV	Production Wing Valve
RBI	Risk Based Inspection
RESDV	Riser Emergency Shutdown Valve
RGP	Raw Gas Pipe
RO	Reverse Osmosis
ROKAMBA	Republic of Korea–Australia Migratory Birds Agreement
ROV	Remote/ly Operated Vehicle
RWP	Relief Well Plan
RWT	Rhodamine WT
SCM	Subsea Control Module
SCSSV	Surface Controlled Subsurface Safety Valve
SDU	Subsea Distribution Unit
SEL	Sound Exposure Level
SEMR	South-East Commonwealth Marine Region
SESSF	Southern and Eastern Scalefish and Shark Fishery
SHX	Subsea Heat Exchanger
SITHP	Shut-in Tubing Head Pressure
SIS	Safety Instrumented System
SMC	Subsea Manifold Cooler
SMPEP	Shipboard Marine Pollution Emergency Plan
SOPEP	Shipboard Oil Pollution Emergency Plan

SPCU	Subsea Power and Control Unit
SPL	Sound Pressure Level
SPRAT	Species Profile and Threats (database)
SQG	Sediment Quality Guidelines
SSSV	Sub-Surface Safety Valve
SST	Sea Surface Temperature
SVS	Subsea Valve Skid
TEMPSC	Totally Enclosed Motor Propelled Survival Craft
TOLC	Top of Line Corrosion
TPC	Third Party Contractor
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TTS	Temporary Threshold Shift
TUTU	Topside Umbilical Termination Unit
UHF	Ultra-High Frequency
UTA	Umbilical Termination Assembly
VBA	Victorian Biodiversity Atlas
VCS	Vertical Connection System
VHF	Very High Frequency
Vic	Victoria
VoO	Vessel/s Of Opportunity
WIMP	Well Integrity Management Plan
WOMP	Well Operations Management Plan
WRSSV	Wireline Retrievable Subsurface Safety Valve
XT	Christmas Tree

Units of Measurement

Abbreviation	**Definition**
’	Foot/Feet
”	Inch(es)
°C	Degrees Celsius
bbl	Barrel
cui	Cubic Inches
dB	Decibel(s)
g	Gram/s
ha	Hectare/s
hr	Hour/s

kJ	Kilojoule(s)
km	Kilometre
km/hr	Kilometres per hour
kPa	Kilopascal(s)
kPaG	Kilopascal(s) – guage pressure
L	Litre(s)
m	Metre(s)
m^2	Square metres
m^3	Cubic metres
mL	Millilitre(s)
MM	Million
MMbbl	Million barrels
MMscf	Million Standard Cubic Feet
nm	Nautical Mile(s)
ppb	Parts per billion
ppm	Parts per million
s	Second(s)
scf	Standard Cubic Foot/Feet
t	Tonne(s)
TJ	Terajoule(s)
V	Volt(s)
µg	Microgram(s)

1. Introduction

1.1 Project Summary

Beach Energy (Operations) Ltd (Beach) is the Operator of the BassGas Development. The BassGas Development consists of gas and liquids produced from the Yolla gas field, located 147 km south of Kilcunda (Victoria) in Bass Strait (Figure 1-1), that are transported via a subsea pipeline to the Victorian mainland via a coastal crossing near Kilcunda.

1.2 Definition of the Activity

In accordance with the Victorian Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Regulations 2021 (herein referred to as the OPGGS Regulations) Regulation 6, the petroleum activity is defined as the:

> *operations or works in an offshore area undertaken for the purpose of—*
>
> *(a) exercising a right conferred on a petroleum titleholder under the Act by a petroleum title; or*
>
> *(b) discharging an obligation imposed on a petroleum titleholder by the Act or a legislative instrument under the Act;*

For the purposes of this activity, Beach defines the activity in Victorian waters as:

> *Operation and maintenance activities related to the flow of gas and condensate through the pipeline in state waters (licence Vic/PL34(V)).*

This Summary Environment Plan (EP) does not describe activities beyond those related to the Victorian portion of the pipeline.

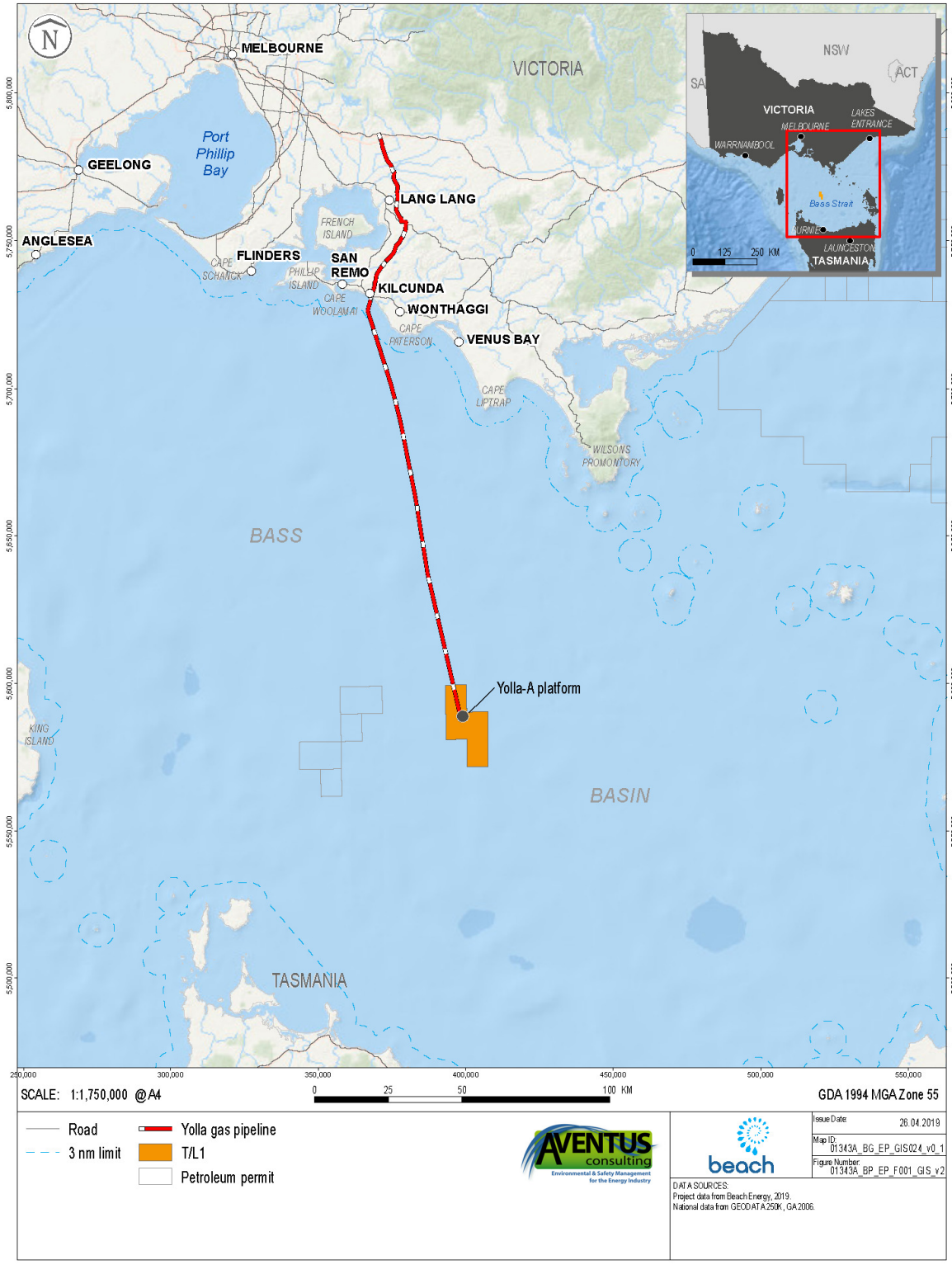


Figure 1-1. BassGas location map

1.3 The Titleholder

Beach is the Titleholder and Operator of the development on behalf of several joint venture partners:

- Beach Energy (Operations) Limited (ABN 66 007 845 338) – 37.5% (Operator);
- Beach Energy (Bass Gas) Limited (ABN 40 009 475 325) – 5.0%;
- Beach Energy Limited (ABN 20 007 617 969) – 11.25%;
- AWE Petroleum Pty Ltd (ABN 52 009 440 975) – 22.5%;
- AWE (BassGas) Pty Ltd (ABN 81 124 779 068) – 12.5%; and
- Prize Petroleum International Pte Ltd (ABN 16 601 684 048) – 11.25%.

Beach was formed in 1961 and is an Australian Stock Exchange-listed oil and gas, exploration and production company headquartered in Adelaide, South Australia. It has operated and non-operated onshore and offshore oil and gas production from five petroleum basins across Australia and New Zealand and is a key supplier to the Australian east coast gas market. Beach's asset portfolio includes ownership interests in strategic oil and gas infrastructure, as well as a suite of high potential exploration prospects. Beach's gas exploration and production portfolio includes acreage in the Otway, Bass, Cooper/Eromanga, Perth, Browse and Bonaparte basins in Australia, as well as the Taranaki and Canterbury basins in New Zealand.

The Titleholder for this activity is:

Beach Energy (Operations) Ltd (ACN 007 845 338)
Level 8, 80 Flinders Street, Adelaide, South Australia, 5000
Phone: 08-8338 2833
Email: info@beachenergy.com.au

The nominated liaison person for this Summary EP is:

Philip Wemyss
Beach Principal Environment Advisor
Level 8, 80 Flinders Street, Adelaide, South Australia, 5000
Phone: 08-8338 2833
Email: info@beachenergy.com.au

1.4 Objectives of this Summary EP

This Summary EP is prepared for submission to DEDJTR in accordance with the Victorian OPGGS Regulations division 2 (13E). The EP was accepted by NOPSEMA on the 23rd of December 2020 and by the Victorian Department of Jobs, Precincts and Regions (DJPR) Earth Resources Regulations (ERR) on the 12th of September 2022.

This Summary EP summarises the full EP, which is available on the National Offshore Petroleum Safety and Environmental Management (NOPSEMA) website.

2. Environmental Regulatory Framework

This Summary EP is only concerned with the activities occurring within state waters. In accordance with Regulation 15(3)(a) of the OPGGS Regulations, this chapter describes the legislative requirements that apply to the activities described in this summary EP.

2.1 Beach Environment Policy

In accordance with Regulation 19(a) of the OPGGS Regulations, Beach's Environment Policy is provided in Figure 2-1. The policy provides a public statement of the company's commitment to minimise adverse effects on the environment and to improve environmental performance.

2.2 Legislative Framework

Because the activity occurs in Victorian waters, this Summary EP has been prepared in accordance with Part 2.2 of the OPGGS Regulations. DJPR is the designated regulator for petroleum activities in Victorian State waters (from the high-water mark to 3 nm from land).

Figure 2-2 provides a simplified representation of the jurisdictions for the BassGas Development. This Summary EP will be focusing on the Victorian portion of the pipeline, within licence Vic/PL34(V), which covers the area from the low water mark to 38° 37′ 09″ S and 145° 27′ 48″ E (Victorian 3 nm limit). This portion of the activity falls within the OPPGS Victorian regulations.

Environment Policy

Objective

Beach is committed to conducting operations in an environmentally responsible and sustainable manner.

Strategy

To achieve this, Beach will:

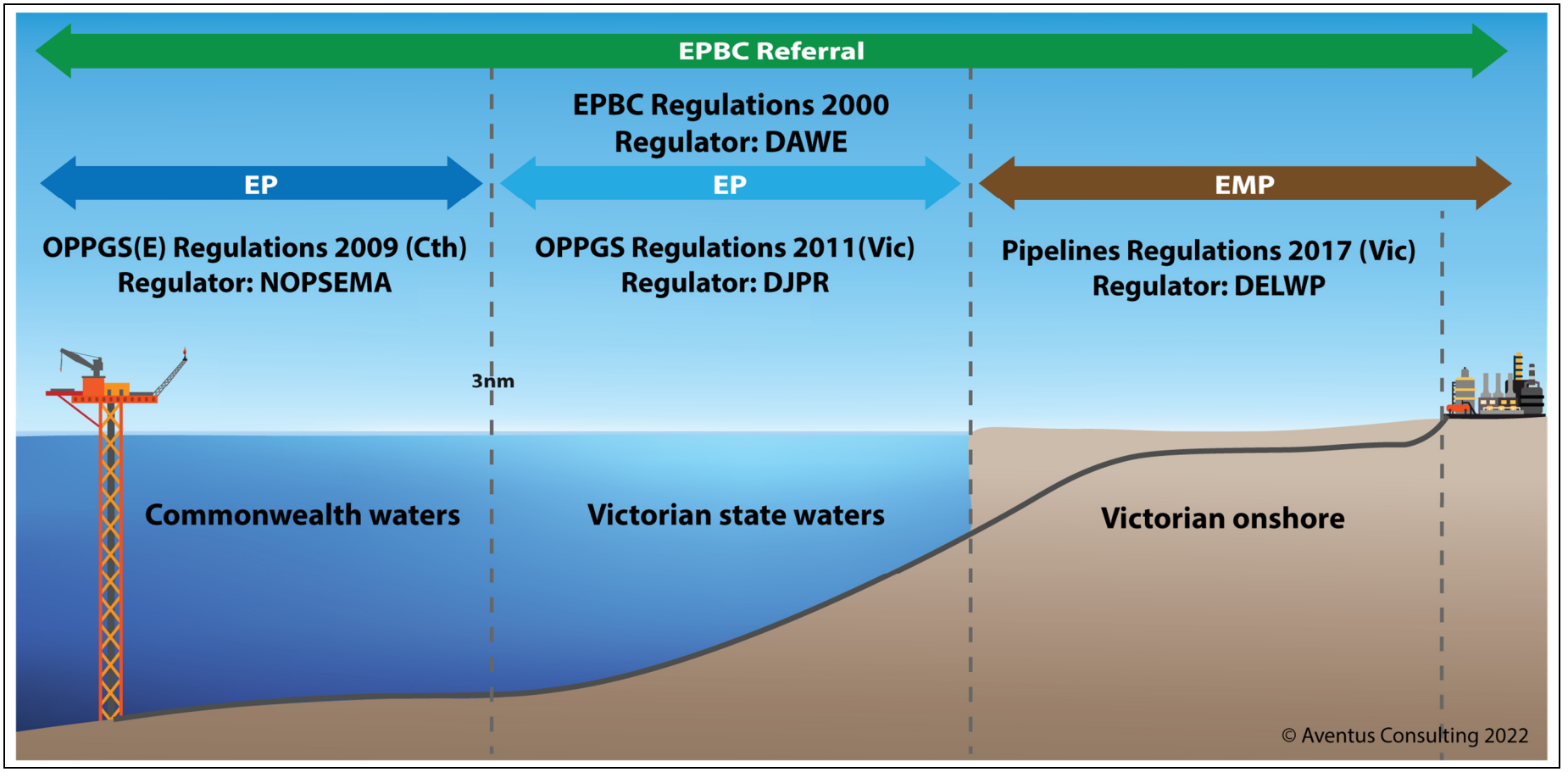
- Comply with relevant environmental laws, regulations, and the Beach Health, Safety and Environment Management System which is the method by which Beach identifies and manages environmental risk.
- Establish environmental objectives and targets, and implement programs to achieve them that will support continuous improvement;
- Identify, assess and control environmental impacts of our operations by proactive management of activities and mitigation of impacts;
- Ensure that incidents, near misses, concerns and complaints are reported, investigated and lessons learnt are implemented;
- Inform all employees and contractors of their environmental responsibilities including consultation and distribution of appropriate environmental management guidelines, regulations and publications for all relevant activities;
- Efficiently use natural resources and energy, and engage with stakeholders on environmental issues; and
- Publicly report on our environmental performance.

Application

This policy applies to all personnel associated with Beach activities.

Matt Kay
Managing Director and CEO
December 2019

Figure 2-1. Beach Environmental Policy



* *Note: The EPBC Referral was relevant to the original development application and does not apply to ongoing operations.*

Figure 2-2. Simplified outline of the regulatory jurisdictions of the BassGas Development

2.2.1 Victorian Legislation

Victorian legislation and regulations relevant to the environmental management of the activity are listed below, with detail to the most pertinent legislation and regulations provided below.

- *Offshore Petroleum and Greenhouse Gas Storage Act 2010 (& Regulations 2021)*
- *Emergency Management Act 2013 (& Regulations)*
- *Flora and Fauna Guarantee Act 1988 (FFG Act) (& Regulations 2020)*
- *Seafood Safety Act 2003 (& Regulations 2014)*
- *Environment Protection Act 1970 (& various regulations)*
- *Pollution of Waters by Oil and Noxious Substances Act 1986 (POWBONS Act) (& Regulations 2022)*
- *National Parks Act 1975*
- *Wildlife Act 1975 Wildlife (Marine Mammals) Regulations 2019*
- *Marine (Drug, Alcohol and Pollution Control) Act* 1988 (& Regulations 2012)
- *Heritage Act* 1995 (& Heritage (Historical Shipwrecks) Regulations 2017)

Offshore Petroleum and Greenhouse Gas Storage Regulations 2021

The OPGGS Act 2010 (and associated OPGGS Regulations 2021) is the key legislation regulating petroleum activities in Victorian state waters and mandates that environmental considerations should be integrated into decision-making with regard to the administration of the Act. In this regard, an EP must be prepared and submitted to the Regulator for assessment and acceptance.

This Act and its Regulations (Chapter 2 – Environment) essentially mirror those of the Commonwealth Act and Regulations of the same name, however, have not been modified to align with most recent revisions of the Commonwealth Act and regulations (streamlining amendments made in 2014 and transparency amendments made in 2019) and hence variations between jurisdictions exist.

3. Activity Description

3.1 Facilities Outline

The offshore portion of the BassGas Development consists of the following:

- Yolla-A Platform - a normally manned platform located in 80 m water depth with wellheads and topside gas and condensate processing facilities. It is located in Production Licence T/L1, approximately 93 km southwest of Wilson's Promontory in Victoria and 109 km northwest of the Tasmanian mainland.
- Offshore raw gas pipeline (RGP) – a 350 mm diameter pipeline consisting of a 147 km subsea section from the Yolla-A Platform and a 1.4 km underground shore crossing section near Kilcunda. The term 'offshore RGP' may be used interchangeably with the simpler term 'pipeline'.

The offshore pipeline that was installed in 2003 within Victorian state waters is the focus of this summary EP (descriptions of the Yolla-A platform are excluded). Additionally, there are onshore components of the BassGass development which are outside of the scope of this summary EP. Gas production commenced in 2006.

The complete EP can be viewed on the website of the National Offshore Petroleum Safety and Environmental Management (NOPSEMA) website.

3.2 Offshore Raw Gas Pipeline

The 350 mm offshore RGP that exports dehydrated gas and condensate from the Yolla-A platform to the Lang Lang Gas Plant (LLGP) has three sections:

1. An offshore export riser and subsea section that runs approximately 147 km along the seabed in a direct route to landfall near the township of Kilcunda on the Victorian coastline.

2. A shore crossing consisting of a horizontal directionally drilled (HDD) buried pipeline approximately 1.4 km in length that passes under the surf zone, beach and coastal dunes.

3. The buried onshore pipeline, which is 32.4 km in length and terminates at the LLGP (outside the scope of this EP).

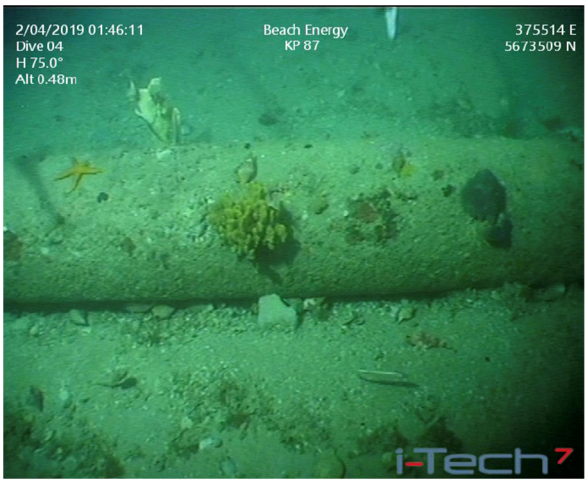
The offshore RGP rests on the seabed (i.e., it is not trenched) and is stabilised by concrete weight coating along its entire length (Plate 1.).

The riser, submerged RGP and shore crossing have a protective coating. Aluminium/zinc bracelet type sacrificial anodes are installed along the length of the pipeline on the seabed and on the riser to provide external corrosion protection in case of coating damage. The shore crossing section of pipeline is protected by an impressed current cathodic protection system. Internal pipeline corrosion is controlled by separation and dehydration of the well fluids and the continuous injection of corrosion inhibitor into the pipeline from the platform. The pipeline has a single main line valve (MLV) station situated onshore near the shore crossing at Kilcunda. The valve station is located north of the Bass Highway and is a buried installation within a small unobtrusive compound located on private property.

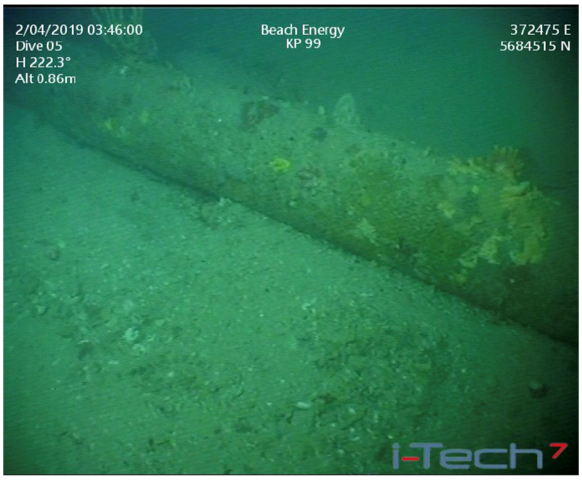
The offshore pipeline maximum allowable operating pressure (MAOP) is 14,100 kPag @ 80°C.

In the event of a pipeline leak, a drop in pressure will be identified at either the LLGP or at the Yolla-A platform. The design life of the RGP is 25 years. The life expectancy of the pipeline remains at 25 years from original construction date (2006), meaning end of pipeline design life is 2031. The offshore RGP is maintained and cleaned using pigging facilities.

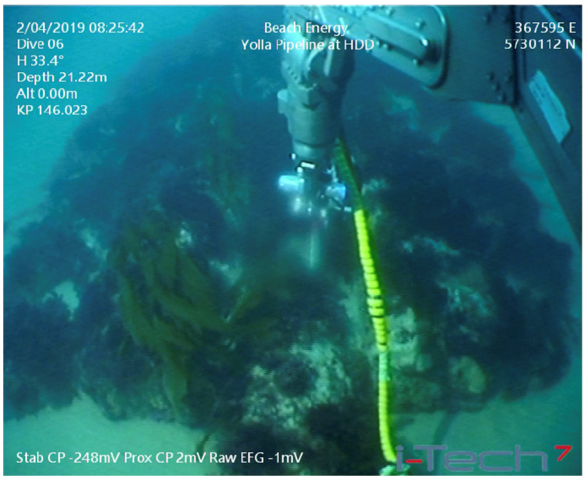
Kilometre point (KP) 87, view from the east



KP 87, view from the west



KP 99, view from east



Shore crossing point where the pipeline enters the stabilisation mattress, view from the south

Plate 1. Images of various sections of the offshore RGP from the 2019 subsea inspection campaign

3.3 Pipeline Geophysical Surveys

Geophysical surveys along the offshore RGP are required infrequently to determine its precise location, especially as large sections of the pipeline have become buried by seabed sediments over time. This allows pipeline engineers to determine any integrity issues. Such surveys involve using a small vessel (typically a fishing vessel) and generally only take up to a few days (depending on sea state conditions). One or all of the following geophysical techniques listed below may be used (generally in combination), and a simple pictorial representation of these techniques is presented in Figure 3-1.

- Single-beam echo sounder
- Multi-beam echo sounder
- Side scan sonar
- Sub-bottom profiler

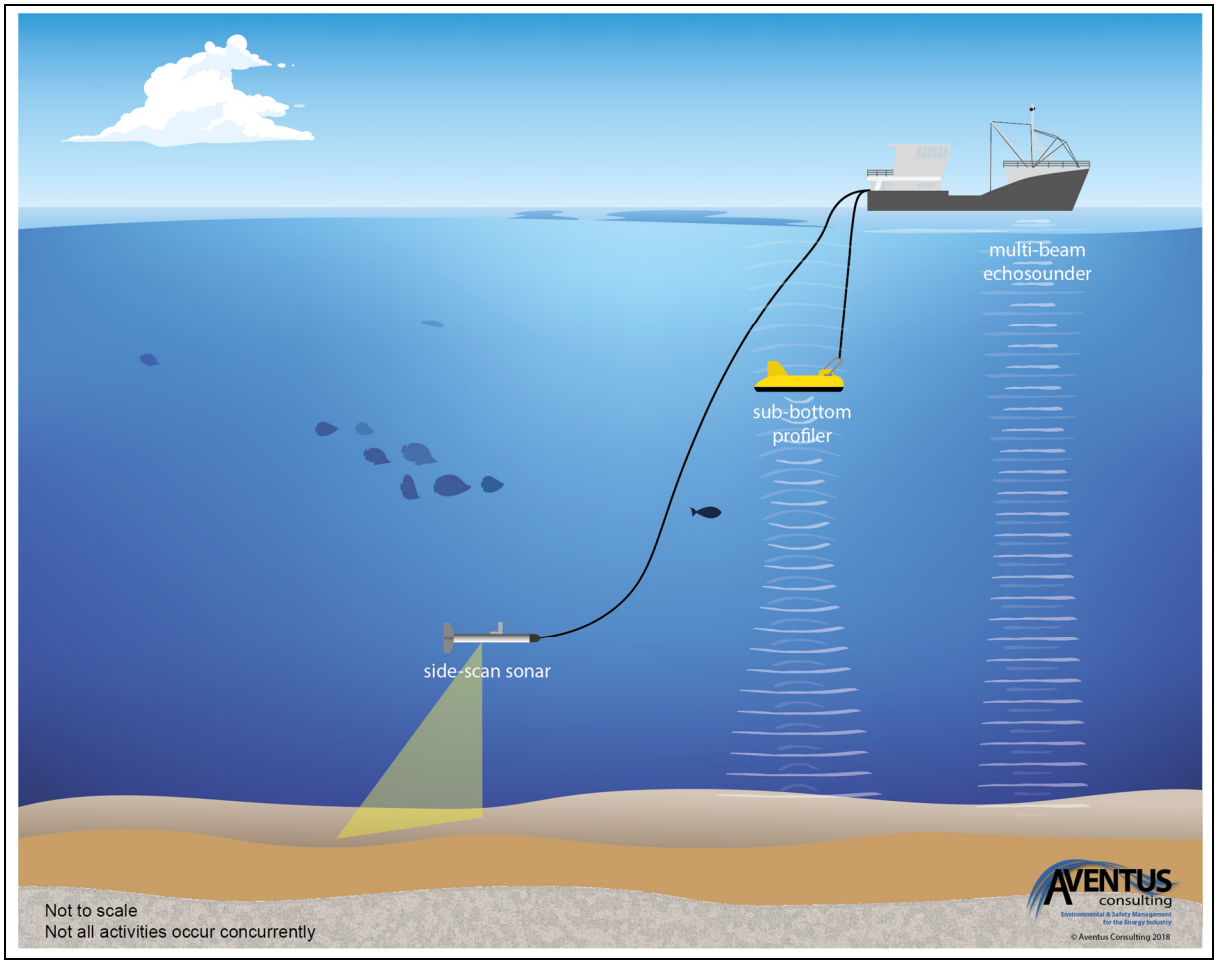


Figure 3-1. Simplified representation of pipeline geophysical survey techniques

4. Stakeholder Consultation

In keeping with Beach's Community and Stakeholder Engagement Policy (Figure 4-1Figure 4-1) and APPEA's Principles of Conduct, Beach is committed to open, ongoing and effective engagement with the communities in which it operates and providing information that is clear, relevant and easily understandable. Beach welcomes feedback and is continuously endeavouring to learn from experience in order to manage its environmental and social impacts and risks. Stakeholder consultation is required under the OPGGS Regulations.

Beach (and its predecessor Origin) has been undertaking regular stakeholder consultation prior to, during and since the initial construction of the offshore assets commenced in 2004. Beach has identified and consulted with relevant persons whose functions, interests or activities may be affected by the activities carried out under the EP, as well as those who Beach deems necessary to keep up to date with the activities in Bass Strait. Table 4-1 identifies these relevant persons.

4.1 Engagement methodology

The tools and methods that have been and will continue to be used for stakeholder engagement are:

- Project Information Sheet;
- One-on-one briefings (where stakeholders have expressed concerns);
- The BassGas Environmental Liaison Group (ELG) (meetings conducted every six-months, primarily targets the onshore components of the project for the neighbours of the LLGP);
- Project hotline (1800 979 01) and dedicated project email (community@beachenergy.com.au); and
- Company website.

4.2 Summary of Stakeholder Consultation

There are no key themes and outcomes resulting from stakeholder consultation. Given that consultation relates to the ongoing operation of an existing asset that has been operating for 16 years, relevant stakeholders have not expressed any concerns about the overlap between their functions, activities or interests and the continued operation of the BassGas Development. Beach will continue consulting with relevant persons regarding the BassGas offshore operations at appropriate times, taking into consideration Beach's desire to minimise 'consultation fatigue' that many stakeholders have expressed.

A summary of stakeholder consultation can be viewed within Section 4.7 of the complete EP available on the NOPSEMA website.

Community and Stakeholder Engagement Policy

1. Policy Introduction

This policy outlines Beach's commitment to engage with its stakeholders to ensure that it develops positive relationships with communities within which it operates. This policy applies in all joint venture operations where Beach is the operator. This policy should be read together with other policies including the Aboriginal Engagement Policy and the Environmental Policy.

2. Scope

This policy applies to all Beach's directors, officers and employees.

3. Position statement

Beach is committed to open and transparent communication with its stakeholders and recognises that its business success is contingent upon building respectful and mutually beneficial relationships while effectively managing its operations. Beach will take the time to listen, understand, give due consideration and respond to the interests and concerns of its stakeholder groups. Beach's aim is to be seen as the operator of choice for its stakeholders, and that its presence in the community is welcomed as a positive experience.

Stakeholders include, but are not limited to, landholders, Aboriginal communities, communities in which Beach operates, interest groups and government.

4. Policy commitment

Beach is committed to:

- Acknowledging that local communities are stakeholders in all operations, that there will be access to reliable and timely information about exploration and development activities and transparent, sincere and respectful consultation with them prior to, during and after operations.
- Clearly communicating the goals and parameters for stakeholder engagement.
- Understanding the social, environmental and economic effects of Beach's activities while delivering business outcomes.
- Seeking to understand stakeholder values, interests and concerns with relevant business operations and in a timely manner address these and deliver on any agreed support or commitments.
- Ensuring its employees and contractors are aware of their obligations toward the protection of local community culture and relationships and the environment.
- Contributing to the community by local employment and engagement of local contractors and suppliers where appropriate and possible.
- Participating in community events where appropriate; and
- Communicating frequently and effectively through a number of means including public meetings, stakeholder forums, its website, annual report, road shows and one-on-one meetings.

Figure 4-1. Beach's Community and Stakeholder Engagement Policy

Table 4-1. Stakeholders consulted for the BassGas operations EP

Category 1 – Department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant	
Australian Maritime Safety Authority (AMSA)	Department of Defence (DoD)
Civil Aviation Safety Authority (CASA)	Australian Fisheries Management Authority (AFMA)
Department of Industry, Innovation and Science (DIIS)	Australian Hydrographic Service (AHS)
Department of Agriculture, Water and the Environment (DAWE)	Australian Communications Management Authority (ACMA)
National Native Title Tribunal (NNTT)	Department of Agriculture and Water Resources (DAWR)
Australian Energy Market Operator (AEMO)	Director of National Parks
Category 2 – Each Department or agency of a State to which the activities to be carried out under the EP may be relevant	
Victoria	
Department of Jobs, Precincts and Regions (DJPR): - Earth Resources Regulation (ERR) - Victorian Gas Program (VGP)	Department of Environment, Water, Land and Planning (DEWLP): - Marine Heritage Branch - Planning Approvals
Department of Transport (DoT) – Emergency Management Branch	Victorian Fisheries Association (VFA)
Environment Protection Authority (EPA) Victoria	Aboriginal Victoria (AV)
Transport Safety Victoria (TSV) (Maritime Safety)	Tourism Victoria
Parks Victoria	Energy and Water Ombudsman Victoria
Essential Services Commission Victoria	
Tasmania	
Tasmanian Parks and Wildlife Service (TPWS)	Department of Primary Industries, Parks, Water and Environment (DPIPWE)
New South Wales	
Port Authority of NSW	Transport for NSW
Category 3 – The Department of the responsible State Minister	
Office of the Victorian Premier	Office of the Minister for Agriculture, Regional Development
Office of the Minister for Resources	Office of the Minister for Energy, Environment and Climate Change
Category 4 – A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP	
Fisheries - Commonwealth	
AFMA - Bass Strait Central Zone Scallop Fishery Manager	AFMA - Southern Jig Squid Fishery Manager
AFMA - Eastern Tuna and Billfish Fishery	AFMA - Small Pelagic Fishery Manager
Southern Shark Industry Alliance	Southern Bluefin Tuna Industry Association

Sustainable Shark Fishing Inc	South Australian Rock Lobster Advisory Council (SARLAC) & South Eastern Professional Fisherman Association (SEPFA)
South-east Trawl Fishing Industry Association (SETFIA)	Commonwealth Fisheries Association (CFA)
Fishwell Consulting	National Seafood Industry Alliance
Fisheries - Victorian	
Seafood Industry Victoria (SIV)	Victorian Rock Lobster Association (VRLA)
Victorian Scallop Association	Abalone Victoria Central Zone
Total Marine Gippsland	VR Fish
Corporate Alliance Enterprises T/A Total Marine Gippsland	Portland Professional Fisherman's Association
Fisheries – Tasmanian	
Tasmanian Association for Recreational Fishing	Tasmanian Rock Lobster Fisherman's Association
Tasmanian Commercial Divers Association	Tasmanian Seafood Industry Council (TSIC)
Tasmanian Abalone Council Limited	Southern Rock Lobster Limited (SRL) (SA, VIC, TAS).
Infrastructure asset owners	
Alcatel Submarine Networks UK LTD	Watersure (Victorian Desalination Plant)
Nearby titleholders	
Cooper Energy Ltd	CarbonNet Project
Esso Australia Resources Pty Ltd	
Native title and cultural heritage significance	
Gunaikurnai Land and Waters Aboriginal Corporation	Bunurong Land Council Aboriginal Corporation
Flinders Island Aboriginal Association	First Nations Legal & Research Services Ltd
Conservation groups	
Institute for Marine and Antarctic Studies (IMAS)	Bass Coast Landcare Network
Three Creeks Landcare	Cape Woolamai Coast Action
Phillip Island Conservation Society	Victorian National Parks Association (VNPA)
Blue Whale Study Inc	South Gippsland Conservation Society
International Fund for Animal Welfare (Australia)	Deakin University
Other organisations	
Destination Phillip Island Regional Tourism Board	SCUBA Divers Federation of Victoria
Phillip Island Business & Tourism Association	Australian Petroleum Production and Exploration Association (APPEA)
Ocean Racing Club of Victoria	
Category 5 – Any other person or organisation that the Titleholder considered relevant	
Flinders Council (Tas)	Mornington Peninsula Shire Council (Vic)
Bass Coast Shire Council (Vic)	South Gippsland Shire Council (Vic)

Near neighbour (pipeline shore crossing)	Member for Bass (Vic)
Mineral Resources Tasmania	EPA Tasmania
Office of the Minister for Energy and Environment (Cth)	

5. Existing Environment

In accordance with the OPGGS Regulation 15(2), the 'environment that may be affected' (EMBA) by the activity is described in this section, together with its values and sensitivities. The EMBA has been established through hydrocarbon spill modelling. The EMBA of this activity extends from the pipeline location within state waters of Kilcunda, this is due to the EMBA being a combination of marine diesel oil (MDO) spill (from a supply vessel) and loss of containment of gas condensate at both a Yolla-A location as well as an subsea pipeline rupture.

The hydrocarbon spill EMBA ('spill EMBA' for simplicity) (Figure 5-1Figure 5-1) is therefore defined as:

> *The amalgamation of the extent of low level hydrocarbon exposure to the sea surface (1 g/m^2), entrained in the water column (10 ppb), dissolved in the water column (10 ppb), and contact to shorelines (10 g/m^2) as a result of a 204,250 bbl subsea release of gas condensate at the Yolla-A location (over 86 days), loss of 3,145 bbl of gas condensate from a subsea pipeline rupture (over 1 hour) at the Commonwealth and Victorian waters boundary and the release of 300 m^3 of MDO (over 6 hours) from a supply vessel at the Commonwealth and Victorian waters boundary during annualised metocean conditions.*

This chapter focuses on the environmental features, values, and sensitivities relevant to the coastal waters of Kilcunda where the Yolla gas pipeline passes through, and the areas intersected by the spill EMBA for the MDO spill and pipeline rupture, which do not extend south of the Yolla-A platform. As such, areas south of the Yolla-A platform are not described in this chapter. Full modelling results that distinguish between the spill EMBAs for a release from the Yolla-A platform, pipeline rupture and MDO spill are presented in Section 7.15, Section 7.16 and Section 7.17, respectively, of the complete EP.

A description of the entire spill EMBA can be viewed within Chapter 5 of the complete EP on the NOPSEMA website.

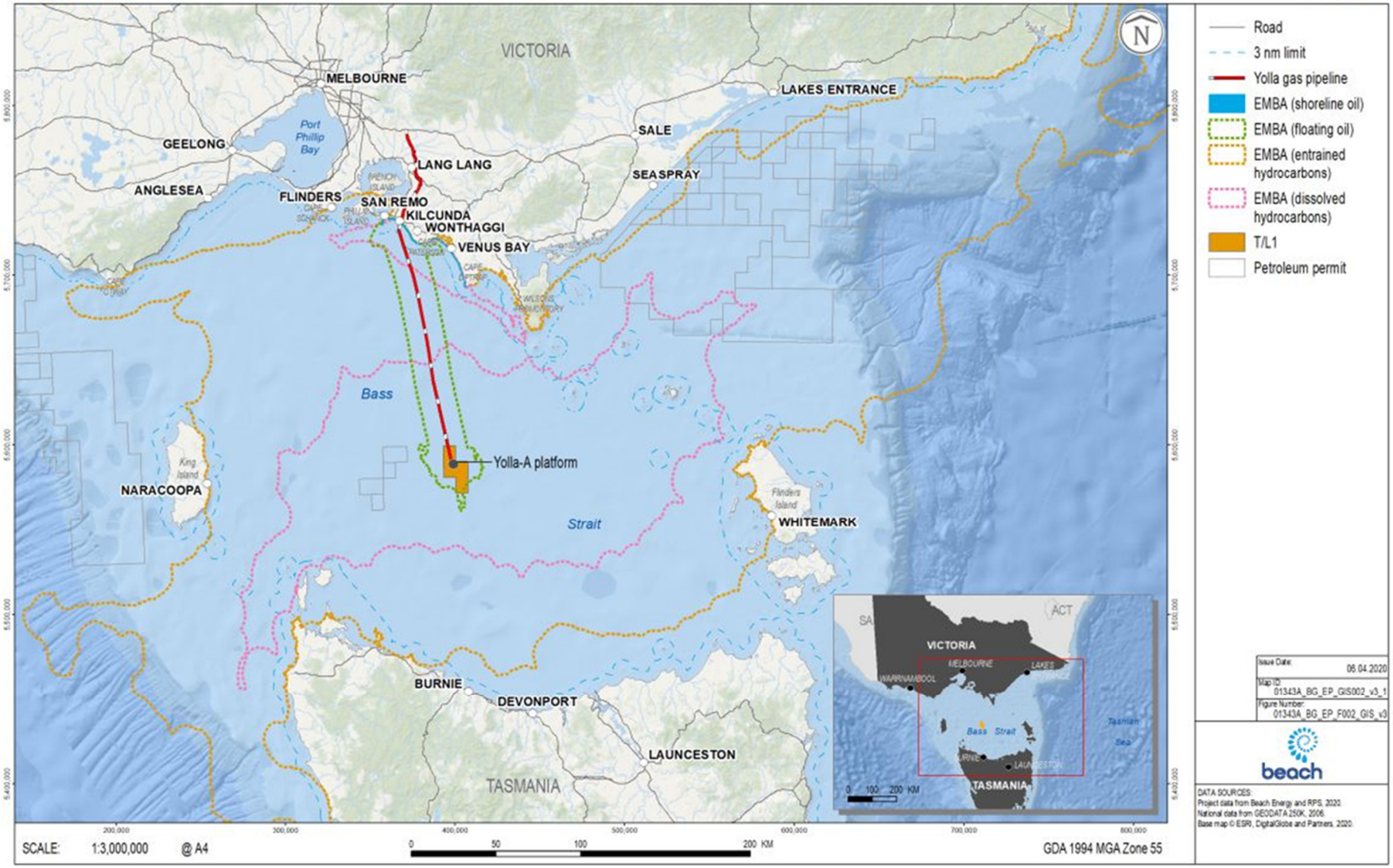


Figure 5-1. The BassGas development EMBA

5.1 Regional Environmental Setting

Bass Strait separates Tasmania from the southern Australian mainland by approximately 230 km at its narrowest point and contains a number of islands, with the largest being King Island and Flinders Island. The Yolla gas pipeline is located within the Bass Strait Provincial Bioregion using the Interim Marine and Coastal Regionalisation for Australia (IMCRA) classification (DEH, 2006). At the mesoscale level, the pipeline is predominately within the Central Bass Strait (CBS) bioregion. Where the pipeline meets state waters, it is within the Central Victoria bioregion.

5.2 Physical Environment

5.2.1 Climate and Meteorology

Bass Strait is located on the northern-most zone of an area known as the 'Roaring Forties' with its climate determined chiefly by the presence of sub-tropical high-pressure ridges and migratory low-pressure systems (extra-tropical cyclones). Migrating low pressure systems typically bring a westerly wind regime to Bass Strait and are likely to affect the area every three to five days on average during the winter months.

5.2.2 Temperature and rainfall

Average air temperatures recorded at Wonthaggi (11.9 km southeast of Kilcunda, the closest point for a Bureau of Meteorology [BoM] weather station) for 1991-2020 range from a minimum of 6.6°C to a maximum of 24.7°C (BoM, 2022). Mean annual rainfall for the period 1991-2020 is 160 mm, with the highest rainfall totals falling in July, August and September (with an average of over 100 mm of rain for each month) (BoM, 2022).

5.2.3 Winds

RPS (2020) acquired high-resolution wind data from 2008 to 2012 (inclusive) across their modelling domain from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR). The data was collected from a wind station close to the Yolla-A platform. The data clearly indicates that winds from the southwest dominate this region. Wind data specific to Kilcunda was not collected.

5.3 Oceanography

5.3.1 Tides and Currents

Bass Strait is a relatively shallow area on the continental shelf, connecting the southeast Indian Ocean with the Tasman Sea. The strait has a reputation for strong tidal currents, which are primarily driven by tides, winds and density-driven flows. The tides of central Bass Strait are semi-diurnal with the dominant large-scale water movements due to the astronomical tide (Jones, 1980). RPS (2020) acquired tidal and current data near the Yolla-A platform, indicating that the surface currents flow predominantly eastwards, and semi-diurnal astronomical tides provide the major water level variations in the region, with four current reversals each day and a relatively small tidal range of about 1.3 m. Tide and current data specific to Kilcunda was not collected.

5.3.2 Waves

In Bass Strait, the interaction between sea and swell and the resultant wave motion is complicated by the islands and Australian mainland coastline embayments, peninsulas and headlands. The local wave climate is derived principally from locally-generated wind waves mostly from the west and southwest. Wave heights range from 1.5 m to 2 m with periods of 8 s to 13 s, although heights of 5 m to 7 m can occur during storm events.

5.3.3 Water temperature, quality, and salinity

Water temperature for Kilcunda was not collected, in shallower waters of the EMBA such as the Bunurong Marine National Park (MNP) and Bunurong Marine Park, Parks Victoria (2006a) (17 km southeast of Kilcunda) notes that surface water temperatures range from 13°C in the cooler months to 17.5°C in the warmer months. The nutrient concentrations in Central Bass Strait are low compared to that of what is seen at its extremities (Gibbs *et al*.,1986; Gibbs, 1992). In the nearshore areas of the EMBA, water quality may be negatively affected through the discharge of polluted waters from rivers, which drain catchments dominated by stock grazing and small coastal settlements (Parks Victoria, 2006a). RPS (2020) reports that the average monthly salinity consistently remains in the range of 34.9 to 35.5 practical salinity units (based on the World Ocean Atlas database).

5.3.4 Seabed

The shore crossing for the pipeline is generally through sedimentary rock (sandstone, mudstone) with sand and clay layers at the surface at both ends. There are numerous small reefs nearby on either side of the exit hole within state waters. Surveys along the offshore RGP route in Commonwealth waters indicate that the seabed consists predominantly of medium to loose sand with localised pockets of clay and gravel.

The seabed in the nearshore parts of the spill EMBA at Kilcunda and surrounding areas are described below, followed by descriptions of the seabed features.

Starting immediately south of Venus Bay, the seabed continues to be dominated by sandy substrates. West of Anderson Inlet, there are extensive areas of subtidal rocky reef (up to 1 km wide in some areas) and other areas of reef and reef/sediment. A 2-km wide section of the seabed occurs within the Bunurong MNP. The seabed becomes sandier closer to San Remo.

5.3.4.1 Sandy substrate

The shifting sands of unsheltered nearshore seabed are often too mobile for the development of marine floral communities and lack the necessary hard substrate required for anchoring. Nevertheless, a rich abundance of faunal communities may be present among the sands including species of molluscs, bivalves, annelids, crustaceans, and echinoderms.

5.3.4.2 Subtidal rocky reef

Rocky reefs provide a stable seabed for a wide range of plants and animals including kelps and other seaweeds, encrusting invertebrates such as sea squirts, sponges and bryozoans. In turn fixed biota provide habitat and food for mobile animals including molluscs such as abalone and octopus, crustaceans such as lobster and crabs, and a wide range of fish species including wrasse and leatherjackets. Parks Victoria (2006a) notes that the Bunurong MNP and Bunurong Marine Park have the highest diversity of intertidal and shallow subtidal invertebrate fauna recorded in Victoria on sandstone.

5.3.5 Shorelines

This section describes the Kilcunda and surrounding shorelines intersected by the spill EMBA.

Starting near Venus Bay, the west-facing beaches continue to be dominated by sandy beaches. West of Anderson Inlet, the shoreline is dominated by mixed sand beach/shore platform and intertidal shore platform. North of Harmers Haven, the shoreline is again dominated by sandy beaches, interspersed by mixed sand beach/shore platform through to San Remo.

5.4 Conservation Values and Sensitivities

The conservation values and sensitivities in and around the offshore RGP within Kilcunda state waters, and surrounding areas within the spill EMBA are described in this section. The spill EMBA related to a release from the offshore RGP does not intersect any Australian Marine Parks, National Heritage-listed Places, Commonwealth Heritage-listed Places, Wetlands of International Importance or Key Ecological Features.

The spill EMBA overlaps Threatened Ecological Communities (TECs), Nationally important wetlands (NIW) and coastal protected areas, which are briefly described here.

5.4.1 Threatened Ecological Communities

Threatened Ecological Communities (TECs) provide wildlife corridors and/or habitat refuges for many plant and animal species, and listing a TEC provides a form of landscape or systems-level conservation (including threatened species). The following TECs occur within the Harmers Haven Coastal Reserve which is 200 m from where the Yolla pipeline intersects with the state waters of Kilcunda:

- Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community; and
- Subtropical and temperate coastal saltmarsh.

Both TECs are situated within the Powlett River (3 km east from the offshore RGP in Kilcunda state waters), which is on land except for the mouth that connects to the ocean.

5.4.2 Nationally Important Wetlands

Nationally important wetlands (NIW) are considered important for a variety of reasons, including their importance for maintaining ecological and hydrological roles in wetland systems, providing important habitat for animals at a vulnerable stage in their life cycle, supporting 1% or more of the national population of nay native plant or animal taxa or for its outstanding historical or cultural significance (DAWE, 2020f).

The Powlett River Mouth (VIC078) is the closest 3 km east) NIW to the section of offshore RGP within the state water of Kilcunda. The Powlett River Mouth provides valuable habitat for the endangered orange-bellied parrot by supporting saltmarsh vegetation.

5.4.3 Victorian Protected Areas

Victoria has a large network of onshore and offshore protected areas that are established, protected and managed under the *National Parks Act 1982* (Vic) by Parks Victoria. The offshore RGP intersects the Kilcunda Coastal Reserve (it was horizontally directionally drilled under/through it). The Kilcunda Harmers Haven Coastal Reserve is 200 m east of the offshore RGP. Both are described below.

Kilcunda Coastal Reserve - The reserve protects coves of sandy beaches, rocky cliffs, intertidal rock formations and patchy vegetation that separates the township from the foreshore. The reserve is important in preserving the recreational beach activities as well as its supporting facilities such as its picnic area, playground, walking trails and shelter (Parks Victoria, 2006a). The offshore RGP was drilled under/through this reserve.

Kilcunda Harmers Haven Coastal Reserve – This is a 180 ha reserve for the protection of the coastal flora habitat. Coastal habitat at Harmers Haven has a high diversity of vegetation communities, many of which are considered rare, depleted or endangered within the Bass Coast Shire, with almost 300 recorded flora species including plants of national, state and regional conservation significance (Parks Victoria, 2006a).

5.5 Biological Environment

The key source of information for the species that may be present in the operational area and spill EMBA include the EPBC Act Protected Matters Search Tool (PMST) and the Victorian Biodiversity Atlas (VBA). Information presented within this section focuses on all parts of the EMBA other than south of the Yolla-A platform.

5.5.1 Benthic Assemblages

Marine invertebrates in Bass Strait include porifera (e.g., sponges), cnidarians (e.g., jellyfish, corals, anemones, seapens), bryozoans, arthropods (e.g., sea spiders), crustaceans (e.g., rock lobster, brine and fairy shrimps), molluscs (e.g., scallops, sea slugs), echinoderms (e.g., sea cucumbers), and annelids (e.g, polychaete worms). Studies by the Museum of Victoria (Wilson and Poore, 1987; Poore *et al.*, 1985) found that invertebrate diversity was high in southern Australian waters, and the distribution of species was irregular with little evidence of any distinct biogeographic regions. The results of invertebrate sampling undertaken in shallower inshore sediments indicate a high diversity and patchy distribution. In these areas crustaceans, polychaetes, and molluscs were dominant (Parry et al., 1990).

The Bunurong Marine National Park (MNP), located 17 km southeast of the offshore RGP pipeline near Kilcunda in state waters, has extensive intertidal rock platforms that exhibit a diverse range of marine life. The subtidal rocky reefs include numerous microhabitats extending several kilometres offshore in relatively shallow water (Parks Victoria, 2006a). The diversity of intertidal and shallow subtidal invertebrate fauna is the highest recorded in Victoria on sandstone. A high proportion of the common invertebrates occurring along the Victorian coast are found in the Bunurong MNP (Parks Victoria, 2006a).

5.5.2 Plankton

Plankton is a key component in oceanic food chains and comprises two elements: phytoplankton and zooplankton. As part of a marine seismic survey undertaken in early 2018, the CarbonNet Project commissioned plankton sampling across nine sites in shallow waters off Golden Beach, Gippsland (171 km to the northeast of where the RGP meets state waters). The results of this work (CarbonNet, 2018) found that:

- The composition of zooplankton was a typical healthy example of those expected for temperate coastal waters; and
- Copepods were the dominant group, with varying proportions of appendicularians, cladocerans and doliolids. Numerous other groups occurred in small numbers, including siphonophores, fish larvae, fish eggs, polychaetes, ghost shrimps and cnidarians (jellies).

Although this work was undertaken to the northeast of the RGP, it is likely that a similar plankton assemblage would occur where the RGP meets state waters, given the well-mixed nature of Bass Strait waters.

5.5.3 Marine Flora

Literature searches indicate there is a paucity of public information regarding the distribution and abundance of marine flora in Bass Strait, particularly in relation to the deeper water of the operational area and spill EMBA.

The VBA records 167 algae species made up of a mix of brown, red and green algae. The most frequently recorded species is the brown algae *Phyllospora comosa*. The subtidal and intertidal rocky reefs of Bass Strait, located closer to the shoreline of Victoria and Tasmania, are understood to have a high diversity of plant species including seagrasses and macroalgae. In sheltered parts of bays, inlets and estuaries, (such as those found in Western Port Bay or on the west coast of Flinders Island) seagrasses establish extensive underwater meadows that are critical in the early life stages of many fish species. Seagrasses trap soil and other material washed from the land by binding them together and stopping it from clouding the water column, which would otherwise prevent sunlight reaching plants on the seabed (DELWP, 2017).

5.5.4 Birds

The EPBC PMST identifies 69 bird species as threatened or migratory whose habitat or migratory path may occur within the EMBA. These primarily comprise 17 albatross, six petrels, two parrots, three shearwaters, three godwits, six terns, one swift, two curlew, one prion, four snipes, three gulls, seven plovers, two tattlers and seven sandpipers. Six of these bird species are listed as critically endangered, nine are endangered and 23 are listed as vulnerable. Many of the bird species listed are protected by international agreements (Bonn Convention, JAMBA, CAMBA and ROKAMBA) and periodically pass-through Bass Strait to and from the Bass Strait islands, mainland Victoria and Tasmania (DAWE, 2020b). An additional 68 bird species were identified by the VBA.

5.5.5 Cetaceans

The PMST identifies that 22 whale species, and eight dolphin species may reside within or migrate through the operational area and spill EMBA. A search of the VBA database indicates that 11 whales have been sighted in the EMBA (the most common being the southern right and humpback whales), along with five dolphins (the most common being the short-beaked common dolphin). Each whale species sighted from the VBA database was also captured by the PMST results of the EMBA. Only the Burrunan dolphin captured in the VBA database was not also captured by the PMST results for the EMBA.

5.5.6 Pinnipeds

There are two pinniped species (the Australian fur-seal and New Zealand fur-seal) recorded under the EPBC Act PMST as potentially occurring within the spill EMBA (DAWE, 2020a). These species are not listed as threatened under the FFG Act. The VBA database records an additional four species of pinniped.

5.5.7 Fish

It is estimated that there are over 500 species of fish found in the waters of Bass Strait, including a number of species of importance to commercial and recreational fisheries (LCC, 1993). There are 39 fish species (31 of which are seahorses and pipefish, the signathid family') recorded in the EPBC Act PMST (DAWE, 2020a) as potentially occurring in the spill EMBA. Six of the fish species detected by the PMST are listed as threatened, and four are listed as migratory.

5.5.8 Reptiles

Four species of marine turtle are listed under the EPBC Act as potentially migrating through the operational area and spill EMBA. No biologically important areas (BIAs) for turtles occur within Bass Strait. EA (2003) reports that the turtles known to occur in Victorian waters are considered to be rare vagrants outside their usual range. No turtles are listed as threatened under the FFG Act 1988 (Vic), except for the leatherback turtle. The VBA search for the spill EMBA does not include any additional records for marine turtles. Only one species of sea snake, the yellow-bellied sea snake (*Pelamis platurus*) is found within Victorian coastal waters with 14 records in the VBA database for the spill EMBA. This species is the world's most widespread sea snake.

5.5.9 Marine Pests

It is widely recognised that marine pests can become invasive and cause significant impacts on economic, ecological, social and cultural values of marine environments. Impacts can include the introduction of new diseases, altering ecosystem processes and reducing biodiversity, causing major economic loss and disrupting human activities (Brusati and Grosholz, 2007).

Marine pests known to occur in Bass Strait, according to Parks Victoria (2015) and Butler et al (2012) include:

- Pacific oyster (*Crassostrea gigas*);

- Northern pacific seastar (*Asterias amurensis*);
- New Zealand screw shell (*Maoricolpus roseus*);
- European shore crab (*Carcinus maenas*);
- Dead man's fingers (*Codium fragile ssp. fragile*);
- Asian date mussel (*Musculista senhousia*); and
- Cord grass (*Spartina anglica* and *Spartina x townsendii sp*).

5.6 Cultural Heritage

Cultural heritage can be broadly defined as the legacy of physical science artefacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations. Cultural heritage includes tangible culture such as buildings, monuments, landscapes, books, works of art, and artefacts, as well as intangible culture such as folklore, traditions, language, and knowledge, and natural heritage including culturally significant landscapes.

This section describes the cultural heritage values broadly categorised as Aboriginal and European heritage within the operational area and spill EMBA, noting that the boundary of the spill EMBA includes the coastline up to the high-water mark.

5.6.1 Aboriginal Heritage

Gunaikurnai people are the traditional owners of Gippsland. There are currently approximately 3,000 Gunaikurnai people and the territory includes the coastal and inland areas to the southern slopes of the Victorian Alps. Gunaikurnai people are made up of five major clans (GLaWAC, 2018). The Gippsland, northern Tasmanian and Bass Strait islands coastlines are of Aboriginal cultural heritage significance. Coastal fishing is an important part of Aboriginal culture with fishing methods including hand gathering, lines, rods and reels, nets, traps and spears (DoE, 2015a). There are numerous areas containing Aboriginal shell middens (i.e., the remains of shellfish eaten by Aboriginal people) along the sand dunes of the Gippsland coast. Other archaeological sites present along the Gippsland coast include scar trees and assorted artefact scatters (Basslink, 2001).

5.6.2 Native Title

In 2010, the Federal Court recognised that the Gunaikurnai holds native title over much of Gippsland. On the same day, Victoria entered into an agreement with the Gunaikurnai under the *Traditional Owner Settlement Act 2010*. The agreement area extends from west Gippsland near Warragul and Inverloch east to the Snowy River and north to the Great Dividing Range. It also includes 200 metres of sea country offshore. The determination of native title under the *Native Title Act* 1993 covers the same area (GLaWAC, 2019). The agreement and the native title determination only affect undeveloped Crown land within the Gippsland region.

5.6.3 Maritime Archaeological Heritage

Shipwrecks over 75 years old are protected within Commonwealth waters under the *Historic Shipwrecks Act* 1976 (Cth), in Victorian waters under the *Victorian Heritage Act* 1995.

The nearest shipwrecks to the offshore RGP (within state waters) are the:

- *Maori* – shipwreck ID 6393, located 1.5 km west of the pipeline and 4 km from the nearest shoreline; and
- *Eli Lafond* – shipwreck ID 6145, located 100 m east of the pipeline and 900 m from the nearest shoreline.

None of the above shipwrecks are within protected zones.

5.7 Socio-economic Environment

This section describes the social and economic environment of the RGP within the state waters of Kilcunda.

5.7.1 Coastal settlements

The pipeline shore crossing is located in the Bass Coast Shire. The Bass Coast Shire is located in south-eastern Victoria, about 130 kilometres south-east of the Melbourne CBD and is a popular holiday destination. Bass Coast Shire is bounded by Western Port Bay in the north and west, Cardinia Shire in the north-east, South Gippsland Shire in the east, and Bass Strait in the south.

Australian Bureau of Statistics (ABS) data from the 2021 census for the Bass Coast Shire indicates that it has a population of 40,789 with a median age of 51 and Aboriginal people comprise 1.1% of the population. The Shire covers an area of 864 km^2, 88% of which is used for primary production (ABS, 2016).

The nearest town to the RGP shore crossing and is Kilcunda, which is briefly described here based on ABS (2021; 2016) census data. Kilcunda has a population of 578 people and a median age of 55 (ABS, 2021). Of those in the labour force, 51.7% worked full-time and 37.8% worked part-time (ABS, 2016). Professionals, managers and technicians and trade workers made up 52.4% of the population's occupations (ABS, 2016). Note that 2021 ABS data employment specific data has not yet been released, so 2016 ABS data has been used in its place.

5.7.2 Offshore energy exploration and production

In 2018, Victoria accounted for 11% of Australia's crude oil production, 11% of Australia's condensate production, 49% of Australia's LPG production and 10% of Australia's conventional gas production (APPEA, 2019). Production has been trending down since it peaked in 2000.

The entirety of the RGP, including where it travels within state waters, does not intersect any other offshore exploration and production assets or titles.

5.7.3 Other infrastructure

The Victorian Desalination Plant, located at Wonthaggi, is located 4 km east of the RGP. Operation of the plant commenced in December 2012. The seawater intake and outlet structures are connected to the onshore plant via a 1.2 km and 1.5 km underground tunnel, respectively. The offshore RGP is located approximately 3 km west of the intake and outlet structures.

There are two Telstra telecommunications cables withing proximity of the RGP, the western telecommunication cable intersects the offshore RGP at a point 33 km off the Victorian coast.

5.7.4 Tourism

Marine-based tourism and recreation in Bass Strait is primarily associated with recreational fishing, boating and ecotourism. Seaside towns are the primary destinations that attract tourists and holidaymakers to the south coast of Victoria. These coastal communities are popular tourist towns for their boating and fishing activities, along with bushwalking, bird watching and other nature-focused activities. The George Bass Coastal Walk is one such nature-focused activity that stretches from the outskirts of San Remo to Kilcunda and features a cliff-top trail that follows the route of explorer George Bass and offers spectacular views of the coastline. It is estimated that the tourism industry in Bass Coast has generated approximately $245 million and supports approximately 1,426 jobs in the region (Remplan, 2019).

5.7.5 Recreation

Recreational fishing along the Bass coast typically targets snapper, King George whiting, flathead, bream, sharks, tuna, calamari, and Australian salmon. Businesses provide for the equipment needs of fishermen and fishing tours along the Bass Coast. Competitions such as the San Remo Easter Fishing Competition, held annually over the Easter long weekend, and community groups such as the Anderson Inlet Angling Club are examples of recreational fishing's popularity in the region.

The Kilcunda Lobster Festival is held annually in late January in the town of Kilcunda (where the pipeline comes ashore) as a fundraising event. The festival draws nearly 7,000 people each year and celebrates all things lobster. The Sam Remo fishing festival (located 11 km from the RGP shore crossing) is held in September each year, with the main event being the 'blessing of the fleet' (to ensure safe journeys and a bountiful season).

5.7.6 Commercial shipping

The South-east Marine Region (which includes Bass Strait) is one of the busiest shipping regions in Australia (DoE, 2015a). Shipping consists of international and coastal cargo trade, passenger services and cargo and vehicular ferry services across Bass Strait (DoE, 2015a).

5.7.7 Commercial Fisheries

5.7.7.1 Commonwealth-managed fisheries

Commonwealth fisheries are managed by the Australian Fisheries Management Authority (AFMA) under the *Fisheries Management Act* 1991 (Cth). AFMA jurisdiction covers the area of ocean from 3 nm from the coast out to the 200 nm limit (the Australian Fishing Zone (AFZ)).

Commonwealth commercial fisheries with jurisdictions to fish within the EMBA are the:

- Bass Strait Central Zone Scallop Fishery – the EMBA does intersect with a minuscule section of fishing intensity saturated around King Island. The pipeline occurs within an area that was fished, with no intensity recorded due to the area being fished by less than 5 fishers.
- Eastern Tuna and Billfish Fishery – both the spill EMBA and pipeline lie within the fishery's jurisdiction but in areas that are not fished.
- Eastern Skipjack Tuna Fishery - both the spill EMBA and pipeline lie within the fishery's jurisdiction, however, this fishery is no longer operational.
- Southern Bluefin Tuna Fishery – both the spill EMBA and pipeline lie within the fishery's jurisdiction but in areas that are not fished.
- Small Pelagic Fishery (eastern sub-area) - both the spill EMBA and pipeline lie within the fishery's jurisdiction but in areas that are not fished.
- Southern Squid Jig Fishery - The pipeline and EMBA both occur within an area that was fished, with no intensity recorded due to the area being fished by less than 5 fishers.
- Southern and Eastern Scalefish and Shark (SESS) Fishery, incorporating.
    - Gillnet and Shark Hook sector - The spill EMBA and pipeline overlaps areas of low and medium intensity fishing.
    - Commonwealth Trawl sector – fishing data indicates that no fishing intensity occurred within the EMBA or around the pipeline.
    - Scalefish Hook sector - fishing data indicates that no fishing intensity occurred within the EMBA or around the pipeline.

5.7.7.2 Victorian-managed fisheries

The Victorian catch and effort grid cell network is based on divisions of 10' latitude (approximately 10 nm) and 12.1' longitude (approximately 12.1 nm). The offshore RGP intersects catch and effort cells G27, H27, H28, J28 and K28, L28, L29, M29, N29, P29 and Q29. The section of the RGP that exists within coastal waters of Kilcunda is within catch and effort cell G27 only.

Victorian-managed commercial fisheries with access licences that authorise harvest in the waters where the offshore RGP passes and the spill EMBA are listed below, along with the likelihood of fishing to occur around the offshore RGP:

- Scallop – fishing effort is east of Wilsons Promontory; data indicates no fishing occurs around the pipeline, however fishing may occur within areas east of Wilsons Promontory where the EMBA intersects.
- Abalone – harvesting is likely to occur around the pipeline. The Kilcunda abalone lease occurs to the immediate east of the RGP near the coastal crossing. Other coastal areas with rocky reef that are intersected by the EMBA are likely to be harvested also.
- Rock Lobster - fishing likely to occur around the pipeline based on catch data in San Remo region and prevalence of rocky reef in the coastal area of the pipeline. Similarly to the abalone fishery, Rock Lobster fishing is likely to occur within the coastal areas with rocky reef that re intersected by the spill EMBA.
- Wrasse – fishing data suggests catch was highest off the central coast in Port Phillip Heads, Western Port and Wilsons Promontory. Fishing intensity is unlikely to be around the pipeline but may occur within the EMBA.
- Ocean Access (General)- there is limited data regarding this fishery, it is assumed they fish around the pipeline and within the EMBA.
- Pipis (the entire Victorian coastline); Venus Bay (30km south east of the RGP within state waters) is the closest high-energy sandy beach where Pipis are known to be harvested in large quantities. There are no harvesting sites around the pipeline, however, the EMBA does intersect high energy sandy beaches.
- Ocean Purse Seine – the only fisher active in Victoria is based out of Lakes Entrance (236 km northeast of the RGP), there is limited data available regarding this fishery. Due to Lakes Entrance being a significant distance from the RGP, it is unlikely fishing effort occurs around the pipeline. The EMBA does extend into the waters off Lakes Entrance and may overlap with fishing intensity.
- Inshore trawl- this fishery is based out of Lakes Entrance, with catch locations being a significant distance from RGP, therefore, it is highly unlikely fishing will occur around the pipeline. Catch locations are a significant distance from the EMBA also.
- Giant crab – fishing efforts are concentrated west of Apollo Bay, meaning it is unlikely fishing will occur around the pipeline. Fishing may occur within the far western extent of the EMBA.

A detailed description and analysis of commercial fisheries can be viewed within Chapter 5, section 5.7.6 of the complete EP on the NOPSEMA website at.

6. Environmental Impact and Risk Assessment Methodology

6.1 Definitions

For this activity, Beach has determined that impacts and risks are defined as follows:

- **Impacts** result from **planned events** – there *will* be consequences (known or unknown) associated with the event occurring. Impacts are an inherent part of the activity. For example, there will be atmospheric emissions associated with flaring.
    - For impacts, only a consequence is assigned in this summary EP (likelihood is irrelevant given that the event does occur).
- **Risks** result from **unplanned events** – there *may* be consequences if an unplanned event occurs. Risks are not an inherent part of the activity. For example, a hydrocarbon spill may occur if the RGP is ruptured by vessel anchoring, but this is not a certainty. The risk of this event is determined by multiplying the consequence of the impact (using factors such as the type and volume of hydrocarbons and the nature of the receiving environment) by the likelihood of this event happening (which may be determined objectively or subjectively, qualitatively or quantitatively).
    - For risks, the consequence and likelihood are combined to determine the risk rating (Table 6-1).

After the impacts and risks have been identified, environmental performance outcomes (EPO) (or objectives) are developed to provide a measurable level of performance for each environmental hazard to ensure that the environmental impacts and risks are managed to be as low as reasonably practicable (ALARP) and acceptable.

6.2 Identifying the risks

Beach's Corporate Risk Assessment Framework requires the following steps to be implemented:

- Identify the activities and the potential impacts associated with them;
- Identify the sensitive environmental resources at risk within and adjacent to the operational area;
- Identify the environmental consequences of each potential impact, corresponding to the maximum reasonable impact;
- Identify the likelihood (probability) of occurrence of each potential environmental impact (i.e., the probability of the event occurring);
- Identify applicable control measures; and
- Assign a level of risk to each potential environmental impact using a risk matrix.

In accordance with this framework, all risks must be reduced to a level that is considered to be ALARP.

A risk identification and assessment workshop was undertaken by Beach on the 12th of February 2019 to re-examine the originally identified BassGas environmental hazards and their associated impacts and risks. The workshop involved a multi-disciplinary team, including personnel from operations, environment and community.

6.3 Evaluating the risks

The purpose of impact and risk evaluation (herein referred to simply as risk assessment) is to assist in making decisions, based on the outcomes of analysis, about the sorts of controls required to reduce an impact or risk to ALARP. Planned and unplanned events are subject to risk assessment in the same manner.

Beach's risk assessment process is described below:

- Identify and describe the risks.
- Determine the maximum credible consequence (to the natural environment and community/social/cultural heritage) arising from the impact or risk without introducing additional controls.
- Adopt controls for each impact or risk.
- Undertake an assessment of the consequence of the impact or risk, corresponding to the maximum credible impact across the consequence categories (Table 6-1) considering the controls identified and their effectiveness.
- Identify the likelihood of occurrence of those consequences ('remote' through to 'almost certain'), considering the controls identified and their effectiveness, as outlined in Table 6-1.
- For risks, multiply the consequence and likelihood to determine the overall risk raking, outlined in Table 6-2.

The ALARP principle states that it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent attempting to reduce an impact or risk to zero**.**

Table 6-1. Beach risk assessment matrix

Consequence Rating	Natural Environment	Reputational and/or Community damage / impact / social / cultural heritage	Likelihood of Occurrence					
			Remote (1)	Highly Unlikely (2)	Unlikely (3)	Possible (4)	Likely (5)	Almost Certain (6)
			<1% chance of occurring within the next year. Occurrence requires exceptional circumstances. Exceptionally unlikely event in the long-term future. Only occur as a 100-year event.	>1% chance of occurring within the next year. May occur but not anticipated. Could occur years to decades.	>5% chance of occurring in the next year. May occur but not for a while. Could occur within a few years.	>10% chance of occurring within the next year. May occur shortly but a distinct possibility it will not. Could occur within months to years.	>50% chance of occurring within the next year. Balance of probability that it will occur. Could occur within weeks to months.	99% chance of occurring within the next year. Impact is occurring now. Could occur within days to weeks.
Catastrophic (6)	Long-term destruction of highly valued ecosystem or very significant effects on endangered species or habitats (formally managed).	Irreparable damage of highly valued items or structures of great cultural significance. Negative international or prolonged national media (e.g., 2 weeks).	High	High	Severe	Severe	Extreme	Extreme
Critical (5)	Significant impact on highly valued (formally managed) species or habitats to the point of eradication or impairment of ecosystem. Widespread long-term impact.	Major irreparable damage to highly valued structures/ items of cultural significance. Negative national media for 2 days or more. Significant public outcry.	Medium	Medium	High	Severe	Severe	Extreme
Major (4)	Very serious environmental effects, such as displacement of species and partial impairment of ecosystem (formally managed). Widespread medium and some long-term impact.	Significant damage to items of cultural significance. Negative national media for one day. Adverse attention from non-government organisations (NGOs).	Medium	Medium	Medium	High	Severe	Severe
Serious (3)	Moderate effects on biological or physical environment (formally managed) and serious short-term effects but not affecting ecosystem functions.	Permanent damage to items of cultural significance. Negative State media. Heightened concern from local community. Criticism by NGOs.	Low	Medium	Medium	Medium	High	Severe
Moderate (2)	Minor short-term damage to area of limited significance (not formally managed). Short-term effects but not affecting ecosystem functions.	Some damage to items of cultural significance. Minor adverse local public or media attention and complaints.	Low	Low	Medium	Medium	Medium	High
Minor (1)	No lasting effects. Low-level impacts on biological and physical environment to an area of low significance (not formally managed).	Low level repairable damage to commonplace structures. Public concern restricted to local complaints.	Low	Low	Low	Medium	Medium	Medium

An iterative risk evaluation process is employed until such time as any further reduction in the residual risk ranking is not reasonably practicable to implement. At this point, the impact or risk is reduced to ALARP. The determination of ALARP is outlined in Table 6-2.

Table 6-2. Alignment of ALARP with impacts (using consequence ranking) and risks (using risk ranking)

Consequence ranking	Minor	Moderate	Serious	Major	Critical	Catastrophic
ALARP level – planned event	Broadly acceptable	Tolerable if ALARP		Intolerable		
Residual impact category	Lower order		Higher order			
Risk ranking	Low	Medium	High	Severe	Extreme	
ALARP level - unplanned event	Broadly acceptable	Tolerable if ALARP		Intolerable		
Residual risk category	Lower order risks			Higher order risks		

Hierarchy of Controls

Beach demonstrates ALARP, in part, by adopting the 'Hierarchy of Controls' philosophy (Figure 6-1). The Hierarchy of Controls is a system used across hazardous industries to minimise or eliminate exposure to hazards.

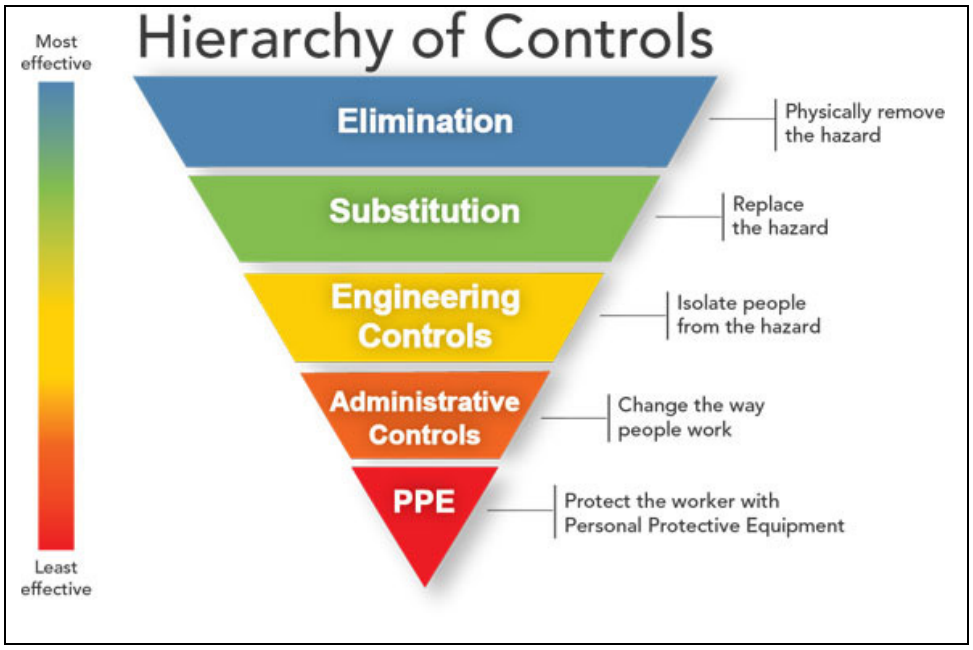


Figure 6-1. The Hierarchy of Controls

6.4 Treat, Monitor and Review the Risks

The BassGas offshore operations environmental impact and risk register records the environmental control measures (e.g., measures to prevent, minimise and mitigate impacts and risks) that were determined by an expert team familiar with the BassGas operations.

Monitoring and review activities are incorporated into the impact and risk management process to ensure that controls are effective and efficient in both design and operation. This is achieved through the environmental performance outcomes (EPO), environmental performance standards (EPS) and measurement criteria that are described for each environmental hazard.

7. Environmental Impact and Risk Assessment Summary

This section of the Summary EP provides a summary table of the Environmental Impact Assessment (EIA) and Environmental Risk Assessment (ERA) for the environmental impacts and risks identified for BassGas operations using the methodology described in Chapter 6, as required under Regulations 15(3)(4)(5) of the OPGGS Regulations.

Note that impacts and risks that are not relevant to the section of offshore RGP within state waters (such as produced formation water discharges and flaring from the platform) are not presented here.

Table 7-1 provides a summary of the EIA and Table 7-2 provides a summary of the ERA.

The detailed EIA and ERA can be viewed within Chapter 7 of the complete EP available on the NOPSEMA website.

Table 7-1. EIA summary

Hazard	Impacts	Inherent consequence	EPS	Residual consequence
Impact 1 - Physical presence of the pipeline	• Loss of benthic habitat over the small area of the seabed impacted by the RGP footprint. • Commercial fishing trawl equipment damage from snagging with the RGP The physical presence of vessels working alongside the RGP has the potential to create the following impacts: • Collision potential with third-party vessels (and damage in the case of collision). • Diversion of third-party vessels from their navigation paths. • Damage to or loss of fishing equipment and/or loss of commercial fish catches.	Minor	The BassGas offshore infrastructure is marked on maritime nautical charts. Beach regularly liaises with fisheries and navigation agencies in accordance with the BassGas Offshore Operations SEP to ensure they are aware of planned vessel-based inspection and maintenance activities. The Australian Hydrographic Office and/or Maritime Safety Victoria will be notified of the vessel-based activity no less than four weeks prior to it commencing to enable the promulgation of Notice to Mariners and AusCoast navigational warnings. Visual and radar watch is maintained on the bridge of the project vessel at all times. The Vessel Master and deck officers have valid SCTW certificates in accordance with AMSA Marine Order 70 (seafarer certification) (or equivalent) to operate radio equipment to warn of potential third-party spatial conflicts (e.g., International Convention on Standards of Training, Certification and Watchkeeping for Sea-farers [STCW95], GDMSS proficiency). Project vessel lighting is managed in accordance with: • Marine Order 21 (Safety of Navigation and Emergency Procedures); and • Marine Order 30 (Prevention of Collisions). Project vessel navigation and radio systems comply with Marine Order 27 (Safety of Navigation and Radio Equipment). The Vessel Master issues warnings (e.g., radio warning, flares, lights/horns) to third-party vessels	Minor

Hazard	Impacts	Inherent consequence	EPS	Residual consequence
			approaching the vessel in order to prevent a collision.	
			Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.	
Impact 2 – Pipeline inspection and maintenance	Inspection and maintenance activities impact on marine receptors due to: • Physical removal or disturbance of seabed sediments through localised water jetting or mattressing. • Temporary and localised reduction in water quality. • Sound disturbance from sub-bottom profiling (to locate buried portions of pipeline). • The dislodgement (and possible death) of marine growth (e.g., macro-algae and epifauna such as sponges, ascidians and molluscs) previously attached to the subsea infrastructure. • The generation of grit blasting material (generally sand) and dislodgement of scale and/or paint that settles on the seabed.	Minor	Inspection and maintenance activities are limited to the immediate works area as per the activity-specific plan (i.e., no indiscriminate sand or water blasting).	Minor
			Water blasting is given preference to grit blasting.	
			Grit blasting material selection is undertaken in accordance with the chemical selection procedure	
			Vessels used to undertake maintenance activities will preferentially use DP; they will only anchor where DP presents unacceptable safety risks.	
Impact 3 – Routine light emissions	The following activities result in light emissions: • ROV operations – underwater light is used in order to illuminate an area of interest (e.g., the pipeline) during subsea inspection and maintenance activities. • Other project vessel operations – navigational lighting is kept on 24 hours a day for maritime safety purposes, with deck lighting used as necessary. The known and potential impacts of lighting are: • Light glow may act as an attractant to light-sensitive species (e.g., seabirds, squid, zooplankton), in turn affecting predator-prey dynamics (due to attraction to or disorientation from light).	Minor	Lighting is managed, as appropriate, in accordance with: • AMSA Marine Orders Part 21 (Safety of Navigation and Emergency Procedures). • AMSA Marine Orders Part 30 (Prevention of Collisions). • AMSA Marine Orders Part 59 (Offshore Support Vessel Operations).	Minor
			Process work lights are directed only onto work areas and are shielded.	

Hazard	Impacts	Inherent consequence	EPS	Residual consequence
Impact 4 – Routine atmospheric emissions	The following support vessel activities generate atmospheric emissions: • Combustion of marine diesel oil (MDO) from engines, generators and fixed mobile deck equipment. • Painting and paint storage, resulting in the release of fugitive VOCs as vapours. The known and potential environmental impacts of atmospheric emissions are: • Localised and temporary decrease in air quality due to gaseous emissions and particulates from diesel combustion. • Addition of GHG to the atmosphere (influencing climate change).	Minor	Only low-sulphur (<0.5% m/m) MDO is used in order to minimise SOx emissions. All combustion equipment is maintained in accordance with the PMS (or equivalent). Vessels >400 gross tonnes possess equipment, systems, fittings, arrangements and materials that comply with the applicable requirements of MARPOL Annex VI. Vessels >400 gross tonnes and involved in an international voyage implement their Ship Energy Efficiency Management Plan (SEEMP) to monitor and reduce air emissions. Vessels >400 gross tonnes manage firefighting and refrigeration systems to minimise ODS. Only a MARPOL VI-approved incinerator is used to incinerate solid combustible waste (food waste, paper, cardboard, rags, plastics). Incineration is only conducted when vessels are in Commonwealth waters (>3 nm from the shore). Oil and other noxious liquid substances are not incinerated.	Minor
Impact 5 – Routine noise and vibration emissions	Noise and vibration is generated by the following activities associated with the operation of BassGas infrastructure and vessels: • High gas flow through the offshore RGP. Inspection and maintenance activities: • Geophysical activities, to locate buried portions of the pipeline. • Abrasive blasting to remove paint and marine growth from RGP. • Vessel operations within the PSZ and alongside the RGP during inspection and maintenance activities (engine noise transmitted through hull, DP thrusters and/or propellers).	Minor	Through constant bridge watch, vessels comply with the *Australian National Guidelines for Whale and Dolphin Watching for Vessels* (DoEE, 2017) when working within the operational area. This means: • Caution zone (300 m either side of whales and 150 m either side of dolphins) – vessels must operate at no wake speed in this zone. • No approach zone (100 m either side of whales and 50 m either side of dolphins) – vessels should not enter this zone and should not wait in front of the direction of travel or an animal or pod/group.	Minor

Hazard	Impacts	Inherent consequence	EPS	Residual consequence
	The potential impacts to marine fauna from high levels of underwater sound are: • Physical injury to auditory tissues or other air-filled organs; • Hearing impairment: ❍ Temporary threshold shift (TTS) – the temporary loss of hearing sensitivity caused by excessive noise exposure, in which the animal recovers usually within a day at most. ❍ Permanent threshold shift (PTS) – a permanent loss of hearing sensitivity caused by excessive noise exposure, considered an auditory injury, from which the animal does not recover. • Direct behavioural effects through disturbance or displacement, and consequent disruption of natural behaviours or processes (e.g., migration, resting, calving or spawning); and • Indirect behavioural effects by impairing/masking the ability to navigate, find food or communicate, or by affecting the distribution or abundance of prey species.		Vessel engines and thrusters are maintained in accordance with the PMS to ensure efficient operation (thereby minimising sound output). For geophysical surveys undertaken during February or March, the contractor implements the EPBC Act Policy Statement 2.1 (Part A) using personnel trained and experienced in undertaking MMO duties in to minimise risks to migrating and foraging pygmy blue whales.	
Impact 6 – Routine produced formation discharges	Not relevant to the RGP.	N/A	Not relevant to the RGP.	N/A
Impact 7 – Routine putrescible waste discharges	The generation of food waste (putrescible waste) from vessel galleys will result in the overboard discharge of this waste. The known and potential environmental impacts of putrescible waste discharges are: • Temporary and localised increase in the nutrient content of waters surrounding the discharge point; and • An associated increase in scavenging behaviour of marine fauna and seabirds (at the sea surface or within the water column).	Minor	Macerated putrescible waste (≤25 mm) is only discharged overboard when the vessel is >3 nm from the shoreline. Un-macerated putrescible waste is only discharged overboard when the vessel is >12 nm from the shoreline. For vessels without a macerator and for non-putrescible galley waste, waste is returned to shore for disposal.	Minor
Impact 8 – Routine sewage	On the vessels, the use of ablution facilities results in the discharge of treated sewage and the use of laundries, showers, kitchens and hand basins results in the discharge of 'grey water' to the ocean.	Minor	In accordance with Regulation 11 of MARPOL Annex IV (as enacted by Marine Order 96), sewage is comminuted, disinfected and only discharged when:	Minor

Hazard	Impacts	Inherent consequence	EPS	Residual consequence
and grey water discharges	The known and potential environmental impact of treated sewage and grey water discharges is: • Temporary and localised increase in the nutrient content of surface waters around the discharge point.		• Vessel is >3 nm from nearest land. • Sewage originating in holding tanks is discharged at a moderate rate while the vessel is proceeding en route at a speed not less than 4 knots. In accordance with Regulation 11 of MARPOL Annex IV (as enacted by AMSA Marine Orders Part 96), untreated sewage and grey water is only discharged when the vessel is >12 nm from shore (e.g., in the event of sewage treatment plant malfunction).	
Impact 9 – Routine cooling and brine water discharges	Seawater is used as a heat exchange medium for cooling machinery engines on vessels. Brine is created through the desalination processes for potable water generation. The known and potential environmental impacts of cooling water and brine discharges are: • Temporary and very localised increase in sea water temperature, causing thermal stress to marine biota. • Temporary and very localised increase in sea surface salinity, potentially causing harm to fauna unable to tolerate higher salinity. • Potential toxicity impacts to marine fauna from the ingestion of residual biocide and scale inhibitors.	Minor	Plant and equipment that requires cooling by water is maintained in good working order in accordance with the vessels' PMS. Only OCNS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals (i.e., low toxicity) are used in the cooling and brine water systems.	Minor
Impact 10 – Routine bilge water and deck drainage discharges	Bilge tanks on the vessels receive fluids from closed deck drainage and machinery spaces that may contain contaminants such as oil, detergents, solvents, chemicals and solid waste. An oily water separator (OWS) then treats this water prior to discharge overboard in order to meet the MARPOL requirement that no greater than 15 ppm oil-in-water (OIW) is discharged overboard. The known and potential environmental impacts of the discharge of bilge water and deck drainage are: • Temporary and localised reduction of surface water quality around the discharge point; • Acute toxicity to marine fauna through ingestion of contaminated water in a small mixing zone.	Minor	For vessels >400 gross tonnes, all bilge water passes through a MARPOL-compliant OWS set to limit OIW to <15 ppm prior to overboard discharge. The OWS is maintained in accordance with the vessel PMS. The OWS is calibrated in accordance with the vessel PMS to ensure the 15 ppm OIW limit is met. The residual oil from the OWS is pumped to tanks and disposed of onshore. The vessel-specific Shipboard Marine Pollution Emergency Plan (SMPEP) is implemented in the	Minor

Hazard	Impacts	Inherent consequence	EPS	Residual consequence
			event of an overboard spill of hydrocarbons or chemicals.	

Table 7-2. ERA summary

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
Risk 1 – Accidental discharge of waste into the ocean	The handling and storage of materials and waste on vessels has the potential to result in accidental overboard disposal of hazardous and non-hazardous materials and waste, creating marine debris. The risks of the release of hazardous and non-hazardous materials and waste to the ocean are: • Injury and entanglement of individual animals (such as seabirds and seals); and Localised (and normally temporary) smothering or pollution of benthic habitats.	Moderate	Possible	Med	A MARPOL Annex V-compliant Garbage Management Plan is in place for the platform (and for support vessels >100 gross tonnes or certified to carry 15 persons or more) that sets out the procedures for minimising, collecting, storing, processing and discharging garbage. Waste is stored, handled and disposed of in accordance with the GMP. This includes measures including: • No discharge of general operational or maintenance wastes or plastics or plastic products of any kind. • Waste containers are covered with secure lids to prevent solid wastes from blowing overboard. • All solid wastes are stored in designated areas before being sent ashore for recycling, disposal or treatment. • Any liquid waste storage on deck must have at least one barrier to minimise the risk of spills to deck entering the ocean. This can include containment lips on deck (primary bunding) and/or secondary containment measures (bunding, containment pallet, transport packs, absorbent pad barriers) in place. • Correct segregation of solid and hazardous wastes.	Moderate	Highly unlikely	Low

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					Vessel crews and visitors are inducted into waste management procedures to ensure they understand how to implement the GMP.			
					Waste types and volumes are tracked and logged.			
					Solid waste that is accidentally discharged overboard is recovered if reasonably practicable.			
					A chemical locker is available, bunded and used for the storage of all greases and non-bulk chemicals (i.e., those not in tote tanks) so as to prevent discharge overboard.			
					Crane transfers are undertaken in accordance with the Lifting and Load Safety Operations Procedure (CDN/ID 3674901) and under a Permit to Work (PTW).			
					The platform CMMS and vessels' PMS are implemented to ensure that lifting equipment remains in certification and fit for use at all times to minimise the risk of dropped objects.			
Risk 2 – Vessel collision with megafauna	The movement vessels has the potential to result in collision with megafauna. The risks of vessel strike with megafauna are:	Serious	Highly unlikely	Med	Through constant bridge watch, vessels comply with the *Australian National Guidelines for Whale and Dolphin Watching for Vessels* (DoEE, 2017) when working within the operational area. This means: • Caution zone (300 m either side of whales and	Serious	Remote	Low

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	• Injury; and • Death.				150 m either side of dolphins) – vessels must operate at no wake speed in this zone. • No approach zone (100 m either side of whales and 50 m either side of dolphins) – vessels should not enter this zone and should not wait in front of the direction of travel or an animal or pod/group. • Do not encourage bow riding. • If animals are bow riding, do not change course or speed suddenly. • If there is a need to stop, reduce speed gradually.			
					Vessel crew has completed an environmental induction covering the above-listed requirements for vessel and megafauna interactions.			
					Vessel strike causing injury to or death of a cetacean is reported to the DoEE via the online National Ship Strike Database (https://data.marinemammals.gov.au/report/shipstrike) within 72 hours of the incident.			
					Entanglement of megafauna (such as ROV tether) is reported to the Whale and Dolphin Emergency Hotline on 1300 136 017 as soon as possible. No attempts to disentangle megafauna should be made by vessel crew.			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
Risk 3 – Introduction and establishment of invasive marine species	The following activities have the potential to result in the introduction of IMS in the operational area: • Discharge of ballast water from the PSV and other vessels containing foreign species. • Translocation of foreign species through biofouling on vessel hulls, niches (e.g., thruster tunnels, sea chests) or in-water equipment (e.g., ROV and tethers). The risks of IMS introduction (assuming their survival, colonisation and spread) include:	Major	Unlikely	Med	A pre-qualification is undertaken for all new vessel contractors against Beach's Introduced Marine Species Management Plan ((IMSMP) S4000AH719916) prior to charter to ensure biofouling and ballast water controls meet these EP requirements. The requirements of the IMSMP are outlined herein. Vessels are managed in accordance with the *National Biofouling Management Guidance for the Petroleum Production and Exploration Industry* (AQIS, 2009) and the to ensure they present a low biofouling risk. This means: • Biofouling risk is assessed. • Conducting in-water inspection by divers or inspection in drydock if deemed necessary (based on risk assessment). • Cleaning of hull and internal seawater systems, if deemed necessary. • Anti-fouling coating status taken into account, with antifouling renewal undertaken if deemed necessary. Vessels >400 gross tonnes carry a current International Anti-fouling System (IAFS) Certificate that is complaint with Marine Order Part 98 (Anti-fouling Systems). Vessels are managed in accordance with the *Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic*	Major	Highly unlikely	Medium

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	• Reduction in native marine species diversity and abundance. • Displacement of native marine species. • Depletion of commercial fish stocks (and associated socio-economic effects) • Changes to conservation values of protected areas.				*Species* (IMO, 2011), which involves ensuring that vessels: • Maintain a Biofouling Management Plan; • Maintain a Biofouling Record Book; • Install and maintain an anti-fouling system; • Undertake in-water inspections (and in-water hull cleaning, if appropriate); and • Instruct crews on the application of biofouling management procedures. An IMS risk assessment is undertaken for new PSVs or other vessels based on the following: • Inspecting the IAFS certificate to ensure currency. • Reviewing recent vessel inspection/audit reports to ensure that the risk of IMS introduction is low. • Reviewing recent ports of call to determine the IMS risk of those ports. • Determining the need for in-water cleaning and/or re-application of anti-fouling paint if neither has been done recently in line with anti-fouling and in-water cleaning guidelines (DoA/DoE, 2015). • Implementing the biofouling guidance provided in Part 5 of the Offshore Installation Biosecurity Guideline (DAWR, 2019, v1.3).			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					Prior to vessel transits out of Port Phillip Bay to the operational area, Beach will ensure that the vessel contractor undertakes a biofouling risk assessment (based on the controls outlined above) and submits this to Beach prior to voyage to ensure that the vessel has a low risk of transferring IMS.			
					Immersible equipment is cleaned (e.g., biofouling is removed) prior to initial use in the operational area.			

					Vessels fulfil the requirements of the *Australian Ballast Water Management Requirements* (DAWR, 2017, v7). This includes requirements to:
					• Carry a valid Ballast Water Management Plan (BWMP).
					• Submit a Ballast Water Report (BWR) through the Maritime Arrivals Reporting System (MARS).
					  ○ If intending to discharge internationally-sourced ballast water, submit BWR through MARS at least 12 hours prior to arrival.
					  ○ If intending to discharge Australian-sourced ballast water, seek a low-risk exemption through MARS.
					• Hold a Ballast Water Management Certificate (BWMC).			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					• Ensure all ballast water exchange operations are recorded in a Ballast Water Record System (BWRS). As above, except a BWR is not required for domestic journeys (i.e., when moving between Australian ports and 200 nm of the coastline). *Note: ballast water management is not required between Australian ports and platforms if:* • *Ballast water is taken up and discharged in the same place.* • *Potable water is used as ballast.* • *Ballast water was taken up on the high seas only.* • *The vessel receives a risk-based exemption from ballast water management.* Prior to vessel transits out of Port Phillip Bay to the operational area, Beach will ensure that the vessel contractor undertakes a ballast water risk assessment (based on the controls outlined above) and submits this to Beach prior to voyage to ensure that the vessel has a low risk of transferring IMS. Non-compliant discharges of domestic ballast water are to be reported to the DAWR immediately (contact details in Section 8.9).			
Risk 4 – Loss of	The known and potential risks of the	Minor		Low	All hydrocarbons and chemicals are stored within secure receptacles (DNV rated)	Minor		Low

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
containment (LoC) of bulk chemicals and hydrocarbons	LoC of bulk chemicals and hydrocarbons are: • Temporary and localised reduction of water quality; and • Acute toxicity to marine fauna through ingestion or absorption.		Highly unlikely		within bunded areas or dedicated chemical lockers that drain to bilge tanks (except methanol, due to safety risk). The vessels' PMS is implemented to ensure the integrity of chemical and hydrocarbon storage areas and transfer systems are maintained in good order. Where hydrocarbons and chemicals are stored within open draining decks, receptacles are stored on/in temporary bunds. Crane transfers of bulk chemicals and hydrocarbons are undertaken in accordance with the Lifting and Load Safety Operations Procedure (CDN/ID 3674901) and under a Permit to Work (PTW). Wherever operationally possible, OCNS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals are used (in preference to higher toxicity chemicals). Vessels have approved SMPEPs (or equivalent appropriate to class) that are implemented in the event of a bulk LoC. Vessel crews are regularly trained in spill response techniques in accordance with their SMPEP. In accordance with the SMPEP, oil spill response kits are available in relevant locations around the vessel, are fully		Highly unlikely	

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					stocked and are used in the event of hydrocarbon or chemical spills to deck.			
Risk 5 – Loss of well control (Yolla wells)	Not relevant to the RGP component of the activity.	N/A	N/A	N/A	Not relevant to the RGP component of the activity.	N/A	N/A	N/A
Risk 6 – LoC from rupture of the RGP	There is the risk that there could be an uncontrolled release of hydrocarbons as a result of: • Pipeline failure through internal or external corrosion. • Unsupported pipeline span due to erosion and causing metal fatigue. • Dropped objects (while carrying out platform crane lifts etc). • Vessel anchor drag/trailer net drag. • Extreme weather.	Moderate	Unlikely	Med	*Note that design elements of the pipeline that assists in preventing the uncontrolled release of hydrocarbons are not detailed here. These are addressed in the original EIS.* The pipeline is operated and maintained in line with the NOPSEMA-accepted BassGas Offshore Pipeline Safety Case (CDN/ID 5214688). The CMMS is used to manage (schedule, record and report) the operations and maintenance of the RGP. This includes, but is not limited to: • Glycol dehydration of the well stream (to minimise corrosion); • Continuous corrosion inhibitor injection; • Online monitoring using corrosion probes; • ROV inspections; and • Intelligent pigging inspections. The pipeline is marked on navigation maps in order to minimise the risk of vessel anchoring over the pipeline.	Moderate	Remote	Low

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	• Human error. • Sabotage. Potential environmental risks resulting from a LoC from the pipeline are: • Increase in methane emissions. • Localised and temporary reduction of water quality. • Potential injury or death of marine life. • Disruption to third-party operations such as shipping and commercial fishing (e.g., potential loss of fisheries income resulting from temporary fisheries closures, mortalities from fish stocks [reducing target species				Pipeline production parameters, including flows, pressures, temperatures and erosion are monitored on a 24-hr basis by qualified and trained operators so that abnormalities are quickly detected and resolved. Operations personnel are qualified, trained and certified as competent to operate and maintain the pipeline. The Beach Lifting and Load Safety Operations Procedure (CDN/ID 3674901) is used for all transfers over the pipeline to minimise the risk of suspended equipment dropping onto the pipeline. Approval from the Yolla PIC (or Field Manager) must be granted to Vessel Masters seeking to work over/alongside the pipeline in order to minimise the risk of anchor drag or dropped objects. An OPEP and ERP are in place and tested annually in desktop exercises by those nominated in the plans to be part of the response strategies. Beach will report the spill to regulatory authorities within 2 hours of the LoC or becoming aware of the LoC.			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	availability and subsequently catch per unit effort] or tainted catches). • Damage to water filtering equipment at the Victorian desalination plant (at Wonthaggi), contamination of water supply and disruption to the supply of water services. • Temporary reduction in some values of some coastal marine reserves. • Temporary restriction in recreational values of the coastline.							

Hazard	Impacts	Inherent risk				EPS	Residual risk			
		Consequence		Likelihood	Risk rating		Consequence		Likelihood	Risk rating
Risk 7 – MDO release	A release of MDO may occur from the PSV or vessels undertaking inspection and maintenance activities around the platform or along the RGP. An MDO release may occur as a result of: • A vessel-to-vessel collision. • A vessel-to-platform collision. • Vessel grounding. • Vessel-to-platform refuelling (e.g., top up of crane pedestal). • Vessel refuelling. • Equipment failure. The known and potential impacts of an MDO spill are:	Benthic fauna	Minor	Highly unlikely	Low	*Preventative controls as per 'Physical presence of infrastructure' and 'Routine light emissions.' Additional controls are provided here.* No vessel refuelling is undertaken at sea (this will be done in port) for routine PSV visits. The Yolla-A Bunkering Procedure (CDN/ID 3973929) and the BassGas Adverse Weather Procedure (CDN/ID 3976810) and Field Support Vessel Operations Procedure (CDN/ID 3974221) is implemented in order to prevent an MDO spill during transfers of MDO between the PSV and Yolla-A (if bulkies are not used) or for at-sea refuelling of vessels undertaking inspection and maintenance activities. This will include (but is not limited to): • A JSA and PTW is signed off for each bunkering event, taking into account spill response considerations. • Bunkering hoses are regularly inspected and replaced as required. • Ensuring that the dry-break refuelling hose couplings assembly is in order to minimise the risk of a spill and hose floats are installed on the refuelling hose so that a hose leak is quickly and easily visible. • Ensuring that communications (visual and/or audio) between the platform and the vessel is tested by the PIC	Benthic fauna	Minor	Remote	Low
		Macroalgae communities	Minor	Highly unlikely	Low		Macroalgae communities	Minor	Remote	Low
		Plankton	Minor	Highly unlikely	Low		Plankton	Minor	Remote	Low
		Pelagic fish	Minor	Highly unlikely	Low		Pelagic fish	Minor	Remote	Low

Hazard	Impacts	Inherent risk				EPS	Residual risk			
		Consequence		Likelihood	Risk rating		Consequence		Likelihood	Risk rating
	• A temporary and localised reduction in water quality; • Injury or death of exposed marine fauna and seabirds; • Habitat damage where the spill reaches shorelines; • Damage to water filtering equipment at the Victorian desalination plant (at Wonthaggi), contamination of water supply and disruption to the supply of water services; and • Changes to the functions, interests or	Cetaceans	Minor	Highly unlikely	Low	and Vessel Master prior to bunkering commencing. • Ensuring that fuel transfer hoses are replaced in accordance with the CMMS or when they are visibly degraded. • The bunkering operation is supervised at all times by trained and competent personnel. • Ensuring that bunkering only commences during daylight hours and in calm sea conditions. • Ensuring that flotation buoys are fitted to the transfer hoses so that they remain on the sea surface (enabling prompt detection of leaks). • Ensuring that tank level indicators and level alarms are provided in the control room for the bunkering tanks.	Cetaceans	Minor	Remote	Low
		Pinnipeds	Minor	Highly unlikely	Low		Pinnipeds	Minor	Remote	Low
		Marine reptiles	Minor	Highly unlikely	Low		Marine reptiles	Minor	Remote	Low
		Seabirds	Minor	Highly unlikely	Low		Seabirds	Minor	Remote	Low
		Shorebirds	Moderate	Highly unlikely	Low		Shorebirds	Moderate	Remote	Low
		Sandy beaches	Minor	Highly unlikely	Low		Sandy beaches	Minor	Remote	Low
		Commercial fisheries	Minor	Highly unlikely	Low		Commercial fisheries	Minor	Remote	Low
		Public amenity	Serious	Highly unlikely	Med		Public amenity	Serious	Remote	Low
		Desalination plant	Major	Highly unlikely	Med		Desalination plan	Serious	Remote	Low

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating

	activities of other users (e.g., commercial fisheries).				In order to minimise the risk of vessel-to-vessel collisions, vessels contracted to work on BassGas activities:
					• Comply with the requirements of:
					  ○ *Navigation Act* 2012 (Cth), Chapter 3, Part 3 (Seaworthiness of vessels).
					  ○ Marine Order 21 (Safety and emergency arrangements).
					  ○ Marine Order 30 (Prevention of Collisions).
					  ○ Marine Order 31 (SOLAS and non-SOLAS certification).
					  ○ Marine Order 91 (Marine pollution prevention - oil).
					• Operate navigational lights and communication systems.
					• Maintain navigational lights and communication systems in accordance with their PMS.
					• Have trained and competent crew maintaining 24-hour visual, radar and radio watch for other vessels.
					
					For vessels undertaking work along the pipeline, AMSA and DJPR (EMD) are notified within two weeks of the commencement of the activity so that Notices to Mariners can be generated.
					
					BassGas notifies relevant stakeholders ahead of major vessel-based inspection and maintenance campaigns so that third-party marine users are aware of vessel location and timing.			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					The support vessels have approved SMPEPs (or equivalent appropriate to class) that is implemented in the event of a large MDO spill			
					support vessel crew are trained in spill response techniques in accordance with their SMPEP.			
					In accordance with the SMPEP, oil spill response kits are available in relevant locations around the vessels, are fully stocked and are used in the event of hydrocarbon or chemical spills to deck.			
					Desktop oil spill response exercises are conducted to test the interfaces between the oil spill response strategies and the Beach BassGas OPEP and ERP.			
					An OPEP and ERP are in place and tested annually in desktop exercises by those nominated in the plans to be part of the response strategies.			
					The Vessel Master will authorise actions in accordance with the vessel-specific SMPEP (or equivalent according to class) in order to stop or reduce the flow of MDO to the sea.			
					The BassGas OPEP is implemented to limit the release of a Level 2 or 3 MDO spill.			
					All incidents of spatial conflict with other marine users will be reported in the Beach incident register (CMO).			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					Beach will report the spill to regulatory authorities within 2 hours of the spill or becoming aware of the spill.			
					Beach will undertake operational and scientific monitoring in accordance with the OSMP.			
Risk 8 – Hydrocarbon spill response activities (other than relief well drilling)	The impacts and risks associated with these response options are: • Routine and non-routine impacts and risks associated with vessel operations. • Noise disturbance to marine fauna and shoreline species by aerial flights. • Damage to foreshore environments from foot access. • Temporary exclusion of the	Minor	Possible	Med	Vessels contracted to BassGas activities have a current SMPEP (or as appropriate to class) in place	Minor	Unlikely	Low
					Access to operational response capabilities is maintained through a current contract with AMOSC.			
					A tactical response plan (TRP) will be prepared by mid-2021 for the most at-risk section of coastline from a hydrocarbon spill (San Remo to Cape Paterson).			
					A register of equipment and services providers is readily available.			
					Access to vessel monitoring capabilities is maintained through contracts with the PSV contractor and VoO.			
					Access to aerial monitoring capabilities is maintained through the contract with the helicopter provider (Bristow), who can quickly deploy helicopters for monitoring purposes.			
					Access (24/7) to OSTM capabilities is maintained through a contract with RPS.			
					A monthly review is undertaken of the Beach operational and scientific monitoring capabilities to ensure that the			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	public from beaches. • Disturbance, injury or death of target or non-target wildlife.				Offshore Victoria OSMP can be effectively implemented. AMOSC undertakes regular testing of response arrangements and equipment to ensure it is always ready to respond rapidly. Beach undertakes annual desktop drills in accordance with the BassGas Offshore Operations OPEP to test internal and external spill response capabilities. Vessels contracted to BassGas activities have a current SMPEP (or as appropriate to class) in place. MDO loss is managed through implementation of the vessel SMPEP (or equivalent according to class). Visual observations from the platform and/or PSE and VoO (depending on source of release) is initiated immediately. An Incident Action Plan (IAP) is prepared by the IMT Planning Officer within the first 24 hours of the spill notification, which is used to guide response activities (see the BassGas OPEP for further details). An operational NEBA is prepared to determine the most appropriate spill response strategies within 12 hours of the spill notification. Visual observations from helicopters are initiated within 6 hours of request (subject to daylight hours).			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					Vectoring is undertaken by an onsite spill assessor within 3 hours of spill notification.			
					Real-time OSTM is initiated within 4 hours of notification of the spill and results provided as soon as they are available.			
					Within 6 hrs of spill event notification, a shoreline assessment team has mobilised to areas of predicted impact (daylight permitting). This information and the status of estuaries is provided to the EMT for inclusion in an operational NEBA.			
					An operational NEBA is prepared by the EMT to determine the net benefits of a booming strategy for estuarine areas predicted to be contacted within 4 hours of receiving real-time OSTM.			
					Personnel and equipment resources are deployed to site to undertake the protection and deflection and clean-up activities within timeframes outlined in the IAP.			
					The TRP is implemented.			
					Booming operations (and clean-up, as required) continue until such time as no further sheen is visible on the sea surface, at the direction of the EMT Leader.			
					DELWP personnel and OWR kits are mobilised to site within 24 hours of the notification from monitoring personnel that fauna are impacted or at risk.			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					An operational NEBA is prepared to determine the most appropriate OWR strategies.			
					Helicopters will maintain a buffer distances of 500 m around cetaceans in accordance with EPBC Regulations 2000 (Part 8).			
					Vessels will maintain buffer distances around whales and dolphins in accordance with The Australian National Guidelines for Whale and Dolphin Watching (DoEE, 2017) for those individuals not visibly affected by hydrocarbons (closer approaches may be necessary to determine impacts).			
					Environmental briefings are conducted for shoreline monitoring crews to identify site-specific risks and suitable controls.			
					Access to shorelines is via established tracks (or areas devoid of native vegetation). Access outside of existing tracks is determined in consultation with local DELWP representatives.			
					Vessels do not anchor in and booms are not anchored to areas of OSRA-mapped or visible kelp forest, reef, sponge gardens or seagrass meadows.			
					Adequate monitoring personnel are in place at booming locations to maintain and attend to the operability of booms, including the release of fauna caught in booms (where safe to do so).			
					Waste storage tanks and hoses are located within a contained, impervious area. Spill kits are available at oil recovery area and it			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
					is under supervision and secured from public access.			
					Collected waste is disposed in accordance with Victorian EPA waste disposal requirements.			
					Wildlife is only handled and treated by authorised DELWP, DPIPWE and AMOSC personnel or Phillip Island Nature Park wildlife clinic oiled wildlife responders.			
Risk 9 - Hydrocarbon spill response activities (relief well drilling)	Known and potential environmental risks from mobilising and drilling of a relief well include: • Localised and temporary impacts to marine users and fishing due to physical presence of the drilling rig. • Localised and temporary disturbance to marine fauna due to increased light, atmospheric and noise emissions.	Minor	Almost certain	Med	Beach has an RWP in place that describes the scope of activities, drill rig specifications, schedule and relief well schematic.	Minor	Unlikely	Low
					Beach undertakes desktop drills in accordance with the BassGas Offshore Operations OPEP to test internal and external RWP capabilities.			
					Annual desktop drills and exercises of the Beach EMP are undertaken to test internal and external emergency response capabilities.			
					Call off contracts are in place with well control specialists to ensure rapid mobilisation to site upon request.			
					Rig broker reports are used to monitor the rig market on a quarterly basis to determine the MODUs readily available to undertake a RWP drilling program.			
					An annual review is undertaken of the Beach operational and scientific monitoring capability to ensure that the Offshore Victoria OSMP can be effectively implemented.			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	• Localised and temporary impacts to water quality due to increased nutrient and turbidity levels from discharge of putrescible wastes, sewage and grey water, cooling and brine water and bilge water/deck drainage. • Localised and temporary impacts to water quality and the benthic environment due to the discharge of drill muds, cuttings and cement. • Localised and temporary disturbance to the benthic				An annual review is undertaken of the Beach operational and scientific monitoring capability to ensure that the Offshore Victoria OSMP can be effectively implemented. The Beach SC IMT activates the APPEA Memorandum of Understanding: Mutual Assistance within 6 hours of assembling to facilitate the transfer of a suitable MODU from another operator. The SC IMT ensures that relief well drilling is undertaken in accordance with the RWP. Specific targets of the RWP are: • Wild Well Control, Boots and Coots and/or Alert Disaster are contacted within 6 hours of the blowout and contracted within 6 hours to source relief well drilling specialists. • Rig broker is contacted within 6 hours of the blowout to source a MODU. • A MODU with an accepted Australian Safety Case is contracted within 14 days of the blowout. • The well is killed within 86 days of the start of drilling. Only OCNS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated base fluids and additives are used in the drilling fluid system to minimise ecotoxicity impacts to marine fauna.			

Hazard	Impacts	Inherent risk			EPS	Residual risk		
		Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
	environment due to drill rig anchoring. • Impacts associated with the introduction of IMS.				Operation of the separation treatment system is monitored on a full-time basis by the Derrickman/Shaker Hand to ensure optimal system performance. Drilling fluid testing is performed by the Mud Engineer working under the supervision of the Drilling Supervisor at least twice per day. Only OCNS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated cement additives are used in the drilling fluid system to minimise ecotoxicity impacts to marine fauna. Once good cement returns are noted at the seabed by the ROV Technician, the mixing and pumping of cement will cease, and displacement of the string with drilling fluid will begin.			

Note: med = medium

8. Implementation Strategy

This chapter provides a description of how the commitments outlined throughout the summary EP will be implemented, as required under Regulation 16 of the OPGGS Regulations.

The Beach Operations Excellence Management System (OEMS) is used to govern the BassGas operations. The OEMS provides guidance on how Beach will meet the requirements of its Environmental Policy (Figure 8-1). The Beach OEMS has been developed considering Australian/New Zealand Standard ISO 14001:2016 Environmental Management Systems. The OEMS is an integrated management system and includes all HSE management elements and procedures.

Figure 8-1. The Beach OEMS

There are three standards (Table 8-1**Error! Reference source not found.**) and 11 outcomes to be delivered under this element. To this effect, Beach's Environment Policy provides a clear commitment to conduct its operations in an environmentally responsible and sustainable manner.

Table 8-1. Beach OEM Elements and Standards

Element		Standard
1	Partners, Leadership and Authority	Leadership Standard
		Technical Authority Standard
		Joint Venture Management Standard
2	Financial Management and Business Planning	Integrated Planning Standard
		Phase Gate Standard
		Hydrocarbon Resource Estimation and Reporting Standard
		Financial Management Standard
3	Information Management and Legal Requirements	Regulatory Compliance Standard
		Document Management Standard
		Information Management Standard
4	People, Capability and Health	Training and Competency Standard
		Health Management Standard
5	Contracts and Procurement	Contracts and Procurement Standard
		Transport and Logistics Standard
6	Asset Management	Asset Management Standard
		Maintenance Management Standard
		Well Integrity Management Standard
		Well Construction Management Standard
		Project Management Standard
7	Operational Control	Operational Integrity Standard
		Process Safety Standard
		Management of Change Standard
8	Risk Management and Hazard Control	Risk Management Standard
		Safe Systems of Work
		Emergency and Security Management Standard
9	Incident Management	Incident Management Standard
10	Environment and Community	Environment Management Standard
		Community Engagement Standard
11	Assurance and Reporting	Sustainability Standard
		Assurance Standard

A description of the OEMS and how it relates to environmental management of the offshore RGP operations can be viewed within Chapter 8 of the complete EP on the NOPSEMA website.

8.1 Summary of the Implementation Strategy Commitments

Table 8-2 summarises the commitments provided throughout this Implementation Strategy by assigning EPOs, EPS and measurement criteria to each commitment.

Table 8-2. Summary of BassGas operations implementation strategy commitments

EPO	EPS	Measurement criteria
All records relevant to implementation of the EP are available for 5 years.	All records relevant to implementation of the EP are stored on OpenText.	Documents are readily accessible through OpenText.
Training and competency records are maintained.	The LMS records and tracks core and critical HSE and technical compliance training.	Training records, including the BassGas Workforce Capability Requirements Matrix, are readily accessible through the LMS.
	Due diligence is undertaken on contractors ensure they are competent to work on BassGas facilities.	Contractor due diligence reports are readily available and verify their suitability to work on the facilities.
All personnel working on vessels associated with BassGas are familiar with their HSE responsibilities.	All personnel working on the activity are inducted into BassGas HSE requirements.	crew and visitor lists, along with induction familiarisation checklists are readily available, verifying that all personnel working on and visiting the platform are inducted.
	All personnel working on the PSV and other vessels are inducted into BassGas HSE requirements.	Vessel crew lists, along with induction familiarisation checklists are readily available, verifying that all personnel working on the vessels are inducted.
	Environmental component of HSE induction is reviewed, and updated if required, after each EP revision.	The record of HSE induction reviews, and updates, aligns with the review and update records of the EP.
Platform- and office-based personnel are familiar with their emergency response responsibilities.	All relevant platform- and office-based personnel participate in OPEP and emergency response training, drills and exercises.	Training records, including the BassGas Workforce Capability Requirements Matrix, are readily accessible through the LMS.
Vessel contractors personnel are familiar with their oil spill response responsibilities.	All vessel-based personnel participate in SMPEP training, drills and exercises.	Vessel training records are available and verify that relevant personnel are up to date with their training.
Personnel are familiar with operations HSE issues.	Regular HSE communications take place between platform- and office-based personnel.	HSE meeting records are available and verify regularity of communications.
The BassGas impact and risk register is maintained current.	BassGas operations and environmental personnel contribute to the regular review and revision of the impact and risk register.	BassGas Offshore Impact and Risk Register is available and includes review and revision information.
Incident reports are issued to the regulators as required.	Recordable incidents reports are issued monthly to NOPSEMA.	Recordable and reportable incident reports and associated email correspondence is available to verify their issue to NOPSEMA and DJPR (ERR).
	Reportable incidents are reported to NOPSEMA and DJPR (ERR) in accordance with the timing requirements provided in Table 8.5 of the full EP.	
Incidents are investigated.	Incident investigations are undertaken by suitably qualified and experienced personnel in a timely manner.	Incident investigation reports are available and align with incidents recorded in the CMS incident management system.

EPO	EPS	Measurement criteria
An Annual EP Performance Report is submitted to the regulators.	The Annual EP Performance Report is issued each year to NOPSEMA and DJPR (ERR).	Annual EP Performance Reports and associated email correspondence is available to verify their issue to NOPSEMA and DJPR (ERR).
Emissions and discharges the PSV and other vessels are recorded.	Emissions and discharges from the PSV and other vessels, in line with Table 8.6, are recorded.	Monitoring records are available and align with the requirements in Table 8.6 of the full EP.
Changes to approved plans (including this EP), equipment, plant, standards or procedures are assessed through the MoC process.	Changes are documented in accordance with the MoC Directive.	MoC records are available in the Stature database.
Platform- and office-based personnel are familiar with their ERP and OPEP responsibilities.	All relevant platform- and office-based personnel participate in annual ERP and OPEP training, drills and exercises.	Training records, including the BassGas Workforce Capability Requirements Matrix, verify that ERP and OPEP exercises are undertaken annually.
Risk assessments are undertaken for hazardous materials that are discharged offshore.	The handling, use and storage of hazardous materials and dangerous goods is assessed in a Hazardous Materials Risk Assessment.	Completed Hazardous Materials Risk Assessment forms are available.
Waste is managed such that non-routine discharges overboard are avoided.	A BassGas Waste Management Plan is in place and implemented to ensure that waste is appropriately managed.	Waste disposal records are in place and verify that relevant wastes are received onshore for disposal.
This EP is reviewed and updated on an as-required basis.	This EP is reviewed and updated based on the triggers presented in Section 8.21.1 of the full EP, on an as-required basis.	A record of EP reviews and updates is available in OpenText.
		The review and/or update details are recorded in the document control page of the full EP.
	If the review identifies that significant changes to the EP are required, the EP (and OPEP, if required) is updated and re-issued to the regulators.	A record of EP revision is included in the document control page of this EP.
		Associated correspondence is available to verify the re-issue of the EP to NOPSEMA and DJPR (ERR).
There is continuous environmental management oversight of BassGas operations.	Beach employs environmental personnel to ensure there is continuous environmental management oversight of BassGas operations.	Environmental meeting notes, annual EP performance reports and environmental inspection and audit reports are available and verify continuous environmental management oversight.

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