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GOLDEN BEACH DRILLING GB3, GB4 & GB5

ENVIRONMENT PLAN SUMMARY

Vic/RL1(V)

Revision 0

GB Energy (Vic) Pty Limited
ABN 63615553010

Rev	Date	Description	Author	Checked	Approved	Document
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Acronyms

Acronym	Definition
2D	Two-dimensional
3D	Three-dimensional
AFMA	Australian Fisheries Management Authority
AHO	Australian Hydrographic Office
ALA	Atlas of Living Australia
ALARP	As Low As Reasonably Practicable
AMSA	Australian Maritime Safety Authority
AMP	Australian Marine Park
APPEA	Australian Petroleum Production and Exploration Association
ATBA	Area To Be Avoided
BIA	Biologically Important Area
BoM	Bureau of Meteorology
BOP	Blow Out Preventer
BWRS	Ballast Water Record System
CASA	Civil Aviation Safety Authority
CBiCS	Combined Biotope Classification Scheme
CEFAS	Centres for Environment, Fisheries and Aquaculture Science
CFA	Commonwealth Fisheries Association
CHARM	Chemical Hazard and Risk Management
CHMP	Cultural Heritage Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DAWE	Department of Agriculture, Water and the Environment
DAWR	Department of Agriculture and Water Resources (Cth)
dB	Decibel
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEDJTR	Victorian Department of Economic Development, Jobs, Transport and Resources (Vic) (former)
DEECA	Department of Energy, Environment and Climate Action
DELWP	Department of Environment, Land, Water and Planning (Vic)
DoD	Department of Defence (Cth)
DoE	Department of the Environment (Cth) (*former*)
DoEE	Department of Environment and Energy (Cth)
DP	Dynamic Positioning
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (Cth) (*former*)
DTP	Department of Transport and Planning
EAC	East Australian Current
EARPL	Esso Australia Resources Pty Ltd
EES	Environmental Effects Statement
EIA	Environmental Impact Assessment
EMBA	Environment that May Be Affected

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Acronym	Definition
EMS	Environmental Management System
EP	Environment Plan
EPA	Environment Protection Authority (Vic)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPO	Environmental Performance Outcome
EPS	Environmental Performance Standard
ERA	Environmental Risk Assessment
ERC	Emergency Response Coordinator
ERP	Emergency Response Plan
ESD	Environmentally Sustainable Development
EZAIA	Eastern Zone Abalone Industry Association
FFG Act	*Flora and Fauna Guarantee Act 1988* (Vic)
FFS	Fishing-Friendly Structure
FIV	Formation Isolation Valve
FNUCH	First Nations Underwater Cultural Heritage
GAB	Great Australian Bight
GB Energy	GB Energy (Vic) Pty Limited
GLaWAC	Gunaikurnai Land & Waters Aboriginal Corporation
GMP	Garbage Management Plan
GP	Gravel Pack
GPF	Gas Processing Facility
GPS	Global Positioning System
HDD	Horizontal Directional Drill / Horizontally Directionally Drilled
HP	High pressure
HPWHH	High Pressure Well Head Housing
HR	High-resolution
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
IACS	International Association of Classification Societies
IAP	Incident Action Plan
IAP2	International Association for Public Participation
IMS	Invasive Marine Species
IMT	Incident Management Team
JUDR	Jack Up Drilling Rig
KEF	Key Ecological Feature
LEFCOL	Lakes Entrance Fisherman's Cooperative
LiDAR	Light Detection and Ranging
LWD	Logging while drilling
MARPOL	International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978
MARS	Maritime Arrivals Reporting System
MDO	Marine Diesel Oil
MNES	Matter/s of National Environmental Significance
MNP	Marine National Park

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Acronym	Definition
MO	Marine Order
MoC	Management of Change
MSL	Mean Sea level
MSV	Maritime Safety Victoria
NEBA	Net Environmental Benefit Analysis
NatPlan	National Plan for Maritime Environmental Emergencies
NNTT	National Native Title Tribunal
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NTM	Notice to Mariners
NZ	New Zealand
OCNS	Offshore Chemical Notification Scheme
OHGP	Open Hole Gravel Pack
OIM	Offshore Installation Manager
OIW	Oil-in-Water
OPEP	Oil Pollution Emergency Plan
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act* (Cth & Vic)
OPGGS	Offshore Petroleum and Greenhouse Gas Storage
ORCA	Oil Response Company of Australia
OSPAR	Oslo-Paris Conventions
OSRA	Oil Spill Response Atlas
OSRT	Oil Spill Response Team
OWR	Oiled Wildlife Response
PCS	Port Closure Sleeve
PBW	Pygmy Blue Whale
PMS	Planned Maintenance System
PMST	Protected Matters Search Tool
PSV	Platform Supply Vessel
PSZ	Petroleum Safety Zone
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
RIV	Reservoir Isolation Valve
ROS	Regional Outfall Sewer
ROV	Remotely Operated (underwater) Vehicle
RVRO	Resources Victoria – Regulatory Operations
SA	South Australia/n
SAR	Search and Rescue
SCAT	Shoreline Clean-up and Assessment Technique
SEEMP	Ship Energy Efficiency Management Plan
SEP	Stakeholder Engagement Plan
SESS	Southern and Eastern Scalefish and Shark
SESSF	Southern and Eastern Scalefish and Shark Fishery
SETFIA	South-East Trawl Fishing Industry Association
SHS	Scalefish Hook Sector
SIMOPS	Simultaneous Operations

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Acronym	Definition
SIV	Seafood Industry Victoria
SMPEP	Shipboard Marine Pollution Emergency Plan
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
STP	Sewage Treatment Plant
TEC	Threatened Ecological Communities
TD	Total Depth
TH	Tubing Hanger
TRG	Technical Reference Group
TSV	Transport Safety Victoria
UXO	Unexploded Ordinance
VBA	Victorian Biodiversity Atlas
VFA	Victorian Fisheries Authority
VHF	Very High Frequency
WA	Western Australia/n
WBA	Water Based Mud
WMC	Well Management Contractor
WOMP	Well Operations Management Plan

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1 Introduction

1.1 Background

GB Energy (Vic) Pty Limited (GB Energy) as the sole holder and operator of Retention Lease Vic/RL1(V), is developing the Golden Beach gas field (the Golden Beach Field) located in the Gippsland Basin approximately 4 km offshore from the Ninety-Mile Beach close to the Golden Beach township, Victoria (Figure 1-1).

The Golden Beach Energy Storage Project (the Project) comprises three phases, the first being the production of a limited amount (10-42 petajoules) of natural gas currently within the reservoir which will be processed at a new, Golden Beach Gas Processing Facility (Golden Beach GPF) on a greenfield site close to the Longford Gas plant. The Project will then transition to an underground offshore gas storage facility. This phase will enable gas to be injected at times of low demand (often in summer) and withdrawn during periods of high demand (usually winter), providing essential supply flexibility to the Victorian energy market. GB Energy is targeting first gas supply in 2028, before transitioning to a flexible storage facility in 2029.

As part of the ongoing development of the Project, GB Energy is proposing to conduct a drilling program to drill 3 horizontal production wells using a Jack Up Drilling Rig (JUDR). The defined Activity area is situated wholly within Victorian State waters (Figure 1-1) and incorporates an indicative drilling campaign footprint shown in Figure 2-1. The activity is expected to take a total of 130 days and is scheduled to commence in 2H 2026. The exact timing is contingent on the receipt of all approvals, the contract of a suitable jack up rig and vessels.

The activity will be conducted in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act 2010 (Vic) (OPGGS Act).

A detailed description of the activity is included in Section 2.6.

1.2 Purpose

The purpose is to drill and complete three development wells for the dual purpose of future gas production and storage by extracting gas from and injecting gas into the targeted reservoir sands, from the time the JUDR first enters the Activity area (see Section 2.2), until the time that it jacks-down and departs the Activity area.

The Activity will be conducted entirely within Victorian State waters in accordance with the Offshore Petroleum and Greenhouse Gas Storage Act 2010 (Vic) (OPGGS Act).

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1.3 Purpose of this Document

This EP Summary is prepared in accordance with the requirements of Regulation 13E of the Regulations. Table 1-1 outlines where the requirements of this regulation are met in this document.

Table 1-1 Addressing this EP Summary against the OPPGS Regulation 13E requirements

Regulation 13E requirement	Location in this EP summary
Location of the Activity	Figure 1-1 and Table 2-1
Description of the receiving environment	Chapter 4
Description of the Activity	Chapter 2
Details of environmental impacts and risks	Chapter 6
Summary of the control measures for the Activity	Chapter 6
Summary of arrangements for ongoing monitoring of the authority holder's environmental performance	Section 7.9
Summary of environmental emergency response arrangements	Section 6 and 7.4
Consultations undertaken and plans for ongoing consultation	Chapter 3
Details of authority holder's nominated contact for the Activity	Section 1.4

1.4 Proponent

In accordance with Regulation 18 of the Victorian Offshore Petroleum and Greenhouse Gas Storage Regulations 2021 (hereafter referred to as OPGGS Regulations), the titleholder and nominated liaison contact details for this Activity are provided below:

- David Standfield (Project Director)
- 90 Collins St, Melbourne, Victoria 3000
- Phone: 0477 354 149
- Email: des@gbenergy.com.au

GB Energy will notify the regulator of a change in GB Energy's nominated liaison person or contact details in line with OPGGS Regulation 18(3).

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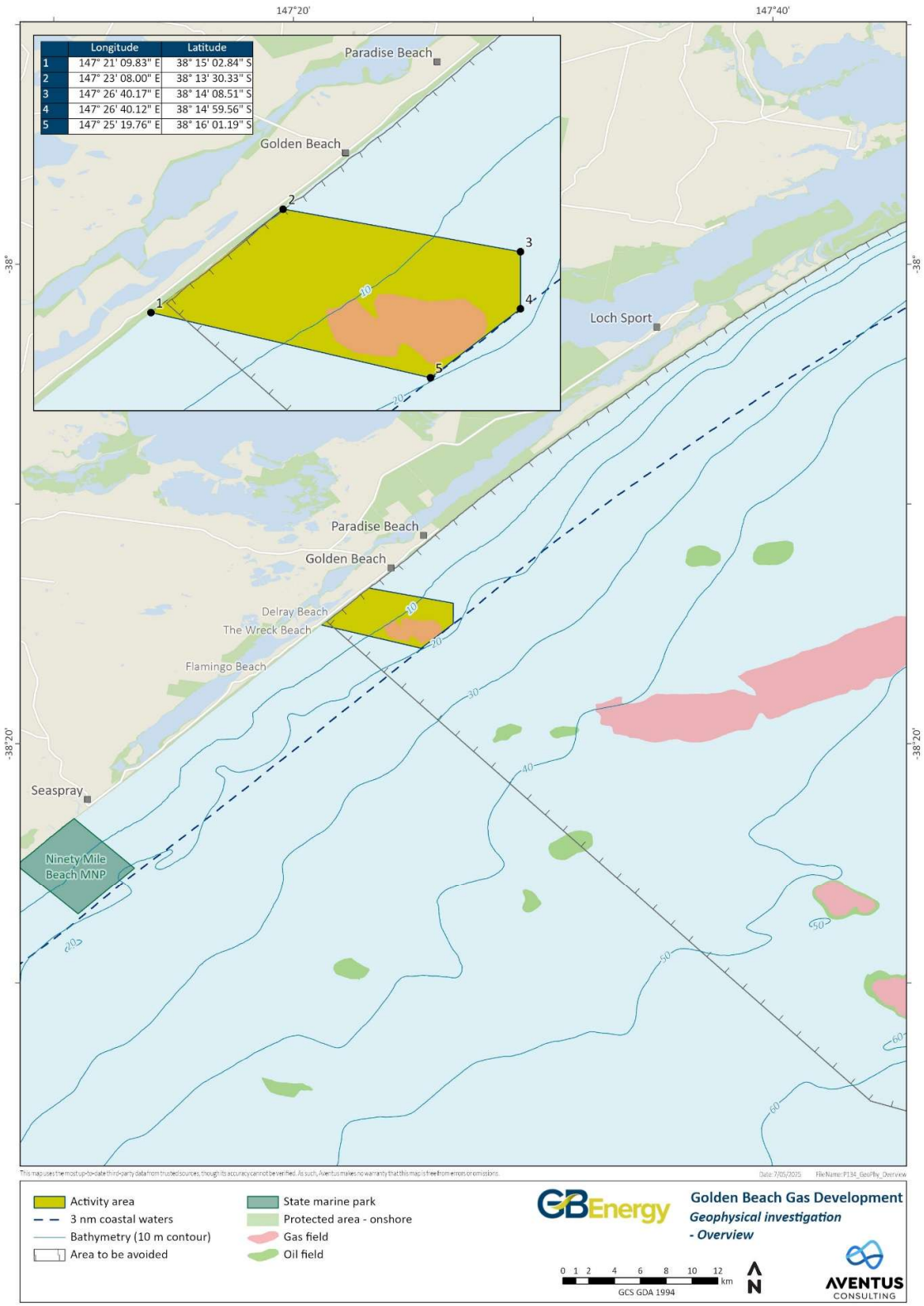


Figure 1-1 Project location

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2 Activity Description

2.1 Activity Location

The Vic/RL1(V) permit is located in Victorian state waters (Figure 1-1). The drilling campaign will take place in the permit area.

The Activity area includes the drill sites and a 500 m buffer around the drill site (Figure 2-1) as this reflects the extent of the temporary Petroleum Safety Zone (PSZ) that will be gazetted prior to commencement of drilling and is the area in which the drilling rig will have operational control over the support vessels. Three development wells (Golden Beach (GB3, GB4 & GB5) are proposed to be drilled, and the coordinates of the drill locations are outlined in Table 2-1. It is planned that all three development wells can be drilled from the one rig location. Water depth at the drill site is 20 m, referenced to mean sea level (MSL).

Table 2-1 Drill wells locations

Well	License	Longitude	Latitude	Water depth
GB3	Vic/RL1(V)	147° 25' 1.502" E	38° 14' 53.522" S	20 m
GB4	Vic/RL1(V)	147° 25' 1.737" E	38° 14' 53.391" S	20 m
GB5	Vic/RL1(V)	147° 25' 1.266" E	38° 14' 53.653" S	20 m

At its closest point, the drill centre is located approximately 4.3 km southwest of the Golden Beach township, with the Golden Beach Activity area located approximately 3.5 km southwest of the township centre. Golden Beach is situated midway along the Ninety Mile Beach between Loch Sport and Seaspray in South Gippsland.

Distances from the drill site and Activity area to nearby features are provided in Table 2-2.

Table 2-2 Distances from the drill site to key regional features

Feature	Distance and direction to the nearest point of feature	
	From drill site	From Activity area
Towns		
Golden Beach (town centre)	4.3 km northeast	3.5 km northeast
Paradise Beach	6.6 km north	5.2 km northeast
Honeysuckles	21 km southwest	18.3 km southwest
Seaspray	24.1 km southwest	22.5 km southwest
Loch Sport	27.1 km northeast	25.5 km northeast
Lakes Entrance	65.8 km northeast	63.5 km northeast
Petroleum infrastructure		
Golden Beach-1/-1A (Plugged & Abandoned, P&A)	1 km southeast	800 m southeast
Golden Beach West-1 (onshore) (P&A)	5.3 km west	4.0km west-north-west

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Feature	Distance and direction to the nearest point of feature	
	From drill site	From Activity area
Golden Beach -2 (Plugged & Abandoned, P&A)	549 meters west-south-west	54meters west-south-west
Bream to shore pipeline: Vic/PL32 & Vic/PL32(V) (gas)	6 km northeast	6.2 km northeast
Barracouta to shore pipeline: Vic/PL1 & Vic/PL1(V) (gas)	7.3 km northeast	7.3 km northeast
Tarwhine subsea well (oil)	19.8 km southeast	17.5 south
Seahorse subsea wells (nearest) (oil)	23.3 km east	18.5 km east
Tarwhine to Barracouta A pipeline (oil)	19.4 km southeast	18.5 km south
Dolphin to shore pipeline (oil)	21.7 km southwest	18.5 km west
Tasmanian gas pipeline	23.5 km southwest	21.5 km west
Seahorse to Barracouta A pipeline (oil)	22 km east	23.5 km east
Non-petroleum infrastructure		
Regional Outfall Sewer (ROS) (Delray Beach)	3.8 km northwest	1 km northwest
Basslink electricity interconnector cable	36.1 km southwest	31.5 km southwest
Australian Marine Parks (AMPs)		
Beagle	98.5 km southwest	95.5 km southwest
Victorian marine parks		
Ninety Mile Beach Marine National Park (MNP)	25.4 km southwest	24.5 km southwest
Natural features		
Lakes Entrance (channel)	62.9 km northeast	61.5 km northeast
Hogan Island group	111.8 km southwest	109.5 km southwest

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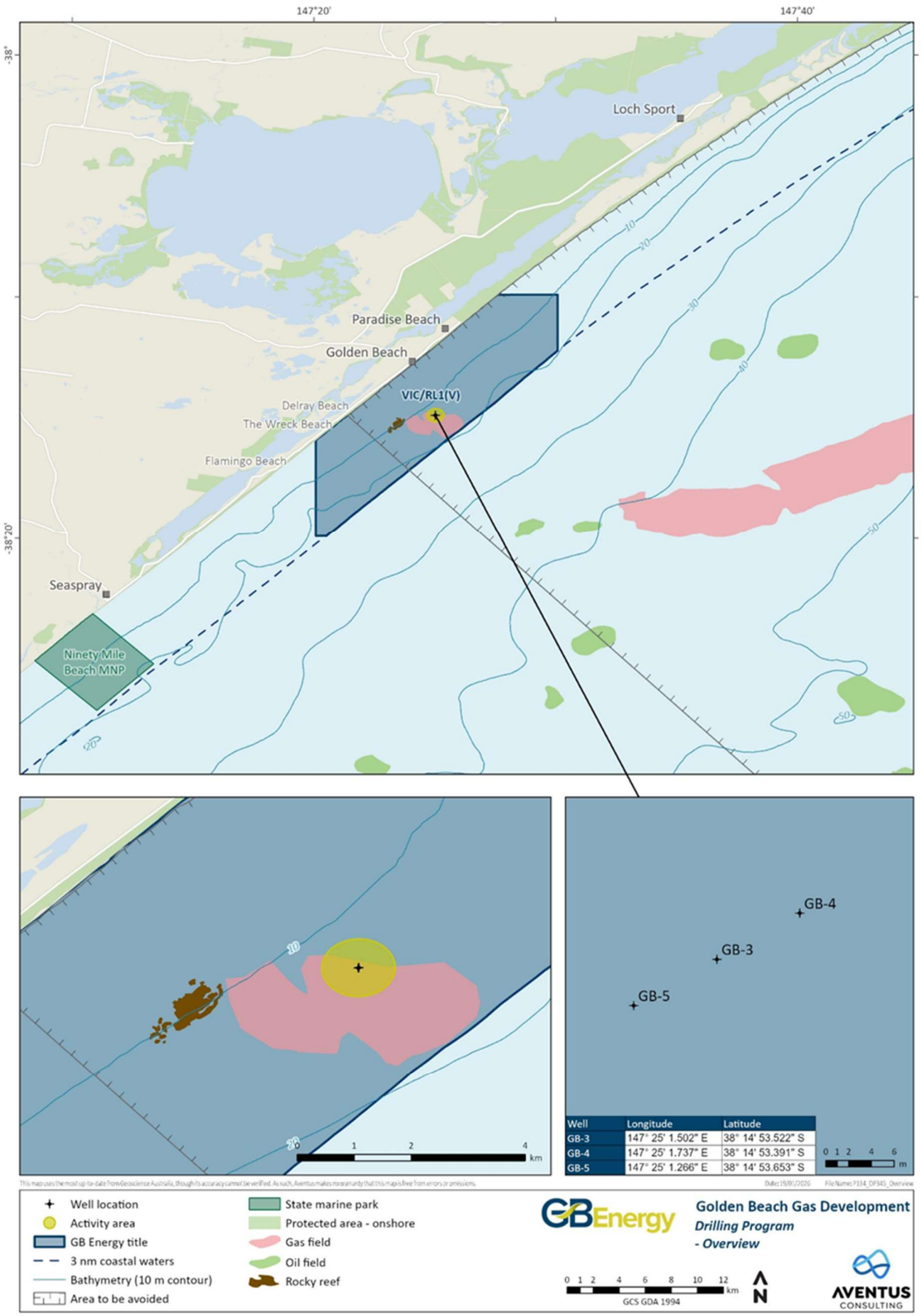


Figure 2-1 The Activity area

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2.2 Timing and Duration

The activity is expected to take approximately 130 days and is scheduled to commence in second half 2026, contingent on the availability of a suitable jack up rig and the receipt of regulatory approvals. Operations will be conducted on a 24-hour basis.

The rig commencement date is defined as the date on which the rig is contractually available to commence operations. Drilling activities are currently anticipated to occur between November 2026 and approximately March 2027, encompassing the peak holiday periods and the End of Summer Surf Festival.

2.3 Project Management

GB Energy will manage this Activity directly and is building up an in-house technical team comprised of highly experienced oil and gas professionals. GB Energy has contracted AGR Australia Pty Ltd (AGR) as the Well Management Contractor (WMC). AGR is responsible for providing project management and well delivery services for the activity.

2.4 Field Characteristics

The Golden Beach structure is a large, closed anticline ("dome"), measuring approximately 10 km by 7 km, oriented east-west and containing the Gippsland Basin formations strata of the Seaspray and Latrobe Groups. The anticline is mapped from continuous quality three-dimensional (3D) seismic surveys in the offshore domain (including the 2018 Pelican 3D marine seismic survey (MSS) conducted by the CarbonNet Project), and good quality reprocessed two-dimensional (2D) seismic data onshore. Table 2.3 summarises the Gippsland Basin stratigraphy.

The GB-2 drilling campaign conducted in 2023, collected two gas samples from the reservoir. Compositional analysis was conducted by PetroLab and results aligned with the original GB-1A test results from 1967, confirming the gas to be approximately 94% methane.

Table 2-3 GB Energy reservoir composition

Composition	Mol % (AB Sand)	Mol % (Gurnard Sand)
Methane	93.61	93.71
Ethane	0.09	0.08
Propane	0.00	0.00
Nitrogen	6.04	6.01
Carbon Dioxide	0.15	0.11
Helium	0.11	0.09
Hydrogen	0.00	0.00
Total	100.00	100.00
Additional Elements		
Hydrogen Sulphide	2.00 ppm	<0.5 ppm
Mercury	2.4 ug/m^3	3.8 ug/m^3

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2.5 Drilling Operations

This section provides details on the drilling activity relating to the JUDR, support vessels, helicopter and supply base for the Project.

2.5.1 Jack-up drilling rig specifications

The wells will be drilled using a JUDR (Photo 1). JUDR's are typically used for drilling in water depths of less than 150 m. GB Energy has contracted the Valaris 107 JUDR for this drilling campaign.

- the JUDR will be towed into position by support vessels
- a mooring may be installed within the permit area for usage at standby to the rig
- if operational requirements arise—such as the inability to secure the rig at the initial location due to geophysical constraints—the rig may be relocated to an alternative site, which will be no more than 50 metres from the current designated well locations. At this time, the tow vessels will be reconfigured to facilitate the final positioning. This activity is not planned unless metocean conditions at the time require it.
- once on the desired location and with the JUDR stationary, the legs will be lowered to be in contact with the seabed, the rig hull raised +/-3 m above the sea surface ('air gap') and rig stabilisation activities conducted (pre-loading)
- when pre-loading activities are completed the JUDR will be jacked up approximately 15 m above the sea surface. At this point, the drilling derrick will be cantilevered over the edge of the JUDR in readiness for drilling.



Photo 1: The Valaris 107 Jack Up Drilling rig

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Table 2-4 JUDR technical specifications

JUDR technical specifications		
Rig name	Valaris 107	
Owner	Valaris	
Design	Keppel Fels Mod V Enhanced B Class, non-propelled, self-elevating (jack up)	
Built	Singapore	
Class	ABS A1 Self Elevating Drilling Unit	
Registry	Monrovia, Republic of Liberia	
Principal dimensions	Lightship, elevated	8102MT
	Lightship, afloat	11,889MT
	Length between perpendiculars	71.3m
	Length including helideck	95.7m
	Width, overall	68.8m
	Height, overall	7.78m
	Maximum operating water depth	122m
	Maximum drilling depth	9,144m
Draft and displacement	Load line displacement (spud cans flooded)	14,657MT
	Load line displacement (spud cans buoyant)	15,994MT
	Load line draft	4.88m
Accommodation	112 persons on board	
Fluid capacities	Preload (seawater)	10,536m3
	Diesel fuel	469m3
	Lubrication oil	3.5m3
	Drill water	3,194m3
	Brine	159m3
	Liquid mud	619m3
	Potable water	326m3
	Base oil	159m3
	Bulk cement	314m3
	Bulk barite/bentonite	165m3
	Bilge	537m3
	Waste oil	19.5m3

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JUDR technical specifications		
Well control equipment	Annular preventer	1x 18-3/4", 5ksi
	Ram preventers	2 x 18-3/4", 10ksi double cavity (Pipe) 1 x Pipe /1 Shear x 18-3/4", 10ksi double cavity
	Diverter	1.193m pass through; fixed

2.5.2 Support vessels

The JUDR will be serviced by chartered vessels which will include anchor handling / towing vessels (AHTV) and/or platform supply vessels (PSV). These will operate out of ports in the region, such as Melbourne, Geelong, or Barry Beach.

Support vessels will primarily operate on dynamic positioning (DP) when loading and unloading activities alongside the JUDR, with their anchors racked. Vessels will not use their anchors when supporting operations alongside the rig. Vessels engaged in towing do not utilise DP in routine towing operations.

All vessels supporting the GB Energy activities will require certification as following international maritime legislative requirements by a Classification Society registered with International Association of Classification Societies (IACS) or by AMSA and be specified and operated in accordance with International and Australian regulatory requirements.

Vessel support activities could include:

- towing of the JUDR to GB Energy well's location
- positioning the JUDR on location
- supplying provisions including food, bulk chemicals, and diesel fuels, and drilling & completions materials to the JUDR and removal of waste to shore
- deployment of ROVs or other subsea equipment (unplanned activity)
- surveys and other subsea activities including subsea deployment and recovery of equipment from the seabed (unplanned activity)
- transferring personnel (unplanned activity)
- standby duties
- monitoring and maintaining the 500m PSZ or any additional safety zones
- marine fauna observations via watchkeeper
- emergency response and rescue.

2.5.3 Helicopter support

Helicopter support will be provided from either Longford heliport, West Sale airport, Tooradin airport or Essendon airport, to support the activities as follows:

- personnel transfers between shore and the rig for crew changes
- optional freight helicopter support, when required
- emergency response, including medivac, evacuation, and search and rescue.

Routine helicopter operations will be restricted to daylight hours. Helicopter selection, suitability, and performance requirements are governed by contractual agreements. Helicopter travel risks are managed by using CASA approved helicopter operators. All emergency helicopter services, including medical evacuations and search and rescue (Medivac/SAR), will be provided by Air Ambulance Victoria.

2.5.4 Supply Base

Marine operations will be based out of ports in the region, such as Melbourne, Geelong or Barry Beach.

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Drilling equipment, tubulars, fluids, bulks and cement will be stored at, or transit through, this supply base and subsequently be delivered to the JUDR by the support vessels. All cement will be mixed onboard the JUDR.

2.6 Drilling Program

The GB Energy wells will be drilled and completed as described in the steps below:

- move/skid JUDR over well location
- drill 30” x 36” hole and run/cement 30” x 24” conductor string c/w Permanent Guide Base (PGB)
- drill 17 ½” hole, open hole to 22” and run/cement 20” x 16” casing c/w 18¾” High Pressure Well head Housing (HPWHH)
- run High Pressure (HP) Drilling riser and nipple up and test surface Blow Out Preventer (BOP)
- drill 12 ¼” x 14 ¾” hole and run/cement 11 ¾” x 10 ¾” casing
- drill 9 ½“horizontal hole to Total Depth (TD) and run lower completion / pump Open Hole Gravel Pack (OHGP)
- close Formation Isolation Valve (FIV)
- clean-up casing and circulate to Inhibited completion brine
- run upper completion
- Tubing Hanger (TH) on simplified landing string
- orient TH in HP WHH and land out
- displace upper completion to Base oil (with Nitrogen as contingency) to achieve underbalance on reservoir
- set and test production packer and tubing hanger
- set wireline suspension plug in TH
- nipple down surface BOP and recover HP riser
- run, land and test subsea tree using open water landing string
- recover suspension plug from TH and pressure cycle open FIV
- clean-up well to rig based well test unit
- shut-in well and perform suspension / pressure tests on subsea tree
- recover open water landing string
- install and test tree cap with ROV
- install the fishing friendly structure
- skid to next well or move rig off location.

Note: Some operations may be batched e.g. top-hole sections, subsea tree installation and well test.

2.6.1 Drilling Fluids

Drilling fluids will be used during the drilling program to provide a range of functions, including:

- control of formation pressures (i.e., providing a hydrostatic head by managing mud density to control formation pressures and maintain well stability)
- transport of drill cuttings out of the hole to the seabed or back to JUDR for discharge
- act as a conduit to send real time geological and survey data from the drill bit to surface
- maintenance of drill bit and assembly (i.e., lubrication, cooling and support)
- sealing of permeable formations to prevent formation invasion

The selection of drilling fluids to be used during the drilling program is undertaken through an evaluation of the technical, safety, commercial and environmental attributes.

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Seawater, drill water or brine will serve as the primary base fluid for drilling and completions operations. The conductor and surface hole sections will be drilled riserless using seawater and periodic sweeps. Inert drilling fluid additives will be mixed with the seawater or drill water to create a water-based mud (WBM). Specific details regarding the fluid additives will be confirmed following the selection of a drilling fluids contractor. The contractor will be chosen from global service providers operating in Australia, such as Schlumberger or Halliburton.

At the end of the program, remaining bulk drilling muds will be transported onshore and managed in accordance with Environment Protection Regulations 2021, Part 4.2 – Industrial waste and Priority waste. Any dry, unopened sacks of chemicals left over at the end of drilling will be returned to shore.

2.6.2 Cuttings discharge

Consistent with industry practice, all cuttings generated from drilling will be returned to the seabed or sea surface where they will be dispersed or deposited in the vicinity of the JUDR.

The surface hole sections will be drilled with seawater and viscous sweeps made from pre-hydrated gel (PHG) or polymer. The PHG sweeps and the drill cuttings from the well will be discharged at the seabed.

The intermediate and production hole sections will be drilled using a WBM recirculating drilling fluid system. The fluids returned with the drilled cuttings will initially pass through a shale shaker on the rig where the drilled cuttings will be separated from the mud and discharged overboard. Table 2-5 outlines the cuttings discharge locations per hole section.

Table 2-5 Approximate drilling cuttings location and fluid selection

Hole size	Cuttings discharge location	Fluid type to drill section
30” x 36” (Conductor)	Seabed	Seawater/ gel sweeps
17 ½” opened to 22” (Surface)	Seabed	Seawater/ gel sweeps
12 ¼” x 14 ¾” (Intermediate)	JUDR / Sea surface	WBM
9 ½” (Reservoir)	JUDR / Sea surface	WBM

The calculated volumes of drill cuttings and drilling and completion fluids, including mud discharged at the end of the well, to be generated and discharged are outlined in Table 2-6.

In the event that a well has to be sidetracked or redrilled then a similar quantity of cuttings will be produced from any redrilled section.

Table 2-6 Approximate drilling cuttings volumes per well

Hole Interval	Cuttings Volume (m^3)	Cuttings Volume (bbls)	Fluid Type	Fluid Discharge Volume (m3)	Fluid Discharge Volume (bbls)
30” x 36” (Conductor)	31	196	water based	556	3500
17 ½” opened to 22” (Surface)	76	478	water based	795	5000
12 ¼” x 14 ¾” (Intermediate)	64	400	water based	596	3750
9 ½” (Reservoir)	14	86	water based	453	2850
Completion	-	-	Brine	556	3500

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2.6.3 Cementing operations

Cement will be transported as dry bulk to the JUDR by support vessels and stored in dry bulk storage tanks on the JUDR.

As the cement is loaded into storage tanks, vents will release compressed air carrying small amounts of cement dust which will be discharged below the JUDR's elevated hull into the atmosphere.

Following the completion of the drilling of the upper and intermediate hole sections, casings will be installed and the annuli between the casings and the hole sections will be cemented. The final drilling program will be confirmed once a cementing service provider is selected.

An indicative outline of the GB Energy wells cementing program is detailed in the following sub sections and summarised in Table 2-7.

Cementing testing

A cement mixing and pumping test may be conducted prior to the first conductor cementing operation to ensure equipment and personnel at the rig are best prepared for these critical cement jobs. The approximate volume of the cement test would be 8m3.

Conductor Installation

The 30" conductor is planned to be cemented back to the seabed. A 15.8 ppg slurry is expected to be used to ensure the conductor provides adequate structural support for both the wellhead and the future installation of the Xmas Tree. Cement returns are expected at the seabed. The final cement slurry formulation will be detailed in the well program. If primary cementing does not achieve full return to the seabed, a remedial cement job will be performed to grout the top of the conductor.

Surface casing

The surface casing is expected to be cemented using a 12.5 ppg (or heavier) lead slurry, followed by a 15.8 ppg tail slurry, with cement returns to the seabed. The final cement slurry formulation will be specified in the well program.

Production casing installation

The production casing will be cemented in accordance with Wells Operations Management Plan (WOMP) requirements. Specifically, the top of cement is planned to reach near the top of the Lakes Entrance Formation to provide a primary cement column suitable for a future rock-to-rock abandonment plug exceeding 60 meters in length. A 15.8 ppg cement slurry will be placed at the casing shoe, with a lighter lead slurry pumped ahead as required for cement height and formation strength. Final cement slurry design and formulation will be detailed in the cementing program.

Cement will be mixed as needed to minimise waste. In the unlikely event of operational problems during cement mixing or pumping—such as a malfunction in the liquid additive system leading to improper slurry formulation and potential barrier integrity concerns—the partially placed cement may be fully displaced from the wellbore and discharged either at the surface or to the seabed. The cementing operation will then be re-executed to achieve proper zonal isolation.

Following each cementing activity, the cementing head and blending tanks are cleaned, resulting in the release of diluted cement slurry into the ocean.

At the conclusion of the drilling program, and assuming the JUDR transitions directly to another operator, any remaining standard cement will be transferred to that operator. If this transfer is not possible, the cement will be transported onshore and managed in accordance with Environment Protection Regulations 2021, Part 4.2 – Industrial waste and Priority waste. Efforts will be made to minimise the volume of unused cement remaining at the end of the program.

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Table 2-7 GB development well cementing program

Casing Size	Density (ppg)	Top Of Cement (TOC) height	Class	Open Hole Excess	Job Objectives
30” Conductor	15.8	Seabed	Class G	300%	Structural integrity
16” Casing	12.5	Seabed	Class G	100%	Shoe integrity
	15.8	150 m above shoe depth	Class G		
11¾” x 10¾” Casing	12.5	150 m above 15.8 ppg tail cement[1]	Class G	25%	Shoe integrity
	15.8	300 m above shoe depth	Class G		

2.6.4 Well evaluation

During drilling operations, it is essential to collect formation data or samples to support ongoing activities and optimize hydrocarbon recovery from the reservoir. Where feasible, this information is obtained in real time using logging-while-drilling (LWD) tools.

2.6.5 Completions operations

Completion operations in the GB Energy wells involve multiple phases, including lower (gravel pack), intermediate (contingency), and upper completions. These activities will result in various types of discharges from the JUDR, including:

- drilling fluids displaced from the well during completion operations
- gravel pack fluids, comprising water-based carrier fluids, chemical breakers, and proppant
- tubing treatment fluids
- weighted and viscous water-based fluids used for well control and wellbore cleaning
- solvent used to remove any excess pipe-dope from inside the drill string, prior to pumping the gravel packs
- dilute hydrochloric acid (acid pickle) used to clean surface piping, hoses, and drill pipe prior to pumping the gravel packs.

Lower completion (gravel pack)

After drilling the approximate 300 m, 9½" outside diameter (OD) horizontal section, the open hole will be conditioned and circulated with Solids Free Mud (SFM). Gravel pack screens and a 3.5" inner workstring will then be run to total depth (TD), the gravel pack packer will be set, and an OHGP operation will be performed.

The gravel pack screens utilize alternate path technology, which requires a viscosified gel carrier fluid to displace the SFM from the open hole/screen section and transport the gravel pack proppant downhole. Once pumping is complete, any excess proppant will be reversed out of the well, followed by circulation of a gel breaker into the gravel pack section.

A return permeability test will be conducted as part of detailed design to assess whether a mud filter cake breaker is needed to enhance reservoir connectivity. If necessary, the filter cake breaker may be incorporated into the GP carrier fluid or pumped into the gravel pack section at this stage.

The gravel pack (GP) setting tool will then be released from the packer, and the 3.5" inner work string will be retrieved from inside the gravel pack screens. During retrieval, the Reservoir Isolation Valve (RIV) and GP Port Closure Sleeve (PCS) will be closed.

The lower completion will comprise:

- 5½" Alternate Path gravel pack screens and gravel

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- 9⅝" Formation Isolation Valve (FIV-II)
- GP Port Closure Sleeve (PCS)
- 10¾" GP Packer

Intermediate completion (contingency)

The combination of the GP packer, RIV, and PCS forms the lower barrier, which will be pressure tested to confirm integrity. If the test fails, an intermediate completion may be installed as a contingency. A wellbore clean-up run will then be carried out to prepare for the upper completion installation.

Upper completion

Prior to running the upper completion string, a second wellbore clean-up run may be conducted if necessary. The wellbore will then be circulated with filtered, inhibited completion brine (NaBr/NaCl-based), which will remain in the well.

The upper completion will consist of:

- 7" x 8⅝", 13 Chrome tubing
- 10¾" x 7" production packer
- 7" downhole pressure/temperature gauge (PDHG)
- 7" Surface-Controlled Subsurface Valve (SC-SSV)
- TFMC tubing hanger.

The upper completion string will be run to depth and the tubing hanger set. The upper section of the tubing is then expected to be displaced with base oil or nitrogen to create an underbalanced condition across the reservoir, facilitating initial well inflow (kick-off) for the well test. The production packer will then be set with wellbore pressure (hydrostatic set) and then the integrity of the upper completion confirmed.

Following this, a slickline plug will be installed in the tubing hanger to establish sufficient barriers, allowing for safe removal of the BOP and installation of the subsea tree.

2.6.6 Subsea operations

The permanently installed subsea tree system hardware consists of the following components:

- Permanent Guide Base
- Tubing Hanger
- Subsea Tree
- Tree Cap
- Fishing Friendly Structure

The subsea tree system controls the production and injection of gas from / to the well. The subsea tree is controlled from onshore using the topside control system which communicates electro-hydraulically with the Subsea Control Module on the tree.

TechnipFMC (TFMC) supplies the subsea tree system which is specifically designed for installation from a Jack-Up Drilling Rig. The tubing hanger supports the weight of the completion string and is landed out in the high-pressure wellhead housing and forms a seal in the Inconel-lined area of the 11¾" casing hanger.

The subsea tree is landed on the wellhead and aligned in a pre-determined orientation to allow later tie-in of the well jumper, hydraulic flying leads, and electrical flying leads.

After the tree is positioned and secured onto the wellhead, pressure testing will be carried out to verify the integrity of the seals between the tree, wellhead, and tubing hanger. Following this, the well will be cleaned up and tested by flowing hydrocarbon gas to the surface test spread through the designated landing string.

Once well testing is complete, the Xmas tree valves are closed, the landing string is retrieved, and the tree cap is installed above the swab valve using a remotely operated vehicle (ROV). This tree cap serves as a secondary barrier to protect the environment during production or injection operations.

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The fishing-friendly structure (FFS) is landed on top of the tree. Although commercial fishing operations in the area are expected to be minimal, the FFS is designed to allow any errant fishing nets to ride over the tree structure without damage, while also protecting the tree.

2.6.7 Well clean-up and testing operations

Prior to the suspension of the wells and releasing the drilling rig, flowback to the JUDR will be conducted to ensure each well is properly cleaned and fully evaluated. The process of well cleanup/testing is intermittent periods of gas flow (flaring) at various rates up to a maximum of 60 MMscf/d. The total period of flaring is not expected to exceed 24 hrs per well.

This clean-up and testing phase is essential to:

- **verify well operability and the integrity of critical components,** ensuring the wells are mechanically sound and ready for production
- **remove residual wellbore construction materials** such as mud, brine, and debris from the wellbore and sandface, which can impair reservoir performance and reduce flow efficiency
- **detect and remedy potential completion sandface issues**, by using clean-up as a diagnostic step while the rig is still onsite — providing an opportunity to intervene before rig demobilisation, particularly given the difficulty and cost of rig re-entry in this remote location
- **estimate well deliverability** to identify any signs of excessive reservoir damage
- **sample reservoir fluid** during flowback for reservoir fluid characterisation and surface facility design.

During this process, drilling and completion fluids may be discharged to the ocean.

At the start of flaring, the fluid arriving at the burner is base oil, so a brief period of darker smoke can occur until the flow stabilises and then becomes mostly gas.

Once the flow shifts to predominantly gas, combustion becomes very efficient, and any smoke quickly disappears.

These short, carefully managed flaring operations are essential for safely cleaning the well, confirming reservoir performance, and ensuring the future gas storage facility can operate reliably once the subsea pipeline is connected.

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3 Stakeholder Consultation

The overarching objective of the project's stakeholder consultation program is to enable the delivery of the project consistent with regulatory requirements and good practice engagement and secure government approvals for the various phases of the project. The Stakeholder Engagement Plan (SEP) (GB Energy,2025) outlines how GB Energy will engage with the community and other stakeholders on the project during the construction and operational phases of the project.

GB Energy is committed to meeting these objectives by:

- identifying stakeholders (or 'relevant persons'), as required by legislation, see Section 3.3 whose functions, interests or activities may be affected by the Activity
- confirming the relevant persons in accordance with the regulations and engaging those stakeholders at the earliest opportunity
- ensuring relevant persons are informed about the Activity and the potential environmental and social impacts and risks
- proactively providing informative, accurate and timely information, and ensuring stakeholders have an adequate opportunity to consider the information and provide feedback
- ensuring affected stakeholders are informed about the consultation process and that their feedback, questions and concerns are considered in the EP
- providing a mechanism for assessing the merit of any stakeholder objections, complaints or claims of adverse impacts received throughout the consultation period, and providing feedback to that stakeholder in a timely fashion.

3.1 Consultation Background

GB Energy has undertaken extensive consultation with the Gippsland community since October 2018, which includes consultation for the following project phases:

- offshore geophysical and geotechnical (G&G) investigations EP which was accepted on 8 March 2019.
- whole-of-project Environmental Effects Statement (EES) application which was accepted 6 April 2021.
- land access negotiations since 2018 for onshore geotechnical studies, environmental and heritage studies and pipeline route.
- GB-2 drilling EP which was accepted on 3 May 2023.
- post GB-2 drilling updates with the Golden Beach community.
- geotechnical investigations EP which was accepted on 16 October 2024.
- geophysical investigations EP, which was accepted on 15 October 2025
- EPA Development License Application, submitted in Q4 2025.
- GB-3, GB-4, GB-5 drilling updates (to support this EP) with Golden Beach community

The feedback received during consultation for the above-listed project phases, which has included multiple information sessions and community meetings in Golden Beach, has provided an understanding of the community's concerns with the development as a whole and allowed GB Energy to develop control measures to alleviate those concerns wherever possible.

Chapter 24 of the Main Report of the EES provides detailed information on community engagement, issues raised and responses. During the EES assessment period, the EES documentation remained available on GB Energy's website (https://gbenergy.com.au). In response to the public exhibition of the EES in 2020, 12 public submissions were received.

In April 2021, the Victorian Minister for Planning favourably assessed GB Energy's EES for the Golden Beach Gas Project. Within the assessed EES, GB Energy maintain two core documents and processes for stakeholder engagement, these being:

- EES Chapter 24 – Community and Stakeholder Engagement; and
- Golden Beach Pipeline – Consultation Plan (GB-PI-AP-PLA-001).

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With the differing legislative requirements between onshore pipeline/facilities construction and offshore petroleum infrastructure development, a separate but complimentary Stakeholder Engagement Plan (SEP) was developed for the GB-2 drilling operations in 2023 and has been updated in 2025, with this utilised for the project's ongoing stakeholder engagement activities.

3.2 Consultation Methodology

The methods of consultation that GB Energy has adopted in the development of this EP are outlined in Table 3-1. The principals and practices of the International Association for Public Participation (IAP2) spectrum have been applied in the consultation undertaken while preparing this EP, noting that interest levels in the project to date have been relatively low.

Table 3-1 Methods of Engaging with Relevant Persons

Engagement Tool	Description
Digital communication	
GB Energy website (www.gbenergy.com.au)	Website is updated as new information becomes available.
Frequently asked questions (FAQs)	Available on the GB Energy website to address anticipated questions or those that have been asked by relevant persons.
Project email	An email address (info@gbenergy.com.au) is available for project enquiries and is publicised via the website, information flyers and print advertisements.
Email updates	Project update emails are issued at regular intervals for those that have not opted out of receiving email communications.
LinkedIn	Major project updates are included on the GB Energy LinkedIn (professional networking site). This has over 2,000 followers as of November 2025.
Community social media pages	Used to promote local community events or community information sessions that GB Energy is attending or organising. Refer to the Governance section for social media protocols.
Print communication	
Information flyers	Information flyers and other written communications have been and will continue to be developed to provide project updates to relevant persons listed in the project's consultation database. These are distributed electronically via email and/or included on the GB Energy website. Copies may also be printed and issued with accompanying letters or for distribution at in-person events.
Letters/ emails	Letters or emails are used to provide formal correspondence and used to formally respond to stakeholders in respect of specific issues, concerns or requests.
Media and advertising	Where relevant, local media (for example, *The Gippsland Times* (circulation of 13,500), *Latrobe Valley Express* (circulation of 35,700) and the local *Letts Beach News*) are used to inform people about the project and provide feedback opportunities.
Public displays/notices	Public notices are placed in local newspapers to promote activities in line with engagement best practice and regulatory obligations.
Briefing packs	Information packs can include a combination of project collateral, such as newsletters, information flyers, maps, etc., and can be used in briefing sessions with stakeholders.

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Engagement Tool	Description
Direct engagement	
1800 phone number	A dedicated toll-free phone number (1800 423 637) is established for the project. All calls received on this phone number are logged into the project's consultation software and assigned to the relevant member in the project team for action.
Face-to-face meetings	Meeting stakeholders face-to-face as required.
Virtual meetings	GB Energy has hosted virtual meetings with stakeholders unable to physically attend information sessions or requiring specific timelines to meet their availability.
Information sessions	Community information sessions have been and will continue to be conducted to provide an opportunity for relevant persons and the broader local communities to meet the project team and ask questions or express concerns. The information sessions are widely publicised through social media, posters in local stores, the local ratepayers' association, community organisations such as the local bowls and golf clubs, local media, and direct email to registered parties. The information sessions are held both virtually and in-person. For in-person meetings, the project hires local venues and utilises the services of the Residents and Rate Payers Association to provide distribution of meeting notifications. Every effort is made to give stakeholders at least three weeks' notice of a meeting. GB Energy will continue to engage with the community and key stakeholders on the most effective approach to providing information and seeking their feedback on the Project.
Attendance at community events	This may include information stands at local shows, sporting, and other events, and provides a platform for community members to ask questions and provide feedback. The project is working with nearby projects to coordinate engagement where possible to minimise consultation fatigue.

3.2.1 Recording Consultation Events

GB Energy uses Open Point software as its stakeholder records management system. This holds copies of all correspondence issued and received in the development of the project as well as other stakeholder interactions, including issues raised and their resolution. This software has been variously managed by several project personnel, including dedicated consultation personnel and Project Interface Manager.

3.2.2 Developing the EP

The consultation methodologies in Table 3-1 have been implemented in an iterative fashion throughout the development of this EP.

In developing this EP, GB Energy has leveraged the extensive base of consultation, relationships and local experience with relevant person conducted on the project to date. GB Energy h local Stakeholder Manager engages regularly with relevant persons for project activities.

GB Energy has provided project information relating to the activities covered in this EP. This includes the following key potential impacts and risks:

- drilling fluids and cuttings discharge
- noise emissions
- vessel movement
- light emissions

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3.3 Relevant Person Identification

The environmental values and sensitivities that occur within the EMBA were assessed to determine which categories of relevant persons may potentially be affected by the activities to be carried out Table 3-2. These impacts and risks were assessed against the Activity and relevant persons who may potentially be affected by the activities were identified (Table 3-3).

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Table 3-2 Categories of Relevant Persons – Values and Sensitivities

Values and Sensitivities	Activity Area	EMBA	Relevant Person Categories
Conservation Values & Sensitivities			
World Heritage Properties	No	No	Not applicable
Australian Marine Parks (AMPs)	No	No	Not applicable
Victorian protected areas: McLoughlins Beach – Seaspray Coastal Reserve Gippsland Lakes Coastal Park Ninety Mile Beach MNP.	No	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples
National Heritage Places	No	No	Not applicable
Commonwealth Heritage Places	No	No	Not applicable
Wetlands of International Importance: Gippsland Lakes Ramsar site.	No	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples
Nationally Important Wetlands	No	No	Not applicable
Threatened and migratory species and biologically important areas (BIAs) (foraging aggregation, breeding) are identified in the EP.	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples
Key Ecological Features (KEFs)	No	No	Not applicable
Ecological and Physical Environment			
The ecological and physical environment described in Chapter 5 provides the basis for further assessment of values and sensitivities, along with impact and risk assessments (Chapter 7 and Chapter 8) from planned and unplanned activities.	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations

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Values and Sensitivities	Activity Area	EMBA	Relevant Person Categories
The ecological and physical environment includes: benthic habitats and species assemblages soft sediment (habitat for various species) seagrass (coastline presence) algae (coastline presence) coral (not a dominant habitat) carbonate sands and exposed limestone (habitat for various species) basalt rises (habitat for various species) plankton invertebrates and fish birds marine reptiles cetaceans pinnipeds pest species.			
Socio-economic			
Coastal settlements: Golden Beach Paradise Beach Seaspray.	No	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Recreational fishing associations Reg 13F(1)(b) Volunteer emergency services
Offshore petroleum industry	Yes	Yes	Reg 13F(1)(b) Offshore oil and gas titleholders
Shipping	Yes	Yes	Reg 13F(1)(a) Government departments/agencies
Tourism industry	Yes	Yes	Reg 13F(1)(b) Local Government Authorities The presence of the Activity area within the Area to be Avoided ([ATBA]) means that GB Energy has not consulted with marine tourism operators (e.g., game fishing charters) because large vessels are not permitted to operate within the ATBA.

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Values and Sensitivities	Activity Area	EMBA	Relevant Person Categories
Recreation (beach walking, fishing, snorkelling, diving, surfing)	Yes	Yes	Reg 13F(1)(b) Recreational fishers Reg 13F(1)(b) Local Government Authorities As per 'tourism industry' regarding the ATBA
Commercial fisheries: Extensive assessment undertaken of Commonwealth and Victorian managed fisheries and fishing effort in the Activity area and EMBA. Very little in the Activity area.	Yes	Yes	Reg 13F(1)(b) Commercial fishing associations
Cultural Environment			
First Nations People cultural values and sensitivities	Yes	Yes	Reg 13F(1)(b) First Nations Peoples
Maritime archaeological heritage	No	Yes	Reg 13F(1)(a) Government departments/agencies

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Table 3-3 Categories of Relevant Persons – Impacts and Risks

Impacts and Risks	Activity Area	EMBA	Relevant Person Categories
Impacts (planned events)			
Section 6– Seabed disturbance: temporary during activities up to several hundred metres.	Yes	No	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section 6 - Underwater noise emissions: temporary during activities up to several hundred metres.	Yes	Unlikely	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section 6 – Discharge of drill cuttings and fluids: temporary during activities non-toxic and inert readily incorporated into seabed	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section 6 – Discharge of cement: temporary during activities non-toxic and inert readily incorporated into seabed	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section - Displacement with third-party vessels and activities: temporary during activities limited to 500 m around the JUDR/vessel.	Yes	No	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) Commercial fishing associations

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Impacts and Risks	Activity Area	EMBA	Relevant Person Categories
Section 6 - Atmospheric emissions: decrease in air quality due to JUDR/vessel emissions temporary and localised.	Yes	No	Reg 13F(1)(a) Government departments/agencies
Section 6 - Light emissions: may attract light-sensitive species temporary and localised during activities.	Yes	No	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section 6 – Discharge of sewerage and grey water: reduction in water quality and increase in nutrients temporary and localised up to 50 m horizontally and 10 m vertically.	Yes	No	Reg 13F(1)(a) Government departments/agencies
Section 6 – Discharge of cooling and brine water: potential toxicity impacts to marine fauna increased sea surface temperature and salinity temporary and localised up to 100 m horizontally and 10 m vertically.	Yes	No	Reg 13F(1)(a) Government departments/agencies
Section 6 – Discharge of bilge water and deck drainage: potential toxicity impacts to marine fauna potential increased sea surface temperature and salinity around the discharge point temporary and localised up to 100 m horizontally and 10 m vertically.	Yes	No	Reg 13F(1)(a) Government departments/agencies
Risks (unplanned events)			
Section 6– Accidental overboard release of waste	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section 6 – Introduction and establishment of invasive marine species	Yes	Yes	As above.

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Impacts and Risks	Activity Area	EMBA	Relevant Person Categories
Section 6– Interference with third-party vessels and activities	Yes	No	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) Commercial fishing associations
Section 6– Vessel strike with megafauna	Yes	No	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples
Section 6 – Accidental bulk discharge of drilling fluids, chemicals or hydrocarbons	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations
Section 6 – Dry gas release from loss of well containment	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations Reg 13F(1)(b) Recreational fishing associations Reg 13F(1)(b) Local Government Authorities
Section 6 – MDO spill Residual risk assessment (i.e., with control measures in place) determined risks to environmental and socio-economic receptors are all 'low.'	Yes	Yes	Reg 13F(1)(a) Government departments/agencies Reg 13F(1)(b) First Nations Peoples Reg 13F(1)(b) Commercial fishing associations Reg 13F(1)(b) Recreational fishing associations Reg 13F(1)(b) Local Government Authorities
Section 6 – Oil spill response activities	Yes	Yes	As above.

Section references in this table refer to the Golden Beach Drilling GB3,GB4 & GB5 Environment Plan.

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3.3.1 Relevant Person Categories – Reg 13F(1)(a) – Authority or Entity of the State

Table 3-4 outlines the authorities or entities of the State (and Commonwealth, mostly related to overlap with the EMBA rather than the Activity area) that have been identified as relevant persons under Regulation 13F(1)(a).

3.3.2 Relevant Person Identification – Reg 13F(1)(b) – Person or Organisation with Functions, Interests or Activities that may be Affected

Relevant Person Identification – General Methods

Authorities, entities, persons and organisations whose functions, interests or activities who may be affected by the proposed drilling activity were researched by either:

- database review;
- functions, interests or activities;
- local knowledge;
- broad based keyword internet searches; and
- Marine Spatial Planning Framework.

Table 3-4 presents the relevant persons under Regulation 13F(1)(b) that have been identified using the methods outlined above, listing their functions, interests and activities and the values and sensitivities.

In light of the findings of the Case and the Appeal, the methods used to identify First Nations People and commercial fishers is described in more detail below.

Relevant Person Identification – First Nations People

The Activity area intersects with areas of First Nations People cultural heritage sensitivity. The Activity area and EMBA are located within the sea country of the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC), representing five clans: Brataualung, Brayakaulung, Brabralung, Krauatungalung and Tatungalung family clans (and adjacent to their traditional lands).

GB Energy first engaged with GLaWAC about the project in November 2018 as part of the EES, and ongoing and regular contact has continued since that time.

In the development of the Cultural Heritage Management Plan (CHMP), GB Energy engaged with GLaWAC and Aboriginal Victoria (now First peoples – State Relations). A total of 37 days was spent with Traditional Owners completing field work and cultural heritage surveys in the onshore Activity area for the CHMP, together with a number of meetings and exchanges of correspondence. This included a meeting with the GLaWAC Registered Aboriginal Party (RAP) Manager (June, 2020) to present the results of the field work and nominated management measures for inclusion in the CHMP. Chapter 9 of the EES (Aboriginal cultural heritage) and Technical Report C of the EES (Aboriginal cultural heritage) provide more detail on the outcome of the CHMP assessments.

The method of identifying potential First Nations Peoples that may be relevant persons included:

- using existing relationships with First Nations People in the Gippsland region
- assessing the total values and sensitivities of the physical environment that may be affected by the planned and unplanned activities in the EP
- understanding and respecting that it is common for First Nations Peoples to be protective of their cultural sensitivities, and therefore such information may not be published, and undertaking further research to identify First Nations Peoples organisations and persons
- researched Prescribed Bodies Corporate, RAPs, Native Title holders and claimants (using the National Native Title Tribunal [NNTT] website)
- consulted with GLaWAC to seek their advice on identifying relevant persons.

GB Energy have ongoing engagement with GLaWAC, with meetings held periodically through 2025 and 2026 to discuss the drilling program and other project matters.

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Relevant Person Identification – Commercial Fishers

The approach to identifying potentially impacted commercial fishing relevant persons is as follows:

- review the identified Victorian and Commonwealth fisheries operating in the EMBA (using government-sourced data) via the project GIS
- continue to engage commercial and recreational fishing associations (e.g. SETFIA, SIV, LEFCOL), (based on the knowledge of project personnel who have worked in Bass Strait for many years) to ascertain whether they are relevant persons
- continue to provide AFMA and VFA, as the Commonwealth and state-based commercial fisheries regulators (respectively), with information flyers and ask if they have any concerns
- provide information flyers to relevant fishing associations, continue to request direct meetings to provide opportunity for detailed discussion, respond to questions, concerns and further information requests, seek further information on actual fishing effort, and seek support for engagement with their members, either directly or via the association as applicable
- provide additional information to interested fishery groups where requested
- send follow up emails and phone key associations and fishers who may fish in the operating area and
- where fishers have identified that they may be potentially impacted by the project, GB Energy has liaised directly with them or the relevant fishing industry association to gather information (e.g., species targeted, fishing patterns and locations) and elicit concerns. For on-water project activities that have already occurred (i.e., geotechnical investigations) and those that will occur in the future, GB Energy has and will use SETFIA's SMS service to keep commercial fishers informed of the location and timing of activities.

3.3.3 Relevant Persons – Reg 13F(1)(c) – Any other Person or Organisation

GB Energy identifies media organisations (print, television, radio, social) as 'other persons or organisations' per Regulation 13F(1)(c). This is because such organisations do not have a function, interest or Activity in the project area per se, rather their 'function' is to report on stories that are likely to have a broader public 'interest'.

To keep the local and regional community informed of the project, GB Energy has consulted with the organisations listed in Table 3-4 through means such as feature interviews and advertising.

Table 3-4 Relevant Persons under Regulation 13F(1)

Category A – Authority or entity of the State	
Commonwealth government agencies	
AFMA	DoD – Defence Support Group & Royal Australia Air force (RAAF) Base East Sale
AEIC - Australian Energy Infrastructure Commissioner	AMSA – Nautical and Regulation Section
Australian Hydrographic Office (AHO)	Department of Agriculture, Fisheries and Forestry (DAFF)
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	NOPSEMA – National Offshore Petroleum Safety and Environment Authority
Victorian government agencies	
DEECA	DEECA - RVRO
Department of Transport and Planning (DTP)	Department of Treasury and Finance
EPA	Parks Victoria
Ports Victoria	Safe Transport Victoria
Victorian Fishing Association (VFA)	West Gippsland Catchment Management Authority (CMA)

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Gippsland Water	
Elected government officials	
Local State MP: Member of Gippsland South	Local Federal MP: Member of Gippsland
Local government	
East Gippsland Shire Council	Wellington Shire Council
Category B – Person or Organisation with functions, interests or activities that may be affected	
First Nations People	
GLaWAC	
Petroleum and greenhouse gas titleholders	
CarbonNet Project	Esso Australia Resources Pty Ltd (EARPL)
3D Oil	Petro Tech Pty Limited
Hibiscus Pty Ltd	Lakes Blue Energy
Offshore Electricity Infrastructure Act Licences	
Blue Mackerel	
Fisheries associations – commercial	
South East Trawl Fishing Association (SETFIA)	Commonwealth Fisheries Association (CFA) (Comfish)
Lakes Entrance Fishermen's Cooperative (LEFCOL)	Victorian Scallop Fishermen's Association (VSFA)
Abalone Council Victoria	Seafood Industry Victoria (SIV)
Eastern Zone Abalone Industry Association (EZAIA)	
Commercial fishing license holders	
Mitchelson Fisheries	
Local groups and residents	
Committee for Gippsland	Landowners (onshore pipeline alignment)
Committee for Wellington	Loch Sport Community Representative Group (Facebook)
Golden Paradise Beach Ratepayers and Residents Association	Golden Paradise Beach Senior Citizens Club
Golden-Paradise Beach Community Centre Committee of Management Inc	Golden Paradise Beach Men's Shed Inc
Industry Capability Network (ICN)	Golden Paradise Beach Bowls Club Inc.
VMMR Community Club - Golden Beach	Bairnsdale Chamber of Commerce and Industry
GROW Gippsland	Golden Beach Surf Lifesaving Club
Golden Beach Golf Club	Golden Paradise Beach Bowls Club Inc.
Seaspray Offshore Wind Strategy Group	Resource for Australia and New Zealand businesses connecting them with project opportunities
Local business and community leaders	Local residents
Fishing Associations - recreational	
Victorian Recreational Fishing (VRFish)	Victorian recreational fishing peak body.
Emergency preparedness and response agencies	

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Gippsland coastguard	Provides emergency response functions in coastal waters
Category C – any other person or organisation	
Gippsland Times and Maffra Spectator newspaper	Latrobe Valley Express newspaper
ABC Gippsland	TRFM Radio
WIN News (Gippsland)	

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3.4 Provision of Information

3.4.1 Approach to Providing Information

The OPGGS Regulations require titleholders to give each relevant person sufficient information to allow them to make an informed assessment of potential effects on their functions, interests or activities from the activities in the EP. Provision of information is responsive and adaptive to the individual needs and circumstances of the relevant person seeking the information. Key approaches to providing sufficient information are set out in Table 3-5.

Table 3-5 Information provided for Relevant Persons categories

Category	Description	Information Type
13F(1)(a)	Relevant authorities or entities of the State	Regular meeting to discuss project updates and specifics regarding project activities. Provision of further information, where requested or required under the regulations. Meeting or phone call, where requested or required. Commencement and cessation of the activity notices for relevant agencies.
13F(1)(b)	Persons or organisations whose functions, interests or activities may be affected by the activity	Project updates sent to relevant persons. Meetings with relevant persons or organisations. Phone calls (when there is no response to initial emails). Provision of further information, where requested or required under the regulations. Public notice advertisements. Feature stories (print, radio, television, social media). Community information sessions in Golden Beach.
13F(1)(c)	Any other person or organisation	Project updates sent to relevant persons. Commencement and cessation notices. Public notice advertisements. Feature stories (print, radio, television, social media). Community information sessions in Golden Beach.

In the information flyers issued to date to relevant persons specifically for the full EP, GB Energy provided as much information as was available regarding investigation techniques and potential impacts and risks, which is considered a sufficient level of information for several reasons:

- many of the government agencies were involved in the TRG and are well informed of the Project
- GB Energy consulted with stakeholders and the local communities in 2019 for the G&G investigations EP with no significant concerns raised
- the EES was hosted on the GB Energy website for over two years, with no related comments or enquiries submitted post-EES exhibition
- the project is located within Australia's oldest petroleum exploration and production region, where the petroleum industry has established close working relationships with local communities. As such, local communities are very well informed and educated about offshore petroleum activities and don't have the same concerns that communities new to the industry have

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- no complaints about the level of detail or requests for additional information resulting from the distribution of these or previous information flyers have been received by GB Energy.

3.4.2 Consultation in the Course of Preparing the EES

Significant consultation for the Golden Beach Gas Storage Project was undertaken between October 2018 and December 2020 while preparing the EES. A summary of consultation undertaken while preparing the EES can be seen in Section 4.6.2 of both the GB-2 drilling EP (approved on 3rd May 2023) and the Geotechnical Investigations EP (approved on 16th October 2024) which has been used to inform the preparation of the EP.

3.4.3 Consultation Undertaken in the Course of Preparing the EP

A summary of consultation undertaken while preparing this EP is provided in Table 3-6. This summary demonstrates that GB Energy has engaged significantly on the proposed drilling program to date and will continue to do so in the coming months. At this point in time, no relevant persons have raised concerns that their functions, activities or interests may be significantly impacted by the drilling program.

Table 3-6 Summary of consultation undertaken in the course of preparing the EP

Date	Description
7 May 2025	Met with GLaWAC – project update, timeline and focus on land and sea country.
10 June 2025	Met with Energy Safe Victoria, EPA and WorkSafe – general project update, timeline and project major works.
11 June 2025	Met with Gippsland Water – site tour and project update, timeline and major works.
18 June 2025	Met with Office of Minister D'Ambrosio to provide a project update.
7 July 2025	Met with regulatory departments (DEECA, NOPSEMA, EPA) discussing overall project and update to drilling schedule.
21 July 2025	Met with DEECA, presented project update, timeline, environmental risk assessment and controls, stakeholder engagement and pipeline installation.
24 July 2025	Met with Industry Capability Network (ICN) discussed project update, timeline and project milestones.
25 July 2025	Met with Tom McIntosh MP, Member for Eastern Victoria – discussed project update, timeline and project milestones.
Commenced August 2025 and ongoing monthly	Community Drop-in sessions held at Golden Beach at Foodworks 9:30 to 11:30.
4 August 2025	Met with regulatory departments (DEECA, NOPSEMA, EPA) discussing overall project and update to drilling program update.
7 August 2025	Committee for Wellington – introduced local Stakeholder Manager and provided project overview.
7 August 2025	Met with Seaspray Offshore Wind Strategy Group - discussed GB Energy project, size, distance from shore, GB community reaction, timeframes.
13 August 2025	Met with West Gippsland CMA - discussed waterways and provided a project overview with timeline.
18 August 2025	Met with Wellington Shire Council - Discussed project and offered the Economic Development team a project briefing.
29 August 2025	Met with new Major Projects Manager GLaWAC - discussed GB Energy project, size, distance from shore, GB community reaction, timeframes.
10 September 2025	Met with Country Fire Authority (CFA) - presented the project overview, timeline and an overview of relevant regulatory approvals.
18 September 2025	Met with Office of Minister D'Ambrosio to provide a project update

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24 September 2025	Advertisements about project developments and upcoming community information sessions placed in local stores (Golden Beach, Seaspray, Loch Sport, Longford and Sale) and community newsletters.
26 September 2025	Project information flyer and notification of upcoming community information session sent out to stakeholders via email.
29 September 2025	Met with regulatory departments (DEECA, NOPSEMA, EPA) discussing overall project and update.
1 October 2025	GB Energy website updated with information on drilling campaign and community information meeting.
1 October 2025	Committee for Gippsland shared community information session and online meeting invitation on LinkedIn.
2 October 2025	Committee for Wellington – timeline and project summary provided to members post meeting.
2 October 2025	Met with the Australian Energy Infrastructure Commissioner – gave a summary of the project timeframe and major project infrastructure.
3 and 6 October 2025	Reminder email about community information session and online briefing sent out via email to 170 Stakeholders.
8 Oct 2025	Community information sessions are held at Golden Beach Community Hall and online.
8 October 2025	Met with EPA – Project update, timeline and major project infrastructure discussion.
27 October 2025	Met with regulatory departments (DEECA, NOPSEMA, EPA) discussing overall project and update to drilling plan and necessary studies well underway.
11 November 2025	Met with Office of Minister D'Ambrosio to provide a project update and amendments to OPGGS regulations.
24 November 2025	Met with regulatory departments (DEECA, NOPSEMA, EPA) discussing overall project and update to drilling plan and necessary studies well underway.
28 November 2025	Meeting with DEECA and Office of Minister D'Ambrosio re amendments to OPGGS regulations.
3 December 2025	Drilling information brochure emailed to relevant stakeholders, uploaded to GB Energy Website and a copy made available in the Golden Beach area.
4 December 2025	Meeting was held to provide a project update and share information on the drilling campaign with Victorian Fishing Association (VFA).
5 December 2025	Attended Marinus link Meet the Contractors Industry Forum and spoke to contractors and local governments representatives about the project and the drilling component.
8 December 2025	Meeting held to provide a project update and share information on the drilling campaign with local State Member for Gippsland and Leader of the Nationals, Danny O'Brien.
9 December 2025	Meeting held to provide a project update and share information on the drilling campaign with South East Trawler Fishing Industry Association (SETFIA).
24-26 January 2026	Annual Golden Beach Fishing Competition Market - Information Stall to answer community and visitor questions about the project. Co-locate with Esso re their decommissioning.
22 January 2026	Meeting held to provide a project update and share information on the drilling campaign on sea country with GLaWAC.
10 August 2026	GB Energy website and LinkedIn posts updated with drilling campaign sections, including link to EP.

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4 weeks, 7 days and 2 days prior to activity	Notify local stakeholders of the activity commencing.
Ongoing	Regular monthly meeting with regulators (DEECA, NOPSEMA, Work Safe, EPA.

3.5 Measures Implemented in Response to Consultation

As a result of consultation with relevant persons while preparing the EP, there have been no requests to modify or add control measures for the drilling activity.

In general, and despite the significant consultation undertaken for the project, there has been very little concern expressed by stakeholders to GB Energy regarding offshore environmental issues.

3.6 Management of Objections and Claims

If any objections or claims (that are non-vexatious in nature) are raised during consultation with relevant persons, GB Energy will attempt to address these using evidence such as publicly available and credible information (e.g., scientific article, government-supplied fishing data).

Where the objection or claim is substantiated, it will be assessed as per the risk assessment process and controls applied where appropriate to manage impacts and risks to ALARP and an acceptable level. Relevant persons will be provided with feedback as to whether their objection or claim was substantiated, and if not why, and if it was substantiated, how it was assessed and if any controls were put in place to manage the impact or risk to ALARP and an acceptable level. If the objection or claim triggers a revision of the EP, this will be managed in accordance with GB Energy's Management of Change (MoC) process, and the relevant person will be advised of the process.

3.7 Ongoing Consultation with Relevant Persons

Consultation with relevant persons in the preparation of the EP does not end once the EP is submitted for assessment to RVRO or once it is accepted. Consultation is ongoing in the lead up to, during and after the drilling activities.

GB Energy continues to consult with relevant persons regarding the drilling activities and the project more broadly. For the drilling program this will be achieved via a number of methods, as outlined in Table 3-7. The planned events and notifications are subject to change, based upon the operational timings for the JUDR and commencement of operations. Additional events and/or the timing and content of events may be modified based upon the feedback received from relevant persons.

Any new relevant persons identified through the ongoing consultation process will be contacted and provided information about the Activity relevant to their functions, interests or activities.

Table 3-7 Summary of plan for ongoing consultation with relevant persons

Timing/ Milestone	Relevant Person	Consultation Method/Content
Ongoing		
As required	All relevant persons	Communication of information and addressing queries and concerns via email, phone or meeting. Project updates including acceptance of EP and start and completion of drilling.
Pre-activity		
2 to 4 weeks prior to activity commencing	AHO & MSV	Vessel contractor to issue notification of activity for publication of NTM, including:

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Timing/ Milestone	Relevant Person	Consultation Method/Content
		geographical coordinates of the Activity area duration of vessel presence on location vessel details including: - name - Maritime Mobile Service Identity - satellite communications details (including INMARSAT-C and satellite telephone) - contact details - call signs - GB Energy contact details. GB Energy will provide updates on project timing and any changes to the intended operations.
4 weeks prior to activity commencing	All relevant persons	Notify local stakeholders of the project activity commencing.
10 days prior to activity commencing	DEECA – Resources Victoria	Email notification of start of activity.
	GB Energy LinkedIn members	Posting of a LinkedIn notification that the activity is imminent.
	All relevant persons	Notify all local stakeholders of the project activity commencing.
7 days prior to vessel arrival	Local community and visitors	Signage will be posted at the Golden Beach lookout and campgrounds along the foreshore providing details of the drilling program given that the JUDR and vessels will be close to the beach.
	Local community	Advertising of the vessels' arrivals in The *Gippsland Times* and *Latrobe Valley* Express newspapers and the Letts Beach News.
	Commercial	Notify LEFCOL and/or SIV to inform their members on project activities via text message.
48 – 24 hrs prior to activity commencing	AMSA - Joint Rescue Coordination Centre (JRCC)	Per AHO & MSV information.
	All relevant persons	Notify local stakeholders of the project activity commencing.
While undertaking drilling activities		
During activity	All relevant persons	Communication of information and addressing queries and concerns via email, phone or meeting. Emergency notifications via email, as and if required (e.g., MDO spill).

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Timing/ Milestone	Relevant Person	Consultation Method/Content
	GB Energy LinkedIn members	LinkedIn post to provide update on operations.
	General public	Progress updates released weekly via the GB Energy website.
	Commercial fishers active in the area	SMS via SETFIA advising of the JUDR location and activity timing.
Activity completion		
Within 24 hours of activity completion	AMSA – JRCC	Email notification providing information on completion to cease AusCoast warnings.
Within 2 days of activity completion	All relevant persons	Email notification providing information on completion and vessel demobilisation.
	AHO & MSV	Email notification providing information on completion to cease NTM.
Within 10 days of activity completion	DEECA – Resources Victoria	Email notification of cessation of activity to close out the EP.
	Local community	Remove information signage at the Golden Beach lookout and campgrounds.
	GB Energy LinkedIn members	LinkedIn post to provide notification of cessation of activity.
	General public	Notification of cessation of activity via the GB Energy website.

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4 Description of the Existing Environment

In accordance with OPGGS Regulation 15(2), the EMBA by the Activity is summarised in this section, together with its values and sensitivities. While each project hazard has its own unique EMBA, the most significant one has been chosen for this chapter, which is that relating to a diesel spill.

This diesel spill EMBA has been established through hydrocarbon spill modelling and is based upon the area that could be affected by the largest credible spill from the project vessels. The EMBA (Figure 4-1) is therefore defined as:

> *The combination of 100 randomly selected spill simulations delineating the extent of moderate level hydrocarbon exposure to the sea surface (10 g/m2), moderate contact to shorelines (>100 g/m2 or) and the extent of high exposure to hydrocarbons entrained in the water column (100 ppb) as a result of the loss of 155 m3 of MDO over 6 hours under annualised metocean conditions from a support vessel within the Activity area.*

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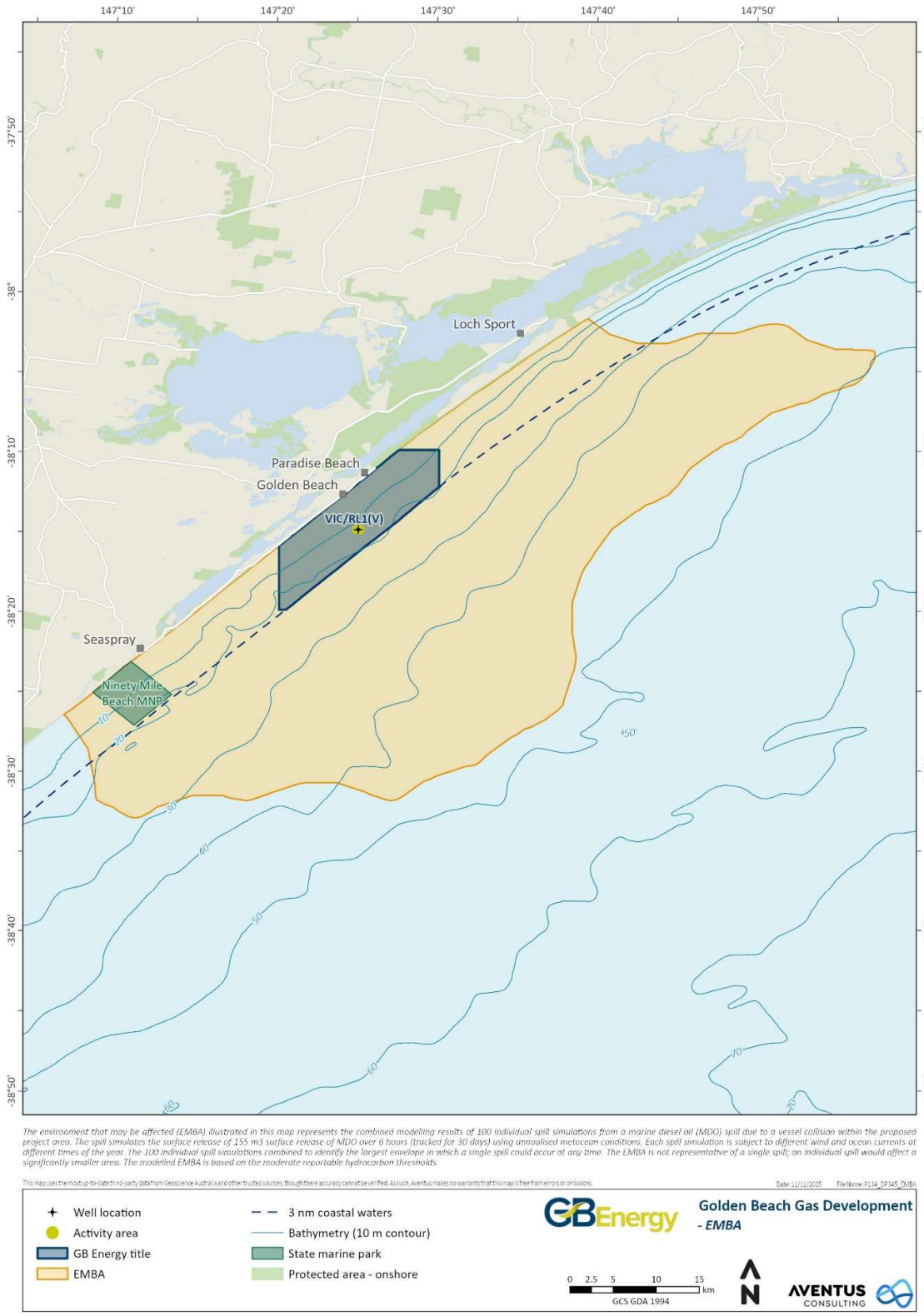


Figure 4-1 The EMBA

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Table 4-1 summarises the presence or absence of receptors and sensitivities within the proposed operational area.

Table 4-1 Presence of receptors within the Activity area and EMBA

Receptor	Activity area	EMBA
Physical		
Low profile rocky reef		
Sponge garden		
Conservation values		
AMPs		
World Heritage-listed properties		
National Heritage-listed properties		
Threatened Ecological Communities (TECs)		
Key Ecological Features (KEFs)		
Nationally Important Wetlands		
Victorian marine protected areas		
Onshore protected areas		
Biological environment		
Plankton		
Benthic species:		
commercial scallops		
Rock lobsters		
Seagrass beds		
BIA for fish:		
Great white shark		
BIA for cetaceans:		
Pygmy blue whale		
Southern right whale		
Humpback whale		
Pinnipeds		
Reptiles		
Seabirds		
Shorebirds		
Marine pests		
Cultural values		

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Receptor	Activity area	EMBA
Shipwrecks		
Indigenous heritage		
Socio-economic Environment		
Native title		
Residential Community		
Tourism		
Petroleum infrastructure		
Commercial fishing		
Recreational fishing		
Commercial fishing		

Red shading denotes no presence; green shading denotes presence.

4.1 Regional Context

The Activity area and EMBA are both wholly located within the South-east Shelf Transition provincial bioregion within the South-east marine region (CoA, 2015a). Victoria's marine environment has been classified into five mesoscale bioregions, with the Activity area and EMBA located wholly within the Twofold Shelf bioregion.

4.1.1 Climate

The region experiences a moist cool temperate climate characterised by cool wet winters and cool summers (Barton et al., 2012). Winter conditions are driven by the northward shift of the subtropical ridge and frequent cold fronts, resulting in sustained west to south westerly winds and frequent rainfall. In summer, weaker frontal systems between high-pressure ridges produce more variable winds and rainfall (McInnes and Hubbert, 2003).

Temperature and Rainfall

Climate statistics between 2006-2024 at Lakes Entrance (62 km northeast of the Activity area, but the closest coastal town with a Bureau of Meteorology [BoM] weather station) shows the average maximum temperature ranges from 15.2°C - 24.3°C and the average minimum temperature ranges from 6°C – 15.2°C (BoM, 2025). Mean annual rainfall is 724 mm with June producing the most rainfall and May the least (BoM, 2025).

Winds

Bass Strait is located on the northern edge of the westerly wind belt known as the Roaring Forties. Occasionally, intense meso-scale low-pressure systems occur in the region, bringing very strong winds, heavy rain and high seas. These events are unpredictable in occurrence, intensity and behaviour, but are most common between September and February (McInnes and Hubbert, 2003).

4.1.2 Physical Environment

Seabed

This section details the seabed composition on regional and local level as well as specific to the Activity area.

Regional

Bass Strait is concave-shaped, with a shallower rim on the eastern and western entrances to the strait and a deeper centre.

The substrate across Bass Strait comprises a variety of sediment types (Harris and Heap, 2009; Wilson and Poore, 1987). Inner shelf sediments, such as those of the Activity area, generally consist of fine sands (Harris

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and Heap, 2009; Victorian Department of Economic Development, Jobs, Transport and Resources [DEDJTR], 2017a), with moderate and well-sorted sands confined to the nearshore zone (Harris and Heap, 2009).

Geoscience Australia's seafloor sediments database classifies the proposed Activity area as having sediment grain sizes ranging in diameter from 0.2 to 0.5 mm, with isolated pockets within the EMBA having sediment diameters up to 5 mm (Harris and Heap, 2009).

Harris and Heap (2009) also state that that the calcium carbonate content of the sands in the Activity area and the EMBA is about 10-20%. The carbonate component consists of recognisable skeletal fragments of molluscs, bryozoans and foraminifera (Harris and Heap, 2009).

Local

In 2021, the DELWP sponsored a new unified scheme for marine ecological classification, referred to as the Combined Biotope Classification Scheme (CBiCS). Edmunds et al. (2021) defines a biotope as a term describing a community of species in a defined abiotic habitat.

The Activity area comprises predominantly of sublittoral sand and muddy sand, and littoral sand (where the Activity area meets the shoreline). The Activity area also contains sparse amounts of non-reef sediment epibenthos, high energy infralittoral rock, high energy littoral rock, and sublittoral seagrass beds. Similarly, the marine environment surrounding the Activity area also contains the biotopes listed above with the addition of littoral sand, moderate energy infralittoral rock, sublittoral coarse sediment, and sublittoral seaweed on sediment (see Section 4.2.1).

Light Detection and Ranging (LiDAR) derived data on the sediments of the nearshore Victorian coastline was acquired in late 2008/early 2009 also indicates that the majority of the seabed shoreward of the activity area comprises sandy sediments. Intermittent and very narrow areas of low-profile reefs (about 0.5 m to 1.5 m in height above the surrounding seabed), running parallel to the coast, are scattered through the nearshore sandy sediments along the Ninety Mile Beach. These reefs comprise calcarenite and occur immediately behind the surf zone, in water depths ranging from 7 to 25 m (Burton et al., 2012) and are likely to be often covered by mobile sand.

A seabed survey undertaken in 2007 for the nearby Sealion-1 drilling location (13.9 km to the east of the Activity area) found fine to medium grained, yellow-brown unconsolidated sand with minor (<3 mm diameter sized) shell fragments (Fugro, 2007).

Activity area

Fugro undertook a geophysical survey in the Activity area in March 2020 for GB Energy. Fugro found the gradient of the Activity area is very flat, ranging from 0 m at the beach to 19.5 m at its deepest point. The key observations from the survey were:

- there are elongated seabed depressions oriented northwest-southeast in the Activity area
- the proposed pipeline route passes through seabed depressions
- the seabed at the proposed well locations is flat
- the seabed depression depths measured less than one metre from the surrounding seabed.

The seabed around the Activity area is largely homogenous, consisting primarily of unconsolidated sediments with some isolated patchy areas of reef/rock.

The seabed samples collected indicate that the seabed of the Activity area is predominantly two types of carbonate sand:

- Class 1: Low, uniform, reflectivity response interpreted as flat lying sediments including fine to medium grained carbonate sands with silts
- Class 2: Moderate to high reflectivity response interpreted as fine to coarse carbonate sands, gravels and shells

Table 4-2 presents a summary of the grab sample material descriptions. The grab samples that were collected assist in determining the seabed types distributed at the GB-2 well site and along the pipeline corridor within the Activity area.

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Table 4-2 Grab sample results of the geophysical Activity area

Sample ID	Location		Sample Description
	Easting (m)	Northing (m)	
Pipeline corridor			
G_001 9.6 m water depth	532,988	8,767,512	Siliceous CARBONATE SAND with silt. Sand is olive brown, fine grained and composed of mixed carbonates and siliclastics (mainly quartz), well sorted with few medium sand shell fragments and traces of coarse sand shell fragments. Some marine growth.
G_002 16.9 m water depth	533,808	5,767,126	Siliceous CARBONATE SAND with silt. Sand is olive brown, fine to medium grained and composed of mixed carbonates and siliclastics (mainly quartz), with few shell fragments and traces of coarse sand shell fragments
G_003 17.3 m water depth	533,942	5,767,277	Gravelly siliceous CARBONATE SAND. Sand is reddish to orange brown and coarse grained. Medium sand fraction composed of mainly quartz (clear and frosted) and some mixed carbonates. Coarse sand is partly shells and shell fragments with gravel composed of shells, shell fragments and traces of rock fragments
G_004 17.9 m water depth	534,565	5,766,820	Siliceous CARBONATE SAND with silt. Sand is olive brown, fine grained and composed of mixed carbonates and siliclastics (mainly quartz), well sorted with medium sand and few shell fragments and traces of coarse sand shell fragments
G_005 18.5 m water depth	534,714	5,766,879	Gravelly siliceous CARBONATE SAND. Sand is reddish to olive brown, coarse grained, and composed of mixed carbonates, particularly shells, shell fragments and probable coral fragments. Gravels of similar composition. Sample is composed for small part (10%) of fine sand
GB-2 Well site			
G_006 18.6 m water depth	535,446	5,766,567	Siliceous CARBONATE SAND with silt. Sand is olive brown, fine grained and composed of mixed carbonates and siliclastics (mainly quartz), well sorted with medium sand and few shell fragments and traces of coarse sand shell fragments
G_007 18.8 m water depth	535,458	5,766,593	Gravelly siliceous CARBONATE SAND. Sand is reddish to olive brown, fine to coarse grained. Fine to medium sand fraction composed of mainly quartz (clear and frosted) and some mixed carbonates. Coarse sand is mainly shells (intact bivalves) and shell fragments with gravel shells, shell fragments (e.g. oyster shell) and traces of rock fragments
G_008 18.8 m water depth	535,532	5,766,779	Gravelly siliceous CARBONATE SAND. Sand is reddish to olive brown, fine to coarse grained. Fine to medium sand fraction composed of mainly quartz (clear and frosted) and some mixed carbonates. Coarse sand is mainly shell fragments with gravel.

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The Commonwealth Scientific and Industrial Research Organisation (CSIRO) GipNet study (2018) includes a series of monitoring sites located in and around the Activity area. These sites have been surveyed for physical properties (such as sediment grain size) and biological properties (including seabed habitat types and benthic fauna abundance). The CSIRO has shared this raw data (i.e., no consolidated study report has been made available) with GB Energy.

Table 4-3 summarises the substrate types identified at the CSIRO investigation sites within the Activity area (site 9, 10, 11) by towed camera footage. CSIRO also conducted seabed surveying using SSS, which provides detailed bathymetry mapping of the sea-floor in the Activity area.

Table 4-3 Seabed conditions at CSIRO investigation sites within the Activity area

CSIRO site	Water depth	Seabed condition
9	15 m	Sandy substrate sparsely interspersed with marine flora and macroalgae. No rocky reef was observed in the towed camera footage of these sites.
10	19 m	
11	19 m	

The bathymetry mapping (in full EP) demonstrates that the seabed of the Activity area gradually increases in depth away from the coast. Areas of rocky reef that overlap with the Activity area are also visible as a rise of 0.5-1 m from the surrounding seafloor. CSIRO assessment site 17 was located within this reef.

Table 4-4. summarises the seabed substrate types of these sites adjacent to the Activity area, as identified through towed camera footage captured by CSIRO.

Table 4-4 Seabed conditions at CSIRO investigation sites adjacent the Activity area

CSIRO site	Water depth	Seabed condition
5	15 m	Dominated by rippled sandy sediments, no hard substrate or reefs observed.
9	15 m	Sandy substrate sparsely interspersed with marine flora and macroalgae. No rocky reef was observed in the towed camera footage of these sites.
10	19 m	Sandy substrate sparsely interspersed with marine flora and macroalgae. No rocky reef was observed in the towed camera footage of these sites.
11	19 m	Sandy substrate sparsely interspersed with marine flora and macroalgae. No rocky reef was observed in the towed camera footage of these sites.
12	20.5 m	Dominated by rippled sandy substrate with some sporadic areas of seagrasses present. No hard substrate observed.
17	18 m	Some areas of sandy substrate. Rocky substrate, reef communities and marine flora observed.
18	18 m	Extensive areas of sandy sediments with only sporadic and interspersed areas of marine flora. Paucity of marine flora suggests lack of hard substrate present at the site.

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4.1.3 Oceanography

Water depths

The Activity area is located in shallow water depths ranging from 0 to 20 m in the Gippsland Basin. The bathymetry contours generally run parallel to the coast, though this pattern is less pronounced in waters deeper than 18 m.

Water Currents

Currents within Bass Strait are primarily driven by tides, winds and density-driven flows (RPS APASA, 2018). The region is oceanographically complex, with subtropical influences from the north and sub-polar influences from the south (CoA, 2015a). There is a slow easterly flow of waters in Bass Strait and a large anti-clockwise circulation (CoA, 2015a). Three key water currents influence Bass Strait:

- the Leeuwin Current;
- the East Australian Current (EAC); and
- the Bass Strait Cascade.

Table 4-5 provides the average and maximum combined surface current speeds (ocean plus tides) located within the Activity area. The surface currents flow in the north-east to south-west axis parallel with the coastline. The average monthly surface current speed was 0.30 metres per second (m/s), with the maximum surface current speeds ranging between 1.0 and 1.5 m/s.

Table 4-5 Predicted average and maximum surface current speeds adjacent to the Activity area from 2008-2012 (inclusive)

Month	Average current speed (m/s)	Maximum current speed (m/s)	General direction
January	0.27	0.87	Tidally dominated from a predominant west-southwest and east-northeast direction
February	0.26	0.89	
March	0.25	0.96	
April	0.25	0.87	
May	0.26	0.89	
June	0.25	0.89	
July	0.26	0.95	
August	0.26	0.81	
September	0.26	0.98	
October	0.26	0.87	
November	0.27	0.87	
December	0.26	0.93	
Minimum	**0.25**	**0.81**	
Maximum	**0.27**	**0.98**	

Source: RPS, (2025)

Sea Temperature

The shallowness of Bass Strait means that its waters more rapidly warm in summer and cool in winter than waters of other nearby regions (CoA, 2015a). The sea surface temperatures in the area reflect the influence of warmer waters brought into Bass Strait by the EAC (IMCRA, 1998; Barton et al., 2012).

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Waters in eastern Bass Strait are generally well mixed, however calm summer conditions can result in surface warming and weak stratification. This creates a thermocline, which separates the wind-driven upper mixed layer from the bottom well-mixed layer and leads to horizontal temperate variations.

Sea surface temperatures in the area range from 12.1°C in August to 20.8°C in February, with an annual average of 16.3°C (RPS, 2025; based on the World Ocean Atlas data).

Salinity

Salinity in the region consistently ranges from 35.4 – 35.6 practical salinity units (psu) throughout the year (based on the World Ocean Atlas database) (RPS, 2025).

Tides

Bass Strait is a shallow area of the continental shelf, connecting the southeast Indian Ocean with the Tasman Sea. The region is known for high winds and strong tidal currents (RPS, 2025).

Tidal currents follow a semi-diurnal pattern with some diurnal inequalities (Barton et al., 2012; Jones and Padman, 1983). Current speeds generally range from 0.1 to 2.5 m/s (Fandry, 1983), with stronger currents of 2 to 2.5 knots reported as characteristic of the area (Barton et al., 2012). Tidal variation is 0.9 m for spring tides and 0.6 m for neap tides.

Tidal flows enter Bass Strait from both the east and west during flood tide and reverse during ebb tide. A three-to-four-hour phase difference in tidal components is observed across the strait, primarily between Lakes Entrance and Wilsons Promontory.

Waves

Bass Strait is a high-energy environment exposed to frequent storms and significant wave heights (Jones, 1980), although Barton et al. (2012) report wave energy in the Twofold Shelf Bioregion as relatively low. Storms may occur several times a month resulting in wave heights of 3 to 4 m or more.

Water Quality

The Regional Outfall Sewer (ROS) discharges at Delray Beach, within the Activity area. The mixing zone extends 100 m from the diffuser and shows elevated nutrient levels compared to background values (National Outfall Database, 2025). In 2020, the average monthly outflow of 851.93 megalitres (ML), with pollutant concentrations as follows:

- colour (Pt. Co. units) – 218.33
- E. coli (org/100 mL) - 3,709.4
- pH – 7.9
- total dissolved solids (mg/L) – 3,10
- total suspended solids (TSS) (mg/L) – 11.83
- total nitrogen (mg/L) – 3.98
- total phosphorous (mg/L) – 1.31.

Ambient Ocean Sound

Physical and biological processes contribute to natural background sound. Physical processes include that of wind, waves, rain and earthquakes, whilst biological noise sources include vocalisations of marine mammals and other marine species.

Table 4-6 presents a comparison of biological and anthropological sounds in the marine environment.

Table 4-6 Sound intensity and pressure (dB re 1uPa) @ 1 m from source for some common marine sources

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Source	Sound intensity (dB re 1 uPa)	Frequency (Hz)	Reference
Natural sound			
Ambient sea sound	80-120	Varied	2
Undersea earthquake	272	50	2
Seafloor volcanic eruption	255+	Varied	2
Lightning strike on sea surface	250	Varied	2
Iceberg calving, shoaling and disintegration	220-245	Varied	5, 6
Bottlenose dolphin clicks	Up to 229	Up to 120,000	2
Breaching whale	200	20	2
Blue whale vocalisations	190	12 – 400 (16 – 25 dominant)	2
Blue whale moans	188	12 – 390 (16 - 25 dominant)	1
Southern right whale	172 - 186	30 – 2,200 (50 – 500 dominant)	1
Humpback whale	144-174	30 – 8,000 (song) (120 – 4,000 dominant) 50 – 10,000 (social calls)	1, 3
Sperm whale clicks	Up to 235	100 – 30,000	2
Anthropogenic sound			
Seismic acoustic source (32 guns)	178-210	Most energy 5 to 200 Hz	1
Ship sound (close to hull)	200	10 - 100	2
Survey vessel	110-135 (without thrusters) 121-146 (with thrusters)	20 - 1,000	4
Fishing trawler	158	100	3
7 m outboard motorboat	156	630	3
Tanker (179 m)	180	60	3
Supertanker (340 m)	190	7	3
Containership (274 m)	181	8	3
Navigation transponders	180 – 200	7,000 – 60,000	3
SSS	220 – 230	50,000 – 500,000	3
Bottom profilers	200 – 230	400 – 30,000	3
References			
1 – Richardson et al. (1995).	3 – WDCS (2004).	5 – Chapp et al. (2005).	
2 – APPEA (2006).	4 – Total (2004).	6 – Matsumoto et al. (2014).	

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4.2 Marine and Coastal Environment

A summary of marine and coastal features within the Activity area and EMBA is provided in Table 4-7.

Table 4-7 Summary of marine and costal features within the Activity area and EMBA

Marine/coastal feature	Activity area	EMBA
Marine features		
Sublittoral sand and muddy sand		
Littoral sand		
High energy infralittoral rock		
Moderate energy infralittoral rock		
High energy littoral rock		
Non-reef sediment epibenthos		
Sublittoral seagrass beds		
Sublittoral coarse sediment		
Sublittoral seaweed on sediment		

** Green shading indicates presence of the feature, red indicates an absence.*

4.2.1 Marine Environment

The biotopes within the Activity area are discussed within Section 4.1.2.1. In addition to the biotopes found within the Activity area, the EMBA also contains littoral sand, moderate energy infralittoral rock, sublittoral coarse sediment, and sublittoral seaweed on sediment. Habitat descriptions can be found at: Marine and Coastal Knowledge – Supporting Information (https://www.marineandcoasts.vic.gov.au/marine-and-coastal-knowledge/feature-activity-sensitivity-tool/supporting-information).

4.2.2 Coastal Environment

The coastal environment described in this section is defined by the extent of the EMBA, which stretches for approximately 55 km from southwest of Seaspray to east of Loch Sport. The Activity area is directly adjacent to the sandy shoreline between Delray Beach and Golden Beach.

The OSRA (2015) maps are the primary resource used when describing the coastal features of the EMBA. According to the OSRA (2015) maps, the following features are overlapped by the coastal areas of EMBA:

- sandy beach - majority of the coastal area overlapped by the EMBA comprises of sandy beaches, including Ninety Mile Beach
- hooded plover habitat - Hooded plover habitats are scattered along the sandy, coastal areas of the EMBA including near Lake Denison, Glomar Beach, Golden Beach and Loch Sport
- estuarine fish habitats - Estuarine fish habitats have been identified at the mouth of the Merriman creek estuary in Seaspray, which is intermittently open to the ocean
- intermittently open estuaries – the EMBA overlaps the Merriman creek estuary and Lake Dennison estuary
- one geological site - located at the mouth of the Merriman creek estuary.

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4.3 Conservation Values and Sensitivities

The conservation values and sensitivities in and around the Activity area particularly, but also within the EMBA, are described in this section, with Table 4-8 providing an outline of the conservation categories included.

Table 4-8 Conservation values in the EMBA

Category	Conservation classification	Section
MNES under the EPBC Act	AMPs	Section 4.3.1
	World Heritage-listed properties	Section 4.3.2
	National Heritage-listed places	Section 4.3.3
	Wetlands of international importance	Section 4.3.5
	Nationally threatened species and TECs	Throughout section 4.4 & 0
	Migratory species	Throughout Section 4.4
	Commonwealth marine areas	Throughout Section 4.4
	Great Barrier Reef Marine Park	Not applicable.
	Nuclear actions	Not applicable.
	A water resource, in relation to coal seam gas development and large coal mining development	Not applicable.
Other areas of national importance	Commonwealth heritage-listed places	Section 4.3.4
	Key Ecological Features (KEF)	Section 4.3.7
	Nationally important wetlands	Section 4.3.8
Victorian protected areas	Marine National Parks and Sanctuaries	Section 4.3.9
	Coastal (onshore) conservation reserves	Section 4.3.9

4.3.1 Australian Marine Parks

No AMPs are located within the Activity area or EMBA.

The Beagle AMP is the closest, located 97 km southwest of the Activity area, followed by the East Gippsland AMP, located 214 km southeast of the Activity area.

4.3.2 World Heritage-Listed Properties

No properties on the World Heritage List occur within the EMBA or Activity area. The nearest site is the Royal Exhibition Building and Carlton Gardens in Melbourne, an onshore property located 215 km to the northwest of the Activity area.

4.3.3 National Heritage-Listed Places

There are no National Heritage-listed places in Bass Strait, with the nearest places all located onshore (Australian Alps National Parks and Reserves and the Point Nepean Defence Sites and Quarantine Station Area) over 70 km away.

4.3.4 Commonwealth Heritage-listed Places

No properties on the Commonwealth Heritage List occur within the EMBA. The nearest places are the Wilsons Promontory Lighthouse (128 km southwest of the Activity area) and the Gabo Island Lighthouse (232 km northeast of the Activity area).

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4.3.5 Wetlands of International Importance

Australia currently has 67 wetlands covering over 8.3 million hectares, recognised for their ecological significance under the Ramsar Conventions and protected by Chapter 5, Part 15 of the EPBC Act (DCCEEW, 2024g). While no Ramsar wetlands are located within the Activity area or EMBA, the 'Gippsland Lakes' Ramsar site lies approximately 1 km north of the Activity area and is in close proximity to the EMBA shoreline, warranting its inclusion in this section.

4.3.6 Threatened Ecological Communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. TECs are a MNES under the EPBC Act. 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) (DCCEEW, 2024h).

The following TEC's were detected by the PMST and overlap with the coastal areas of the EMBA:

- natural Damp Grassland of the Victorian Coastal Plains
- subtropical and Temperate Coastal Saltmarsh.

Both of the above listed TECs are described within this section.

Natural Damp Grassland of the Victorian Coastal Plains

This TEC is a type of grassland of open grassy woodland with scattered trees and shrubs that occurs in the South East Coastal Plain. This TEC is generally found on heavy grey silty–loamy soils, which are poorly drained and therefore often damp and sometimes waterlogged. The heavy soils may be derived from floodplain or swamp deposits, and they may be influenced by moisture from local rainfall, surface flows from local creeks or runoff from surrounding land, and occasionally groundwater. Despite this TEC being terrestrial in nature, a range of wetland and coastal birds utilise this TEC, such as the curlew sandpiper, Australasian bittern, white-throated needletail, pacific golden plover, Australian painted snipe, Australian fairy tern and the marsh sandpiper.

Subtropical and Temperate Coastal Saltmarsh

According to the Conservation Advice for Subtropical and Temperate Coastal Saltmarsh, this TEC occurs in a relatively narrow strip along the Australian coast, within the boundary along 23°37' latitude along the east coast and south from Shark Bay on the west coast of WA (TSSC, 2013). The community is found in coastal areas which have an intermittent or regular tidal influence. The saltmarsh community is inhabited by a wide range of infaunal and epifaunal invertebrates and low and high tide visitors such as fish, birds and prawns (Adam, 1990). It is often important nursery habitat for fish and prawn species. Insects are also abundant and an important food source for other fauna. The dominant marine residents are benthic invertebrates, including molluscs and crabs (Ross et al., 2009).

4.3.7 Key Ecological Features

Key Ecological Features (KEFs) are components of the marine ecosystem that are considered to be important for biodiversity or ecosystem function and integrity of a Commonwealth marine area (DCCEEW, 2024i).

Both the Activity area and EMBA do not intersect any KEFs.

4.3.8 Nationally Important Wetlands

Nationally important wetlands are designated for their ecological and hydrological functions, roles in supporting vulnerable life stages of fauna, supporting ≥1% of the national population of native species, or significant historical or cultural value (DCCEEW, 2024j).

While several such wetlands occur along the Victorian coast, none occur within the Activity area or EMBA. The closest is the 'Lake Victoria Wetlands' located 6.2 km north of the EMBA.

4.3.9 Victorian Marine and Coastal Protected Areas

Victoria has twenty-four marine national parks and sanctuaries that were established, and are protected and managed, under the National Parks Act 1982 (Vic) by Parks Victoria. The EMBA overlaps a small area (~ 0.5 km2) of the Ninety-Mile Beach MNP, located 21.2 km west of the Activity area.

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Victoria has forty-five national parks and twenty-six state parks that were established, and are protected and managed, under the National Parks Act 1982 (Vic), Crown Lands (Reserves) Act 1978 (Vic) and Parks Victoria Act 1998 (Vic) by Parks Victoria.

Ninety Mile Marine National Park

The Ninety-Mile Beach MNP covers an area of 2,750 ha and extends along approximately 5 km of coastline and offshore for 5 km from the high-water mark. The park protects an internationally significant sandy environment, recognised for its exceptionally high diversity of marine invertebrates.

The park's key natural values are listed as:

- very high diversity of marine invertebrates, including the large endemic southern Australian sea star (Coscinasterias muricata) and the soft coral (Pseudogorgia godeffroyi);
- scattered low calcarenite reefs providing habitat for a distinctive marine invertebrate fauna, especially sponges, with sparse flora communities of small red algae; and
- important habitat for threatened shorebird species, including species listed under international migratory bird agreements.

More than eight hundred different species were found within 10 m2 of Ninety Mile Beach sand (compared to 300-400 per 10 m2 in comparable habitats), making it one of the most biologically diverse marine environments in the world. Intertidal sand communities along the Ninety Mile Beach are species-poor, which is typical of coarse-grained, steep-faced, high-energy beaches.

The subtidal reefs support a community dominated by invertebrates, particularly sponges and sea squirts. Seaweeds are largely absent, possibly because of frequent scouring by shifting sand. The reefs themselves are likely to be periodically covered and uncovered by sand.

The waters of the park have aggregations of juvenile white shark (Carcharodon carcharias), snapper (Pagrus auratus), Australian salmon (Arripis spp.), long-finned pike (Dinolestes lewini) and short-finned pike (Sphyaena novaehollandiae). The southern right whale, Australian fur seals and New Zealand fur-seals are known to frequent the park.

Gippsland Lakes Coastal Park

Information provided here is sourced from Parks Victoria (1998).

This park is a narrow coastal reserve, covering 17,584 ha along the Ninety Mile Beach (including the beach itself, assumed to be to the low water mark) from Seaspray to Lakes Entrance.

The park's key natural values are listed as (use of the term 'Parks' in this section references the adjacent Lakes National Park):

- supports valuable remnants of vegetation communities that have been disturbed throughout much of their range, including Coast Banksia Woodland, Heath Tea-tree Heathland and Hairy Spinifex Grassland
- Lake Reeve is of international significance and is a site of special scientific interest. This long, shallow lagoon is fringed by salt marsh with a number of plant species 'relatively uncommon in Victoria east of Seaspray'
- six significant flora and over 20 significant fauna species have been recorded within the Parks
- Lake Reeve provides important breeding habitat for a number of waterfowl species and is one of Victoria's five most important areas for waders
- the wetlands are important nursery areas for many fish species
- the Parks contain sites of national, state and regional geological and geomorphological significance, mainly associated with the evolution of the barrier system that formed the Gippsland Lakes
- the Gippsland Lakes area, which includes the Parks, is recorded as a significant regional landscape by the National Trust of Australia.

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4.4 Biological Environment

The results of the PMST and VBA database searches provide the key means by which species are identified for the Activity area and EMBA and are discussed in this section.

Additionally, BIAs are identified for those species that may occur within the Activity area and EMBA. BIAs are spatially and temporally defined areas of the marine environment used by protected marine species for carrying out critical life functions. BIAs are designated by identifying areas and times known or likely to be regularly or repeatedly used by individuals or aggregations of a single species, stock, or population for either reproduction, feeding, migration or resting (DCCEEW, 2023b).

4.4.1 Benthic Assemblages

Regional knowledge

The seascape of the region is composed of a series of massive sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment (Wilson and Poore, 1987).

The sediment flats are generally devoid of emergent fauna, but benthic invertebrates such as polychaetes, bivalves, molluscs and echinoderms are present (Wilson and Poore, 1987). There are also a number of burrowing species that inhabit the soft seabed, including tubeworms, small crustaceans, nematodes, nemerteans and sea pens (OMV, 2001).

Bass Strait

Surveys of benthic invertebrates in Bass Strait (Poore et al., 1985; Wilson and Poore, 1987) have shown:

- crustaceans and polychaetes dominate the infaunal communities, many of which are unknown species
- the high diversity of a wide range of invertebrate groups has been a recurrent observation of all surveys in Bass Strait and diversity is high compared with equivalent areas of the northern hemisphere
- many species are widely distributed across the Strait
- some invertebrate groups are allied with fauna from Antarctic seas. In winter, when the east coast of Tasmania is supplied with water from the sub-Antarctic, the overlap with the EAC contributes to the high diversity due to the transportation of nutrient-rich waters.

Parry et al. (1989) also found high diversity and patchiness of benthos sampled off Lakes Entrance, where a total of three hundred and fifty-three species of infauna was recorded. Crustaceans (53%), polychaetes (32%) and molluscs (9%) dominated sample results.

Barton et al. (2012) report that in the Ninety-Mile Beach Marine National Park (22 km southwest of the Activity area), reefs are dominated by invertebrates (70% coverage), including sponges, ascidians (sea squirts) and smaller bryozoans (resembling coral) and hydroids (colonies of tiny jellies attached to a feather-like base).

A search of the VBA database for the EMBA reports no results for benthic fauna species. Elsewhere in eastern Bass Strait, the VBA indicates the presence of benthic species including sea snails, sea stars, sea urchins, sea slugs, rock lobsters and limpets (none of which are threatened species under Commonwealth or Victorian legislation).

This confirms the diverse nature of the benthic environment in the Bass Strait and Southern Ocean regions.

Activity area

The ALA database did not contain any records of benthic species within the Activity area.

CSIRO has conducted biological surveying and investigation at the sites with a towed camera and Remotely Operated (underwater) Vehicle (ROV) footage, fish baiting and sampling of epibenthic fauna.

At sites within the Activity area, sled tows of various lengths as well as opportunistic sampling of epibenthic fauna were conducted. The general assemblage of epibenthic fauna at sites in the Activity area is consistent with the literature describing the region, with gastropods, polychaetes, echinoderms, cnidarians, crustaceans, bivalves and an assortment of sponges being collected and identified (CSIRO, 2018). Where hard substrate is

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identified at investigation sites, such as at site 14 (1.8 km north of the Activity area), species richness is higher than the soft substrate samples.

A total of 1,253 individuals were found recorded from the benthic tows within the Activity area, represented by 6 phyla, 8 classes and 28 taxa. The number of taxa recorded at Site 9 (8 taxa) and Site 10 (6 taxa at Site 10(A/B) and 3 taxa at Site 10(2A/2B)) was generally lower compared to other sites from the survey area. The abundance of benthic fauna at Site 9 and 10 was lower than most sites, with 0.5 individuals/m2 at Site 9, 0.3 individuals/m2 at Site 10(A/B) and 0.7 individuals/m2 at Site 10(2A/2B)) recorded. Both abundance and richness of benthic fauna taxa at Site 11(A/B) was the second highest of all surveyed sites, with 19 taxa and 24.8 individuals/m2 recorded.

Electroma georgiana (little wing pearl shell) was the most abundant species at all three sites (and accounted for 75% of the abundance and 76% of total biomass across all the CSIRO sample sites).

Ophiura kinburgi is also abundant at site 11 (in the Activity area). This is a brittle star that grows up to 2 cm in diameter and lives in soft sediments in water depths ranging from 2 to 500 m (Port Phillip Marine Life, 2020) .

Site 9, close to the proposed Horizontal Direction Drilling (HDD) seabed exit point, has low species diversity and abundance.

A marine habitat assessment was commissioned by CarbonNet for their Pelican 3DMSS and conducted in early April 2017 to characterise the seabed. This habitat assessment included 11 sites two of which (site 32 and 33) were within the Activity area and the others located within proximity to the Activity area. Nine of the 11 sites consisted of sandy sediments and gravels/shells with contouring that is typical of mobile seabed affected by swell waves and strong tidal currents. Rocky reef was present at two sites located 800 m to 1 km to the southwest of the Activity area. No beds of giant kelp, seagrass or sponges were observed at any of the 11 sites within proximity to the Activity area. The results of this sampling relevant to the Activity area indicate that, in general, the seabed is dominated by fine sand with very little epibiota. Low profile discontinuous rocky reef was observed at sites 64, 65 and 67 (directly adjacent to the Activity area) during the assessment.

Scallops

Commercial scallops (*Pecten fumatus*) are distributed along the southeast Australian coast, including Bass Strait, inhabiting soft sediments (mud to coarse sand) from 10-120 m depth (AFMA, 2017a; Przeslawski et al., 2016b). Though largely sedentary, scallops can swim when threatened (AFMA, 2017a). Scallops feed on prey and detritus, while they are prey for starfish, whelks, and octopus (AFMA, 2017a).

Reproduction begins in the second year, with spawning from June to November, peaking in spring (DPI, 2005). Larval scallops drift for up to six weeks before settling on hard surfaces, eventually detaching and burrowing into sediment (AFMA, 2017a; Przeslawski et al., 2016b). Scallop settlement is highly variable and natural mortality ranges from 11-51% annually (AMFA, 2017a; VFA, 2017, DPI, 2005).

Although the sandy sediments in the Activity area provide suitable habitat, recent surveys suggest commercial scallop presence is nil to low. The VFA 2023 pre-season abundance survey assessed the Tarwhine and Clonmel scallop beds (18 km southeast and 82 km southwest of the Activity area, respectively) and conducted 25 exploratory tows in proximity to the Activity area (Koopman et al., 2023).

Rock Lobster

Two species of rock lobster occur in Victorian waters:

- southern rock (*Jasus edwardsii*) – found on coastal reefs to depths of 150 m, from WA to NSW, including Tasmania and New Zealand (VFA, 2022)
- eastern rock lobster (*Sagmariasus verreauxi*) – found up to 200 m depth, predominantly in NSW, with small quantities taken off eastern Victoria (VFA, 2017).

Lobsters undergo a complex life cycle, after mating in autumn, the fertilised eggs are released by the female, typically between September and November. Lobsters then undergo a planktonic larval stage (phyllosoma) lasting up to two years, followed by settlement to the benthos. Growth is through moulting, which slows with age. Males grow faster, reaching 160 mm in carapace length by ten years, while females generally reach 120 mm in the same period.

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Adults feed on benthic invertebrates and are prey to octopuses and large fish. Scattered low-profile rocky reef inshore of the Activity area (<20 m depth) likely provides suitable habitat for lobsters (VFA, 2017; DPI, 2009).

EMBA

Although the VBA reported no benthic species in the EMBA, the ALA records show a variety of species including (see Appendix F):

- annelids (polychaetes, tube worms, bristle worms)
- crustaceans (crabs, lobsters, amphipods, shrimp)
- molluscs
- bivalves (mussels, scallops, oysters, clams)
- gastropods (sea snails, nudibranchs)
- echinoderms (star fish, sea cucumbers, brittle stars, urchins, feather stars)
- sessile and other invertebrates (sponges, sea squirts, sea spiders, barnacles, corals).

4.4.2 Flora

Literature searches, combined with OSRA (2015) mapping, indicate that marine flora, such as seagrasses and kelp, are generally not abundant in the extensive areas of subtidal sand flats in the nearshore waters of the EMBA. This is likely to be due to the high-energy nature of the Gippsland coastline and the mobile nature of sands, which prevents many species being able to anchor themselves.

Barton et al. (2012) report that in the Ninety-Mile Beach MNP (21.2 km west of the Activity area), reefs have sparse floral communities of small red algae. Given the park's proximity, this may be expected to be representative of flora present on rocky reefs in the proposed Activity area.

As noted earlier, most of the fine sands in and around the Activity area contain only sparse occurrences of seagrass.

4.4.3 Plankton

Plankton is a fundamental component of marine food webs and includes phytoplankton (photosynthetic microalgae) and zooplankton (animal plankton).

Phytoplankton consists of 13 algal divisions, including diatoms, dinoflagellates, gold-brown and green flagellates, cyanobacteria and prochlorophytes (McLeay et al., 2003). While primarily drifting with currents, some species can migrate short distances vertically via ciliary movement. Phytoplankton biomass is greatest in shallow, nutrient-rich areas, particularly in northeast Bass Strait.

Zooplankton includes small crustaceans (such as krill), fish larvae, and other drifting or motile organisms. Over 170 species of zooplankton have been recorded in eastern and central Bass Strait, with copepods comprising approximately 50% of these (Watson & Chaloupka, 1982). High species diversity is attributed to missing of distinct water masses, particularly in the east. Despite this diversity, seven species account for 80% of individuals (Kimmerer and McKinnon, 1984).

Plankton communities within the Activity area are expected to reflect those typical of temperate coastal waters.

4.4.4 Fish

The PMST detected 34 fish species (26 of which are seahorses and pipefish) as potentially occurring in the Activity area, an additional two species of shark were detected in the EMBA only. Of the fish species detected, seven were listed as threatened under the EPBC Act and five were listed as threatened under the FFG Act. The great white shark (Carcharodon carcharias) has a reproduction BIA that overlaps with the Activity area (0.13%) and EMBA (31.18%).

A search of the VBA database reveals no recordings of threatened fish species or sygnathids in the EMBA.

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 (Latrobe City Council [LCC], 1993). Fish species commercially fished in and around the Activity area are listed in Section 4.6.2.

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The marine habitat assessment undertaken by CarbonNet found various site-attached species at some of the patch reef and sponge gardens in the area, including butterfly perch (*C. lepidoptera*), wrasse (*Labridae sp.*), goatfish (*Upeneichthys vlamingii*), bearded rock cod (*Pseudophycis sp.*), morwong (*Cheilodactylus sp.*), cowfish (*Arcana sp.*) and boarfish (*Pentaceropsis recurvirostri).*

4.4.5 Cetaceans

The PMST indicates that six whale species and seven dolphin species may reside within or migrate through the Activity area, an additional species of whale was detected in the EMBA only.

A search of the VBA database indicates that the southern right whale has been recorded 17 times within the EMBA, with the most recent sighting recorded in 2021. One sighting of the strap-toothed whale (*Mesoplodon layardi*) and pygmy sperm whale (*Kogia breviceps*) were also recorded by the VBA within the EMBA, neither of these species were detected by the PMST, and have preferences for deeper water, it is likely the sightings were a result of strandings, vagrants or possibly misidentification.

The VBA also detected three sightings of the common dolphin (*Delphinus delphis*) and two sightings of the Risso's dolphin (*Grampus griseus*). One record of the burrunan dolphin (*Tursiops australis*) was also detected by the VBA within the EMBA in 2003, this species is listed as critically endangered under the FFG Act. This species of dolphin inhabits semi-enclosed embayments and estuarine systems, the species has also been recorded high up in freshwater rivers and potentially inhabits inshore coastal waters. There are approximately 63 individuals located in Gippsland Lakes (onshore) directly adjacent to the EMBA.

Blue Whales

The blue whale (Balaenoptera musculus) has four subspecies, two of which occur within Australian waters, including the Antarctic blue whale (B. m. intermedia) and the pygmy blue whale (B. m. brevicauda) (Rice 1998, in (Department of the Environment, 2023)).

The pygmy blue whale (PBW) has five population groups, two of which are found in the Southern Hemisphere.

Distribution

McCauley et al. (2018) found Antarctic blue whale calls along the entire southern Australian coast, while calls from the New Zealand PBW population occur predominantly eastward of Bass Strait, and calls from the Indo-Australian PBW population were heard west of Bass Strait. The Indo-Australian PBW population wasn't recorded on the east Australian coast or east of Bass Strait and the NZ PBW population was always heard in the Bass Strait recordings, and only ever heard as far west as Portland in Victoria. The Antarctic blue whale was recorded at all sites south of 19°S (McCauley et al., 2018).

Balcazar et al. (2015) suggests that the Australian continent acts as a geographic boundary, separating Indo-Australian and NZ PBW acoustic populations at the junction of the Indian and Pacific Ocean basins (Balcazar, et al., 2015). There are few contemporary records of blue whales in the Gippsland region, which can be seen in the few sighting records within the ALA database (all of which are pre-2000). However, recent scientific literature suggests that PBW populations are capable of travelling great distances far beyond their expected range (Barlow, 2023). This concept that blue whales can extend beyond their current range is corroborated by Branch et al. (2023), who modelled the predicted detection range for the Antarctic blue whale and PBW populations.

Diet

Blue whales have the highest known prey requirements, consuming up to two tonnes of krill per day (DoE, 2015a). Krill is the key to understanding the ecology and behaviour of blue whales. Krill is sensitive to temperature and migrates vertically and horizontally to maintain optimal positioning with respect to nutrients, often being found along thermal fronts and thermoclines. The krill species, Nyctiphanes australis, frequently swarm at or near the surface, making it easily available to foraging blue whales. Foraging is energetically expensive for blue whales, which must regularly find sufficient food to balance their enormous energy requirements (Gill., 2020). There are two important seasonal feeding aggregations areas known in Australia where large numbers of PBW have been recorded: the Bonney Coast Upwelling KEF and adjacent waters off South Australia (SA) and Victoria (located 440 km west of the EMBA); and the Perth Canyon KEF and adjacent waters off WA (located over 3,000 km west of the EMBA).

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Antarctic Blue Whale

The Antarctic blue whale subspecies consists of one or more populations that feed off Antarctica during summer, and limited evidence suggests that some proportion migrate to subtropical latitudes of the Pacific and Indian Ocean to breed. They have been acoustically detected off the West and North coasts of Tasmania predominately from May to December. Based on the seasonality of recordings, these areas possibly form part of their migratory route, breeding habitat or a combination of the two (CoA, 2015).

Barlow (2023) noted that the South Taranaki Bight could be a migratory corridor for the Antarctic blue whale. The Antarctic blue whale is predicted to remain consistently within the Southern Hemisphere, with especially high probabilities in winter months (May-August), and low probabilities in summer (December-March) (Branch, 2023).

In light of the findings of Barlow (2023) and Branch (2023), it is possible the Antarctic blue whale will be present within the Activity area and EMBA.

Indo-Australian Pygmy Blue Whale

The distribution and migration patterns of Indo-Australian PBW are relatively well understood in areas further west of the EMBA. Satellite tagging of Indo-Australian PBW by Double et al. (2014) and Möller, et al. (2020) has revealed that the Indo-Australian population migrates from southern Australian foraging grounds through a WA migratory corridor to (presumed) breeding grounds in waters around Indonesia. The EMBA overlaps with 0.98% of the BIA for foraging.

Barlow et al. (2023) detected the Indo-Australian PBW song during a 10-day period in January 2017, implying a rare vagrant occurrence. The modelling predicts that the distribution of the Australian PBW is further westward of WA, further south along the GAB and Indian Ocean, south eastward towards the Bass Strait and Tasmania and even as far as NZ (Branch et al., 2023).

In light of the findings of Barlow et al. (2023) and Branch et al. (2023), it is possible the Indo-Australian PBW will be present within the Activity area and EMBA.

New Zealand Pygmy Blue Whale

Relatively little is known about NZ PBW. Antarctic blue whales are known to co-occur with PBW around New Zealand. Barlow et al. (2023) states that despite extensive acoustic recordings in eastern Australia, Bass Strait and Tonga, the NZ PBW has rarely been being detected in these locations. The NZ PBW is anticipated to be distributed northwards and eastwards of Tasmania (including Bass Strait and the eastern coast of Australia), and around NZ (Branch et al., 2023).

Due to a lack of records within the Gippsland region and known distribution surrounding NZ, it is unlikely the NZ PBW is present within the Activity are and EMBA.

Southern Right Whale

The southern right whale (SRW) (*Eubalaena australis*) is listed as endangered under both the EPBC Act and FFG Act. SRWs were depleted to less than 300 individuals globally due to commercial whaling in the 19th and 20th centuries (Tormosov, Mikhaliev, Best, Zemsky, & Sekiguichi, 1998). They were protected from whaling in 1935, however, due to illegal whaling in the 1970s and because southern right whales have a slow rate of increase (7% per annum (p.a.)) compared to other marine mammals, their numbers remain low (IWC, 2013). Global abundance estimates are 13,000 for the species, across key wintering grounds in South Africa, Argentina, Australia, and New Zealand.

Population

The Australian population of SRW is divided into two subpopulations due to genetic diversity (Carroll, 2011; Baker et al., 1999) and different rates of increase (DSEWPAC, 2012b). The western sub-population occurs predominantly between Cape Leeuwin, WA and Ceduna, SA. This sub-population comprises most of the Australian population and is estimated at 3,200 individuals increasing at an annual rate of approximately 6% p.a. (Smith et al., 2019).

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The eastern subpopulation can be found along the south-eastern coast, including the region from Tasmania to Sydney, with key aggregation areas in Portland and Warrnambool in Victoria. The eastern subpopulation is estimated at less than 300 individuals and is showing no signs of increase (Bannister, 2017). Connectivity between the two populations is unknown however, some limited movement between the two areas has been recorded (Burnell, 2001; Charlton, 2017; Pirzl et al., 2009).

Distribution

SRWs generally occur along the southern coast of Australia; they migrate annually along the eastern coastline from high latitude feeding grounds to lower latitudes for calving between mid-May and October (DCCEEW, 2023b). Known calving and aggregation grounds in the south-east region are Warrnambool, Port Fairy, Port Campbell and Portland in Victoria, and Encounter Bay in SA (DSEWPC, 2012). Nursery grounds are occupied from May to October, with female-calf pairs generally staying in the area for two to three months (Charlton, 2017). Calving itself usually occurs in very shallow (<10 m depth) waters. Sightings within the ALA database indicate that the SRW has been spotted within the Gippsland region pre and post 2000.

Biologically Important Areas

The Activity area overlaps 0.007% of the reproduction BIA and the EMBA overlaps 0.47% of the reproduction BIA. The Activity area overlaps 0.0002% of the migration BIA and the EMBA overlaps 0.07% of the migration BIA.

Southern right whales are likely to migrate through the Activity area and EMBA.

Humpback whale

The humpback whale (Megaptera novaeangliae) is a moderately large (15-18 m long) baleen whale that has a worldwide distribution but geographic segregation. In the 19th and 20th centuries, humpback whales were hunted extensively throughout the world's oceans and as a result it is estimated that 95% of the population was eliminated. In Australia, commercial whaling of humpback whales ceased in 1963 and until this time, it is estimated that humpback whales were reduced to between 3.5 and 5% of pre-whaling abundance (TSSC, 2015e).

In 2022, the humpback whale was removed from the vulnerable category and now holds no threatened status under the EPBC Act. However, they remain a MNES under the EPBC Act as a listed migratory species, and the species remains listed as a cetacean, where it is an offence to kill, injure, take, trade, keep, move or interfere with a cetacean (DAWE, 2022d).

Humpback whales are found in Australian offshore and Antarctic waters. Bass Strait represents part of the core range of the E1 Group, but feeding, resting or calving is not known to occur in Bass Strait (TSSC, 2015e), though migration through Bass Strait may occur. The nearest area that humpback whales are known to congregate (foraging BIA) is at the southern-most part of NSW (near the eastern border of Victoria), approximately 190 km northeast of the EMBA.

Humpback whales undertake annual migrations between their summer feeding grounds in Antarctic waters to their breeding and calving grounds in subtropical and tropical inshore waters, migrating up the Australian east coast (TSSC, 2015e). The northern migration off the southeast coast starts in April and May, with the southern migration occurring from November to December. This migration tends to occur close to the coast, along the continental shelf boundary in waters about 200 m deep (TSSC, 2015e).

The listing advice for the humpback whale (DAWE, 2022) identifies vessel strike and anthropogenic noise as current threats to the species. As the Activity area and the EMBA represent a core range for humpback whales, they may be encountered, particularly during April, May, November and December, though the likelihood is considered low for the Activity area due to their preference for migrating along the edge of the continental shelf in waters much deeper than those of the Activity area.

Dolphins

None of the six dolphin species listed in the PMST are listed as threatened under the EPBC Act or FFG Act. The detected dolphin species are listed below:

- the common dolphin (Delphinus delphis)
- risso's dolphin (Grampus griseus)
- the dusky dolphin (Lagenorhynchus obscures)

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- the killer whale (Orcinus orca)
- the Indian Ocean bottlenose dolphin (Tursiops aduncus)
- the bottlenose dolphin (Tursiops truncatus).

4.4.6 Pinnipeds

There are two pinniped species recorded under the EPBC Act PMST as potentially occurring within the Activity area and EMBA. The New Zealand fur-seal is listed as vulnerable under Victorian legislation but not under commonwealth. The VBA search for the EMBA recorded both species of the fur-seal. According to the VBA, the Australian fur-seal has been detected five times within the EMBA, with the most recent recording being in 2017. The New Zealand fur-seal was recorded once in 2015.

Three additional species of seal were also recorded by the VBA. The occurrences of these species within Australian coastal waters are considered vagrant and are typically pups or juveniles who have gone astray. It is highly unlikely any of the additional seal species detected by the VBA will be encountered in the EMBA.

One un-specified eared seal (*Otariidae spp.)* was also recorded by the VBA in the EMBA in 2014.

New Zealand fur-seal

New Zealand fur-seals (Arctocephalus forsteri) are listed as marine under the EPBC Act, and vulnerable under the FFG Act. NZ fur seals are mostly found in central South Australian waters (Kangaroo Island to South Eyre Peninsula); 77% of their population is found there (Shaughnessy, 1999).

There are 51 known breeding sites for New Zealand fur-seals in Australia, with most of these outsides of Victoria (47 in SA and WA) (DEHWA, 2007). Breeding locations in Victoria occur at Kanowna Island, off Wilson's Promontory (located 138 km southwest of the Activity area) and the Skerries (located approximately 193 km northeast of the Activity area) (Kirkwood et al., 2009) (the latter being within the EMBA).

During the non-breeding season (November to January) the breeding sites are occupied by pups/young juveniles, whilst adult females alternate between the breeding sites and foraging at sea (Shaughnessy, 1999).

Haul-out sites in Bass Strait occur outside the EMBA (Barton et al., 2012).

There is no BIA for the New Zealand fur-seal in Bass Strait. Given the close proximity of the Activity area to breeding colonies and haul-out sites, it is likely that the species feeds within the Activity area and EMBA. However, there are no islands or rock outcrops within the Activity area or EMBA, so a resident population is unlikely to occur. These waters are unlikely to represent important critical feeding or breeding habitat.

Australian fur-seal

The Australian fur-seal (*Arctocephalus pusillus*) is listed as marine under the EPBC Act. The Australian fur-seal has a relatively restricted distribution around the islands of Bass Strait, parts of Tasmania and southern Victoria.

There are 10 established breeding colonies of the Australian fur-seal that are restricted to islands in the Bass Strait; six occurring off the coast of Victoria and four off the coast of Tasmania (DCCEEW, 2024b The largest of the established colonies occur at Lady Julia Percy Island (26% of the breeding population and 471 km west of the Activity area) and at Seal Rocks (25% of the breeding population and 198 km west of the Activity area), in Victoria (DCCEEW, 2024b). These areas are not located within the EMBA. Historically, Australian fur-seal breeding colonies were more widespread, but several islands have not been occupied since their populations were removed by early commercial sealing (DCCEEW, 2024b).

Their preferred habitat, especially for breeding, is a rocky island with boulder or pebble beaches and gradually sloping rocky ledges. Australian fur-seals are present in the region all year. Pups begin to forage in June/July and are generally weaned by September/October (Shaughnessy, 1999).

Australian fur-seals are also regularly seen resting and foraging on and around the petroleum production platforms off the Gippsland coast. Barton et al. (2012), Carlyon et al. (2011) and OSRA list the haul-out sites known in Bass Strait, however, none of these sites occur in the EMBA.

During the summer months, Australian fur-seals travel between northern Bass Strait islands and southern Tasmania waters following the Tasmanian east coast, however, lactating female fur-seals and some territorial males are restricted to foraging ranges within Bass Strait waters.

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Male Australian fur-seals are bound to colonies during the breeding season from late October to late December, and outside of this time they forage further afield (up to several hundred kilometres) and are away for long periods, even up to nine days (Kirkwood et al., 2009; Hume et al., 2004).

There is no BIA for the Australian fur-seal in Bass Strait.

4.4.7 Reptiles

Three species of marine turtle are identified in the PMST as potentially occurring within the Activity area and EMBA, all of which are listed as threatened under the EPBC Act. Robertson and Coventry (2014) note that known occurrences of turtles in Victorian waters are rare vagrants outside their usual range. No BIAs for marine turtles occur within Bass Strait. According to the Southern Australian Sea Turtle project (CIE, 2014), all species of sea turtle have been recorded in southern Australian waters (i.e., waters off South Australia, Victoria, and Tasmania) except the Kemp's ridley sea turtle. Leatherback turtles have the highest occurrence, appearing to be sighted more often during summer and autumn than the rest of the year.

Loggerhead turtle

The loggerhead turtle (*Caretta caretta*) is listed as endangered and migratory under the EPBC Act. The loggerhead turtle is globally distributed in sub-tropical waters (Limpus, 2008a) including eastern, northern and western Australia (CoA, 2017) and is rarely sighted off the Victorian coast. No loggerhead foraging areas have been identified in Victoria waters (CoA, 2017).

The CIE (2014) noted that the loggerhead turtle had been recorded seven times in Victoria, the closest sighting to the EMBA area was recorded in the northeast region of Wilson's Promontory (approximately 62 km west of the EMBA). Given the lack of sightings of the loggerhead turtle in eastern Victoria and an absence of foraging areas, it is highly unlikely the species will be present within the Activity area or EMBA.

Green turtle

The green turtle (*Chelonia mydas)* is listed as vulnerable and migratory under the EPBC Act. The green turtle is distributed in sub-tropical and tropical waters around the world (Limpus, 2008b; CoA, 2017). In Australia, they nest, forage, and migrate across tropical northern Australia. There are no known nesting or foraging grounds for green turtles in Victoria, and they occur only as rare vagrants (CoA, 2017). The CoA (2017) maps the green turtle as having a 'known' or 'likely' range within Bass Strait.

Similarly, the green turtle has been recorded in Victoria only five times. The closest sightings of the green turtle were recorded in the northern region of Wilsons Promontory (approximately 91 km southwest of the EMBA) and within Corner Inlet (approximately 71 km west of the EMBA). Given the lack of sightings of the green turtle in eastern Victoria and an absence of foraging areas, it is highly unlikely the species will be present within the Activity area or EMBA.

Leatherback turtle

The leatherback turtle (*Dermochelys coriacea*) is listed as endangered and migratory under the EPBC Act. The leatherback is widely distributed throughout tropical, sub-tropical and temperate waters of Australia (CoA, 2017) including oceanic waters and continental shelf waters along the coast of southern Australia (Limpus, 2009). Unlike other marine turtles, the leatherback turtle utilises cold water foraging areas, with reported foraging along the coastal waters of central Australia (southern Queensland to central NSW), southeast Australia (Tasmania, Victoria and eastern South Australia) and southern WA (Limpus, 2009). No major nesting has been recorded in Australia, with isolated nesting recorded in the Northern Territory, Queensland and northern NSW (CoA, 2017). This species nests only in the tropics. The CoA (2017) maps the leatherback turtles as having a known or likely range within Bass Strait.

Unlike the loggerhead and green turtle, the CIE (2014) noted 28 records of the leatherback turtle in Victoria. The closest sightings to the EMBA are in the southwest part of Wilsons Promontory (approximately 95 km southwest of the EMBA) and around the waters surrounding Manns Beach (approximately 34 km northwest of the EMBA). Despite the leatherback turtle being recorded the most within Victoria, it is still considered unlikely that the species will be encountered in the EMBA due to a lack of nesting sites.

4.4.8 Avifauna

Birds in the marine environment can include both seabirds and shorebirds:

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- seabirds refer to those species whose normal habitat and food sources are derived from the ocean (both coastal and pelagic); seabirds include such species as albatrosses, petrels, pelicans, gannets and cormorants
- shorebirds (sometimes referred to as wading birds) refers to those species commonly found along sandy or rocky shorelines, mudflats, and shallow waters; shorebirds include such species as plovers and sandpipers.

Fifty-eight (55) seabirds and shorebirds are listed under the EPBC Act as potentially occurring in the Activity area and EMBA. The majority of these are listed as migratory and marine species.

The VBA database recorded an additional seven seabirds and fifteen shorebirds in the EMBA with over 100 terrestrial birds also recorded.

A search of the BirdData database was conducted for both the Activity area and EMBA in 2025. The BirdData database identified 7 birds two gulls, one gannet, one currawong, one silvereye, one tern and one blackbird) within the Activity area, all species were detected once, except for the greater crested tern which was detected twice. The BirdData database identified 61 species of birds.

Albatross and Petrels

The PMST report detected 15 albatross and five petrel species that have the potential to occur within the EMBA.

Albatrosses and petrels are mostly surface capturing, pelagic predators that feed on live and dying prey. Their ability to dive varies across species and involves either surface plunge dives or shallow dives to catch prey (generally less than 15 m deep). Both species are wide-ranging, opportunistic predators.

Albatrosses and petrels have a tendency to follow fishing vessels. Competition for fishers discards and baited hooks can be intense with smaller birds subject to secondary attacks by other larger birds (CoA, 2022). None of the remote offshore islands listed in the National Recovery Plan for albatrosses and petrels (CoA, 2022) that should be regarded as habitat that is potentially critical to the survival of albatrosses and petrels in Australia are within the Activity area or EMBA or in close proximity.

Due to their extensive ranges and the presence of several BIAs, it is likely that albatross and petrel species will be encountered in the EMBA.

Shearwaters

Three species of shearwaters were detected by the PMST. Shearwaters represent the most abundant seabird in Australia they are typically pelagic, except during breeding seasons where they are found on remote islands or coastal headlands. Shearwaters are medium-size long-winged seabirds that are most common in temperate and cold waters. They spend most of their time foraging in the ocean and return to coastal cliffs and offshore islands only to breed.

Shearwaters feed on fish, squid, cephalopod molluscs (squid, cuttlefish, nautilus and argonauts), crustaceans (barnacles and shrimp) and other soft-bodied pelagic prey. Food is usually taken by pursuit-plunging, surface plunging or surface-seizing (DCCEEW, 2025b).

Due to their expansive ranges, it is likely that shearwaters may overfly or forage in the EMBA.

Little penguins

The Little penguin (*Eudyptula minor*) was not detected by the PMST, however, the VBA recorded four sightings of the species in 2021.

Nest building (in sand dunes or in rock crevices) occurs from June to December, breeding occurs from August to October, egg laying occurs from August to December, chick raising occurs from August to March and moulting occurs between February and April (during which time they must remain on land). During winter, penguins spend most of their time at sea, returning to the burrows to rest and attend to their burrows (PFPI, 2017). Based on OSRA (2015) mapping, little penguin colonies in the Gippsland region all occur outside the Activity area and EMBA.

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The nearest BIA for little penguins occurs at Curtis Island (south of Wilson's Promontory, 138 km southwest of the Activity area), around Flinders Island (150 km south) and at Phillip Island (180 km west) (all located outside the EMBA). Little penguins may forage within the Activity area and EMBA.

Other seabirds

Other seabirds listed in the PMST that may occur within the Activity area and EMBA are listed here:

- the southern fairy prion (Pachyptila turtur subantarctica)
- the white-bellied sea eagle (Haliaeetus leucogaster)
- the osprey (Pandion haliaetus).

Shorebirds and Coastal Species

Shorebirds and coastal species listed in the PMST that may occur within the Activity area and EMBA are listed here:

- terns - three species of tern (the little tern, Australian fairy tern & white-fronted tern) were detected by the PMST as potentially occurring within the EMBA
- plovers - seven plovers may occur within the EMBA (double-banded, pacific, grey, greater sand, red-capped, hooded and eastern plover). The double-banded, red-capped and hooded plovers are also listed under the VBA as occurring within the EMBA, with the latter listed as vulnerable under the FFG Act
- sandpipers - five sandpiper species may occur within the EMBA (marsh, curlew, common, sharp-tailed, pectoral). Low numbers of four of these sandpipers are recorded in the VBA for the EMBA
- snipes - there are four snipe species that may occur within the EMBA (Latham's, inhoe's, pin-tailed and Australian painted). Latham's snipe is also recorded from the EMBA in the VBA and is not listed as threatened under the FFG Act. Snipes may be present within the EMBA during the Activity
- godwits - There are two species of godwit that may occur within the EMBA (bar-tailed and Nunivak bar-tailed). Godwits may be present within the EMBA during the Activity
- red knot - The red knot is the only EPBC Act-listed species of knot that may occur within the Activity area and EMBA (and is recorded in the VBA). Knots may be present within the EMBA during the Activity
- swift parrot - The swift parrot (Lathamus discolour) is a small parrot that has rapid, agile flight. The entire population migrates from Tasmania to the mainland for winter. On the mainland it disperses widely and forages on flowers and psyllid lerps in eucalypts. Given its habitat preferences, this species is unlikely to occur within the EMBA
- orange-bellied parrot - The orange-bellied parrot (*Neophema chrysogaster*) migrates across Bass Strait in autumn and over-winters on the mainland of Australia. In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries, or, rarely, saltworks. Orange-bellied habitat may occur around the Gippsland Lakes area. The EMBA overlaps with the species infrequent non-breeding range. The orange-bellied parrot may to be present within the coastal areas of the EMBA in low numbers during winter.
- Blue-billed duck – The Blue-billed Duck (*Oxyura australis)* is a small, stiff-tailed diving duck endemic to Australia, measuring 35–44 cm in length. Adult males have a bright blue bill, black head and neck, and chestnut body during the breeding season, while females and juveniles are mottled grey-brown with a darker bill. The species occupies both natural and artificial wetlands across temperate south-eastern and south-western Australia.

4.4.9 Marine Pests

Marine pests known to occur in South Gippsland, according to ParksVic (2015) and Barton et al. (2012) include:

- pacific oyster (Crassostrea gigas)
- northern pacific sea star (Asterias amurensis)

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- New Zealand screw shell (Maoricolpus roseus)
- european shore crab (Carcinus maenas).

The Marine Pests Interactive Map (DAFF, 2019) indicates that the Port of Melbourne is known to harbour the following species:

- northern pacific sea star
- european shore crab
- european fan worms (Sabella spallanzannii and Euchone sp)
- Japanese kelp (Undaria pinnatifida)
- asian date mussel (Musculista senhousia)
- asian shore crab (Hemigrapsus sanguineus).

These species have the potential to be picked up in the ballast water and transferred to the Activity area. Two of these species (Pacific oyster and European green crab) are also known to occur in the Gippsland Lakes (Hirst & Bott, 2016).

4.4.10 Amphibians

The three amphibian species highlighted during the sound modelling desktop assessment inhabits permanent and ephemeral wetlands, damp woodland depressions and drainage lines. Their breeding calls are acoustic and are essential for mate attraction. Given the species reliance on acoustics, noise can interfere with mating calls, and prolonged noise disturbance may reducing reproductive success.

- Green bell frog
- Golden bell frog
- Growling grass frog

4.4.11 Terrestrial mammals

The sound and light studies carried out to support the impact assessment identified terrestrial mammals.

- New Holland Mouse
- Yellow-bellied Sheathtail Bat
- Grey-headed flying fox

4.5 Cultural Heritage Values

4.5.1 Underwater cultural heritage

First Nations Underwater Cultural heritage

First Nations Underwater Cultural Heritage (FNUCH) is defined in the Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters Guidelines on the application of the Underwater Cultural Heritage Act 2018 (DCCEEW, 2024) as constituting of archaeological and/or environmental traces of human existence (habitation and/or activities), which can be discovered on the seabed surface (on exposed ancient land surfaces), or within stratified sediment deposits (accumulated on subsequently buried ancient land surfaces) within the submerged paleo landscape of the present-day Australian continental shelf. DCCEEW (2024) notes that intangible underwater cultural heritage that lacks a physical component is not protected under the Underwater Cultural Heritage Act 2018. However, DCCEEW (2024) supports the notion that understanding intangible FNUCH can support impact assessment.

“Gunai/Kurnai” is the name of the indigenous group who have inhabited the Gippsland region for at least 18,000 years (Ramahyuck, 2023). The Gunaikurnai Land and Waters Aboriginal Corporation (GLAWAC, 2023) describe their Country as:

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> *"The land, the rivers and the ocean, the people, and the stories, the past and the future. All of it is connected. All of it is important to us. Country heals us and connects us to our ancestors, our culture, and our history".*

Country can be broadly categorised (although interconnected) into Land and Sea Country. Sea Country, also known as Saltwater Country, is of particular importance for this activity, as the Activity area and EMBA may exist within known and/or unknown areas of Sea Country.

Smyth and Isherwood (2016) describe Sea Country as all estuaries, beaches, bays, and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants, and people were created. The sea, like the land, is integral to the identity of indigenous groups. Connection to Sea Country is accompanied by a complexity of cultural rights and responsibilities. Formal recognition of Sea Country rights lags considerably compared to land rights; this could be for a range of reasons including conflicting perspectives and opinions on traditional custodianship of land and how far it extends (Smyth & Isherwood, 2016).

The Australian Government has provided an $11.6 million dollar commitment to the Sea Country Indigenous Protected Areas (IPA) Program. The program seeks to increase the area of sea in IPAs to strengthen the conservation and protection of Australia's marine and coastal environments, while creating employment and economic opportunities for Indigenous Australians (DCCEEW, 2023d).

As part of the program, the GLAWAC signed an agreement with the Commonwealth Government to start the process of establishing a Sea Country IPA from Nanjit, east of Wilsons Promontory, to Mallacoota, on the Victorian/NSW border. The proposed IPA is located within the coastal waters of the Gippsland region, comprising of numerous marine and coastal parks and includes the Ramsar listed Gippsland Lakes and Raymond Island, a highly significant cultural site. The Activity area and the coastal areas of the EMBA overlap with the proposed Sea Country IPA.

Maritime Archaeological Heritage

There are no shipwrecks mapped as occurring in the Activity area.

Shipwrecks within the EMBA are as follows:

- Colleen Bawn (1913)
- Trinculo (1879) – located on shoreline
- PS Paynesville (1881) – located on shoreline.

Of the 779 shipwrecks in Victoria, nine have been placed within protected zones (a no-entry zone of 500 m radius [78.5 ha] around a particularly significant and/or fragile shipwreck). Five of these are located within Port Phillip Bay, and two along the west Gippsland coast, these being the PS Clonmel (just outside Corner Inlet) and the SS Glenelg (35.5 km southwest of the Activity area).

4.5.2 Native Title

A search of the NNTT database identifies that there is registered Native Title determination over much of the coastline adjacent to the EMBA and Activity area, this being for the Gunai/Kurnai People (VCD2010/001). The determination extends offshore (up to 200 m) within some areas of the EMBA however, not within the Activity area. The claim was approved in 2010, meaning that a determination of native title was made by the Federal Court of Australia.

There are no Native Title Claims over the Activity area or adjacent coastline (NNTT, 2025).

4.6 Socio-economic Environment

4.6.1 Coastal Settlements

The coastline adjacent to the Activity area is sparsely populated, with the adjoining townships of Golden Beach and Paradise Beach being the closest. These towns are located within the Shire of Wellington.

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4.6.2 Commercial Fishing

Commonwealth-managed Fisheries

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

- Bass Strait Central Zone Scallop Fishery (BSCZSF).
- Eastern Tuna and Billfish Fishery (ETBF).
- Eastern Skipjack Tuna Fishery (ESTF).
- Southern Bluefin Tuna Fishery (SBTF).
- Small Pelagic Fishery (SPF).
- Southern Squid Jig Fishery (SSJF).
- Southern and Eastern Scalefish and Shark Fishery (SESSF), incorporating:
    - Gillnet and Shark Hook sector;
    - Commonwealth Trawl sector (CTS); and
    - Scalefish Hook sector (SHS).

Victorian-managed Fisheries

Victorian-managed commercial fisheries with access licences that authorise harvest in the waters of the Activity area and the EMBA include the following (noting that not all operate in the Activity area):

- Victorian Scallop;
- rock lobster (eastern zone);
- abalone (central zone);
- wrasse;
- banded Morwong;
- pipi;
- octopus (eastern zone);
- ocean general;
- trawl inshore;
- purse seine;
- sea urchin;
- giant crab; and
- eel.

4.6.3 Recreational Fishing

Recreational fishing along the Gippsland coast typically targets snapper, King George whiting, flathead, bream, sharks, tuna, calamari, and Australian salmon.

Recreational fishing and boating are largely confined to the Gippsland Lakes and nearshore coastal waters, though surf fishing does occur along the beaches adjacent to Golden Beach. As Bass Strait is relatively shallow, the water currents through the Bass Strait can create unpredictable seas, reducing the numbers of recreational boats from venturing long distances into the Bass Strait from shore. Small boats are likely to fish around the nearshore reef area, while larger game fishing boats are likely to fish further out to sea and use nearby ports and boat ramps for launching.

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There are no boat ramps adjacent to the Activity area, though recreational fishers often carry small 'tinnies' (aluminium-hulled boats) over the sand dunes in order to access the beach, with the sand dune clearing for the Regional Outfall Sewer at Delray Beach providing one of the more suitable access points.

Two regular fishing competitions occur at Golden Beach: the Golden Beach Australia Day Weekend Fishing Carnival which is held over the long weekend near Australia Day, and the Ninety Mile Beach Surf Fishing Competition takes place over the weekend during the Easter long weekend each year between Seaspray and Loch Sport as part of the Golden Beach End of Summer Surf Festival. It is estimated that up to 1,000 extra people are in the region during these competitions, which provides an important economic contribution to local towns. The period of time between Christmas and New Years weekend are generally the busiest for recreational fishing.

The Gippsland Lakes Fishing Club Inc. and Loch Sport Fishing Association are active recreational fishing clubs in the region.

4.6.4 Tourism

Marine-based tourism and recreation in the Bass Strait is primarily associated with recreational fishing and boating (see previous section). The Gippsland Lakes (comprising Lake Victoria, Lake King, and Lake Wellington, together with other smaller lakes, marshes and lagoons) are the primary tourist attraction in the region. The communities adjacent to this network of lakes are popular tourist towns for their boating and fishing activities, along with bushwalking, bird watching and other nature-focused activities. Towns including Lakes Entrance, Metung, Loch Sport, Golden Beach and Lake Tyers are especially popular in summer.

4.6.5 Offshore Energy Exploration and Production

Petroleum

The Activity area is located in proximity to several gas pipelines, these being:

- TasGas pipeline (Tasmanian Gas Pipeline Pty Ltd) – located 21 km west of the Activity area.
- Seaspray to Dolphin to Perch pipeline (EARPL) – located 20 km southwest of the Activity area.
- Bream A to shore pipeline (EARPL) – 5 km east of the Activity area.
- Barracouta to shore pipeline (EARPL) – 6.5 km east of the Activity area..

Electricity

The western extent of the EMBA intersects with a very small portion of Basslink Interconnector that allowed the trade of electricity between Tasmania (hydropower) and the National Electricity Market of the mainland. Basslink runs from Loy Yang in Gippsland, Victoria, across Bass Strait to Bell Bay in Northern Tasmania.

Renewable Energy

The EMBA intersects Australia's first offshore area declared available for renewable energy projects (OEI-01-2022 Part 1). The Activity area is located about 7 km from the declared area. The closest site that has been granted a feasibility license is the Gippsland Dawn offshore wind Activity area, located 12 km east of the project area and the Blue Mackerel North offshore wind project area located 27 km southwest of the Activity area.

4.6.6 Commercial Shipping

The South-east Marine Region (which includes Bass Strait) is one of the busiest shipping regions in Australia (CoA, 2015a). Lakes Entrance is an important fishing port for the region (CoA, 2015a).

The Activity area is located entirely within the Bass Strait ATBA. This area is a routing measure that ships in excess of 200 gross tonnes should avoid due to the high concentration of offshore petroleum infrastructure (oil and gas platforms and pipelines) that can provide a navigational hazard. Operators of vessels greater than 200 gross tonnes must apply to NOPSEMA to enter and be present within the ATBA (Australian Border Force, 2017).

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4.6.7 Defence Activities

Defence activities that may take place in the region include transit of naval vessels, training exercises, hydrographic survey, surveillance and enforcement, and search and rescue. There are no defence training areas within the EMBA (CoA, 2015a). RAAF Base East Sale Restricted Airspace (R360)

The DoD unexploded ordnance database indicates a risk (undefined) of UXO in and around the Activity area and EMBA. UXO is a by-product of past training activities undertaken by the Australian Defence Force or foreign defence forces.

The interactive DoD database (DoD, 2023) indicates that the Activity area lies within the '393 Seaspray' and '392 Bass Strait' UXO sites. The EMBA also overlaps both sites. Both sites were used as an Air Weapons Range during WWII and fall under the 'other' category, meaning defence records confirm that the area was used for military training but do not confirm that the sites were used for live firing. UXO or explosive ordnance fragments/components have not been recovered from the sites. The geophysical investigations undertaken in 2020, did not detected any UXO.

4.6.8 Other Infrastructure

Other infrastructure present within the Activity area (pipeline route investigation portion) includes the ROS ocean outfall at Delray Beach. This outfall is operated by Gippsland Water and disposes large volumes of secondary treated, high saline wastewater from central Gippsland (ParksVic, 2006).

There are no submarine cable protection zones in the vicinity of the Activity area. The nearest telecommunications cables, which connect Tasmania to the Australian mainland, occur to the west of Wilsons Promontory and are far outside the EMBA.

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5 Impact and Risk Assessment Methodology

5.1 Risk Assessment Approach

GB Energy uses a risk management methodology that is compliant with the Australian New Zealand Risk Management Standard ISO31000:2009 (Risk management Principles and guidelines).

GB Energy recognises that risk management is an integral part of good governance and management practice. In planning and designing its approach to risk management, GB Energy has sought to embed risk management into the project's day-to-day processes so that risk management is relevant, effective, efficient and sustained.

The risk management framework is illustrated in Figure 5-1

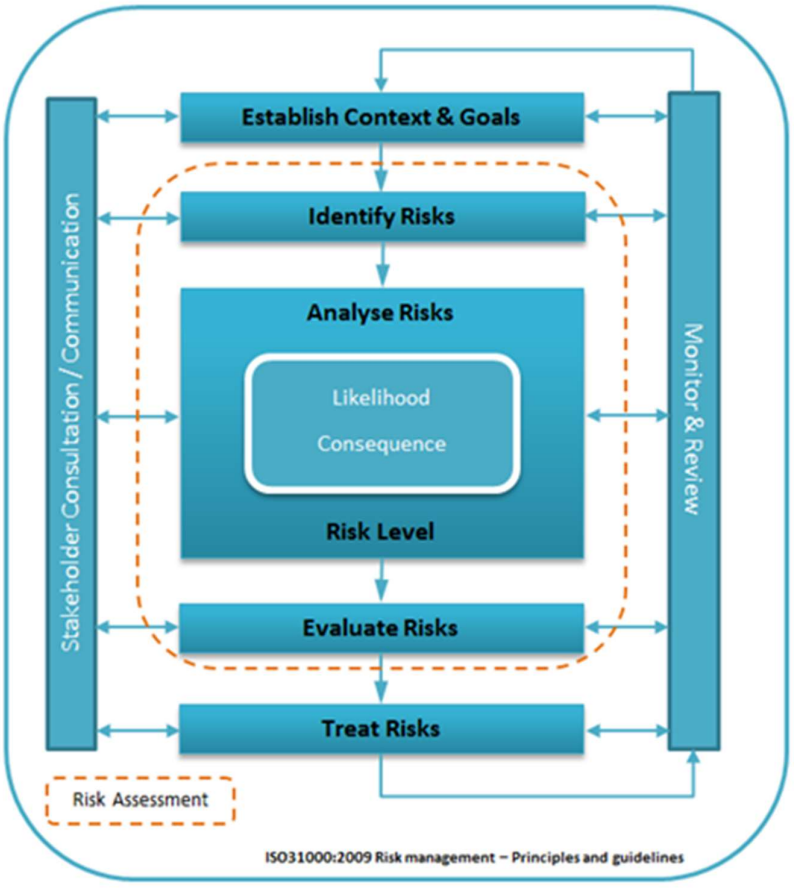


Figure 5-1 Risk management framework

5.2 Risk Management Process

The environmental risk management methodology Principles, consists of the following steps:

1. Identifying the environmental aspects of the activity (including stakeholders that may be affected by the activity).
2. Analysing the environmental impacts and risks of the activity.
3. Evaluating those impacts and risks.

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4. Identifying the treatments that can be incorporated into the activity to ensure the impacts and risks are managed to be ALARP and acceptable.
5. Ensuring the environmental management system (EMS) is robust enough to achieve the objectives in place to manage the impacts and risks of the activity.

5.2.1 Stakeholder Identification

Stakeholder engagement and cooperation is an essential part of GB Energy's corporate sustainability strategy. GB Energy defines stakeholders as individuals or groups who may affect, or be affected by, its activities.

5.2.2 Risk Identification

To identify the environmental impacts and risks associated with this project (together with recommendations for their control), a review and revision of the environmental identification risk register, first developed in November 2018 for the geotechnical investigations, in March 2024 has been completed. The results of this review form the basis for the environmental impact assessment (EIA) and environment risk assessment (ERA) presented in Chapters 6

5.2.3 Risk Analysis

The OPGGS Regulations reg 15(3-5) requires that the EP detail and evaluate the environmental impacts and risks for an activity, including control measures used to reduce the impacts and risks of the activity to ALARP and an acceptable level. This must include impacts and risks arising directly or indirectly from all activity operations (i.e., planned events) or potential emergency or incident conditions (unplanned).

Environmental impact is defined in OPGGS Regulations reg 6 as:

- *any change to the environment, whether adverse or beneficial, that wholly or partially results from an activity.*

Risk is defined in OPGGS Regulations reg 4 as:

- *the likelihood of a specific undesired event occurring within a specific period or in specified circumstances and with specified consequences Determining risk consequence.*

The difference between EIA and ERA is that EIA is concerned with events that are certain to occur, such as planned discharges (planned events); while ERA is concerned with events that may occur such as MDO spills, introduction of marine pests and loss of waste overboard (unplanned events).

5.2.4 Determining risk consequence

Risk consequence is carried out with reference to:

- *Past records*
- *Relevant experience*
- *Industry practice and experience*
- *Relevant published literature*
- *Experimental data*
- *Quantitative or engineering modelling*
- *Specialist or expert judgement*

The consequence definitions are provided in Table 5-1.

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Table 5-1 Consequence definitions

	Health & Safety *(impact to GB Energy or contracting personnel)*	Environment *(impact to the physical and ecological environment and cultural heritage)*	Financial *(loss of revenue, business interruption, commodity trading, asset loss)*	Reputation and Social *(services and community interruption)*	Schedule	Technical *(Occupational Health and Safety, environment, industrial relations, trade practices, industry acts)*
5. Critical	Fatality	Widespread, long-term impact to environment, flora/fauna and ecosystem. Complete remediation not possible.	> AUD 70MM	Critical impact on business reputation and/or international media exposure	> 6 months project delay	Cannot perform work
4. Major	Permanent disabling injury and/or long term off work	Regional, medium/long-term impact to environment, flora/fauna with conservation value. Impact to ecosystem function. Remediation difficult or expensive.	AUD 7 MM < x ≤ 70 MM	Significant impact on business reputation and/or national media exposure.	1 month < x ≤ 6 months project delay	Can perform work only after complete change of work method
3. Moderate	Injury requiring medical treatment, time off work and rehabilitation	Localised, medium-term impact to environment, flora/fauna with	AUD 700k < x ≤ 7 MM	Moderate to small impact on business reputation	1 week < x ≤ 1 month project delay	Can perform part of work with significant

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	Health & Safety *(impact to GB Energy or contracting personnel)*	Environment *(impact to the physical and ecological environment and cultural heritage)*	Financial *(loss of revenue, business interruption, commodity trading, asset loss)*	Reputation and Social *(services and community interruption)*	Schedule	Technical *(Occupational Health and Safety, environment, industrial relations, trade practices, industry acts)*
		conservation value. Ecosystem function is not affected. Damage can be remediated but may be difficult or expensive.				technical changes
2. Minor	Injury requiring medical treatment with no lost time	Localised, short-term impact on environment, flora or fauna. Readily treated.	AUD 70k < x ≤ 700k	Some impact on business reputation.	2 days < x ≤ 1 week project delay	Can perform majority of work with significant technical changes
1. Negligible	Minor injury - first aid treatment	Negligible impact on environment. Minor disturbance of flora/fauna.	≤ AUD 70k	Minimal impact to business reputation	≤ 2 days project delay	Can perform all of work with some technical changes

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5.2.5 Determining risk likelihood

The definitions of likelihood are provided in Table 5-2.

Table 5-2 Consequence definitions

Frequency		Description	Probability
E	Almost certain	Impact is occurring now. Could occur within days to weeks.	99% chance of occurring within the next year.
D	Likely	Balance of probability will occur. Could occur within weeks to months	>50% chance of occurring within the next year.
C	Possible	May occur shortly but a distinct probability it won't. Could occur within months to years.	>10% chance of occurring within the next year.
B	Unlikely	May occur but is not anticipated. Could occur in years to decades.	>1% chance of occurring within the next year.
A	Remote	Occurrence requires exceptional circumstances. Exceptionally unlikely event in the long-term future.	<1% chance of occurring within the next year.

5.2.6 Risk Evaluation

The risk is evaluated by 'multiplying' likelihood and consequence, as per Table 5-3. The recommended form of action, escalation and monitoring for each risk level is provided in Table 5-4.

Chapter 6 presents the 'inherent' rating (pre-treatment) and 'residual' risk rating (with controls adopted) for each risk (unplanned events).

Table 5-3 Qualitative risk analysis matrix

		Consequence				
		1	2	3	4	5
Frequency		Negligible	Minor	Moderate	Major	Critical
E	Almost certain	Medium	High	High	Extreme	Extreme
D	Likely	Low	Medium	High	High	Extreme
C	Possible	Low	Medium	Medium	High	High
B	Unlikely	Low	Low	Medium	Medium	High
A	Remote	Low	Low	Low	Low	Medium

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Table 5-4 Risk treatment action

Risk rating	Treatment action
EXTREME	Modify the threat, the frequency or consequence so that the risk is reduced to 'high' or lower. For an operational activity, the risk shall be reduced as soon as possible, typically within a timescale of not more than a few weeks. For commercial risks, review the risks and where practicable reduce by additional mitigation measures such as hedging, insurance, etc.
HIGH	Repeat threat identification and risk evaluation processes to verify and, where possible, quantify the risk estimation; determine the accuracy and uncertainty of the estimation. Where the risk ranking is confirmed to be 'high', if practicable, modify the threat, the frequency or consequence to reduce the risk ranking to 'medium' or 'low'. Where the risk ranking cannot be reduced to 'medium' or 'low', to demonstrate ALARP it is necessary to review if it is reasonably practicable to remove threats, reduce frequencies and/or reduce the severity of consequences, and if it is reasonably practicable, these risk treatment actions shall be applied. If it is not reasonably practicable, no further action is required and ALARP is demonstrated. For an operational activity, the reduction to 'medium' or 'low' or demonstration of ALARP shall be completed as soon as possible; typically, within a timescale of not more than a few months.
MEDIUM	Determine the management plan for the threat to prevent occurrence and to monitor changes that could affect the classification. Management responsibility must be specified – monitor to determine if risk changes and needs to be reassessed.
LOW	Review at the next review interval. Manage by routine procedures – reassess at next review.

5.2.7 Risk Treatment

Each of the impacts and risks identified and evaluated in Chapter 6 have associated control measures. The following sections describe how ALARP and acceptability are defined and assessed.

5.2.8 Demonstration of ALARP

The level of ALARP assessment is dependent upon the:

- residual impact and risk level (high versus low)
- degree of uncertainty associated with the assessed impact or risk

A risk is reduced to ALARP when the following criteria are met:

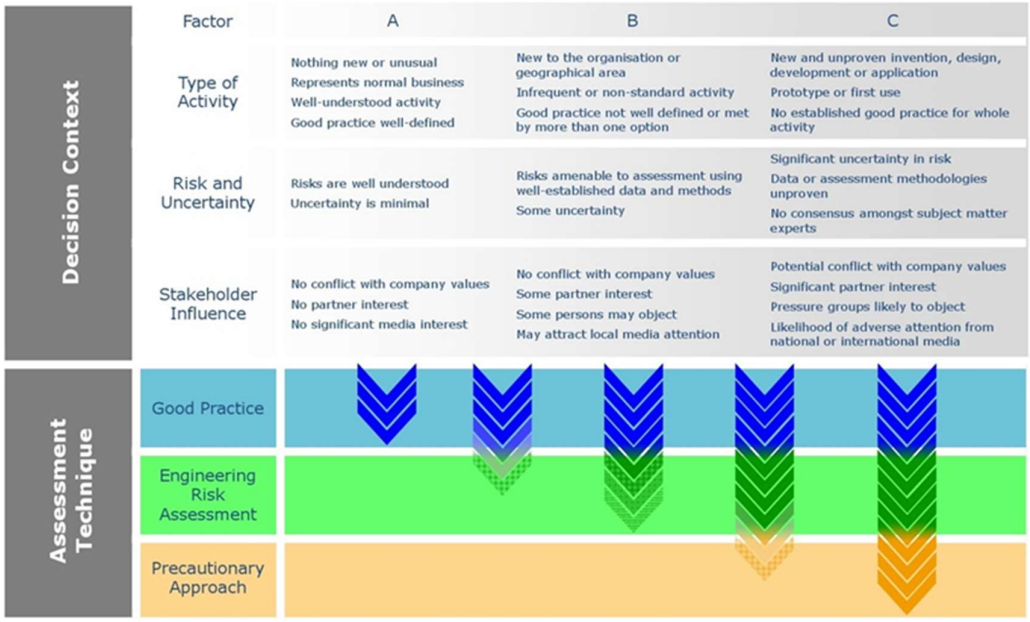
  - there are no additional reasonably practicable measures available to further reduce the risk, or
  - there are no reasonably practicable alternatives to the activity, or
  - the 'cost' of implementing further measures is grossly disproportionate to the reduction in risk.

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GB Energy has adopted the Oil & Gas UK (OGUK) offshore oil and gas industry Guidance on Risk Related Decision Making (Oil & Gas UK, 2014) to demonstrate ALARP. It provides a structured framework that enables business, technical and societal factors to be considered and used to establish a transparent and justifiable basis for decision-making. This is to ensure:

- activities do not pose an unacceptable risk
- appropriate focus is placed on activities where the risk is anticipated to be acceptable and demonstrated to be ALARP
- appropriate effort is applied to the management of risks based on the uncertainty of the risk, the complexity and risk rating.

The framework provides appropriate tools, commensurate to the level of uncertainty or novelty associated with the risk (referred to as the decision type A, B or C) (Source: CER (2015), from Oil & Gas UK (2014).
Figure 5-2). The decision type is selected based on an informed discussion around the uncertainty of the risk. Decision types and methodologies to establish ALARP are outlined in Table 5-5.



Source: CER (2015), from Oil & Gas UK (2014).

Figure 5-2 Impact and Risk 'Uncertainty' Decision-Making Framework

Table 5-5 ALARP Decision-Making Based upon Level of Uncertainty

Decision type	Description	Decision-Making Tools
A	<u>Activity</u> Nothing new or unusual. Represents normal business. Well-understood activity. **Good practice** is well defined. <u>Risk & uncertainty</u> Risks are well understood. Uncertainty is minimal. <u>Stakeholder influence</u> No conflict with **company values.** No partner interest.	<u>Good industry practice</u> Identifies the requirements of legislation, codes and standards that are to be complied with for the activity. Applies the '**Hierarchy of Controls**'. philosophy, which is a system used in the industry to identify effective controls to minimise or eliminate exposure to impacts or risks.

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	No significant media interest.	Identifies further engineering control standards and guidelines that may be applied over and above that required to meet the legislation, codes and standards.
B	Activity New to the organisation or geographical area. Infrequent or non-standard activity. Good practice not well defined. Risk & uncertainty Risks amenable to assessment using well-established data and methods. Some uncertainty. Stakeholder influence No conflict with company values. Some partner interest. Some persons may object. May attract local media attention.	*In addition to decision type A:* Engineering risk-based tools **Engineering risk-based tools** to assess the results of probabilistic analyses such as modelling, QRA and/or cost benefit analysis to support the selection of control measures identified during the risk assessment process.
C	Activity New and unproven invention, design, development or application. Prototype or first use. No established good practice for whole activity. Risk & uncertainty Significant uncertainty in risk. Data or assessment methodologies unproven. No consensus amongst subject matter experts. Stakeholder influence Potential conflict with company values. Significant partner interest. Pressure groups likely to object. Likely to attract adverse attention from national or international media.	*In addition to decision type A and B:* Precautionary Principle **Application of the Precautionary Principle** is to be applied when good industry practice and engineering risk-based tools fail to address uncertainties.

The decision-making tools outlined in Table 5-5 are explained below.

Good Practice

In the absence of an Australian definition, the OGUK (2014) and the Irish Commission for Energy Regulation (CER) (2015) define 'Good Practice' as:

- The recognised risk management practices and measures that are used by competent organisations to manage well-understood hazards arising from their activities.

There are no 'codes of practice' or standards endorsed by Australian regulators to give them a legal status in terms of good practice. Good practice is taken to refer to any well-defined and established standard or codes of practice adopted by an industrial/occupational sector, including 'learnings' from incidents that may yet to be incorporated into standards.

Good practice can also be used as the generic term for those standards for controlling risk that have been judged and recognised as satisfying the law when applied to a particular relevant case in an appropriate manner.

There is no universally accepted guidance to applying the ALARP principle to environmental assessments. For the EP, the guidance provided in NOPSEMA's EP decision making guideline has been applied and augmented where deemed necessary (as outlined in GB Energy's Risk Management Procedure).

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Good practice also requires that hazard management is considered in a hierarchy, with the concept being that it is inherently safer to eliminate a hazard than to reduce its frequency or manage its consequences (CER, 2015). This being the case, the 'Hierarchy of Controls' philosophy is applied to reduce the risks associated with hazards. The Hierarchy of Controls is, in order of effectiveness:

- elimination
- substitution
- prevention
- control
- mitigation
- emergency response.

The Hierarchy of Controls philosophy is outlined in Table 5-6.

Table 5-6 The Hierarchy of Controls

Type of Risk Reduction Measure	Description and Examples	Increasing Effectiveness
Elimination	Complete removal of a hazard (e.g., excising a sensitive marine area from an Activity area).	
Substitution	Replacement of one part of an activity, process or design by another that is inherently less hazardous (e.g., replacement of a toxic chemical with a non-toxic chemical).	
Prevention	Measures implemented to reduce the frequency of a hazard.	
Control	Measures implemented to reduce the consequences of a hazard, controlled through design features or administrative procedures (e.g., shutdown devices to avoid tank over-pressure).	
Mitigation	Measures to protect the environment from the consequences of a hazard (e.g., pumping fuel from a ruptured tank to another tank).	
Emergency response	Measures implemented to protect the environment in response to an emergency (e.g., implementation of the OPEP in the event of a large spill of diesel from a vessel).	

Engineering Risk Assessment

All impacts and risks that do meet decision 'type A' and require assessment beyond that of good practice are subject to an Engineering Risk Assessment.

Engineering risk-based tools can include, but are not limited to, engineering analysis (e.g., structural, fatigue, mooring, process simulation) and consequence modelling (e.g., ship collision, dropped object) (CER, 2015). A cost benefit analysis to support the selection of control measures identified during the risk assessment process may also be undertaken.

Precautionary Principle

All impacts and risks that do meet decision 'type A' or 'type B' and require assessment beyond that of good practice and engineering risk assessment are subject to the 'Precautionary Principle'. CER (2015) states that if the assessment, taking account of all available engineering and scientific evidence, is insufficient, inconclusive or uncertain, then the precautionary principle should be adopted in the hazard management process. While there is no globally-recognised definition of the Precautionary Principle, it is generally accepted to mean:

> *Uncertain analysis is replaced by conservative assumptions which will increase the likelihood of a risk reduction measure being implemented.*

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The degree to which this principle is adopted should be commensurate with the level of uncertainty in the assessment and the level of danger (hazard consequences) believed to be possible.

Under the precautionary principle, environmental considerations are expected to take precedence over economic considerations, meaning that an environmental control measure is more likely to be implemented. In this decision context, the decision could have significant economic consequences to an organisation.

For this EP, ALARP is determined as follows:

- Impacts – residual impact ratings of 'negligible' or 'minor' are considered ALARP
- Risks – residual risk rankings of 'low' are considered ALARP
- only those hazards that do not meet these rankings are provided with an ALARP analysis.

5.2.9 Demonstration of Acceptability

In addition to determining whether environmental risks are ALARP, GB Energy undertakes an assessment of environmental hazards to determine whether they will be of an acceptable level (as required in reg 13D(c) of the OPGGS Regulations).

GB Energy considers a range of factors when evaluating the acceptability of environmental impacts associated with its activities, as outlined in Table 5-7.

Table 5-7 Acceptability test

Test	Question
Internal context	
Policy compliance	Is the proposed management of the risk or impact aligned with the GB Energy's HSE Policy?
Management System Compliance	Is the proposed management of the risk or impact aligned with the GB Energy's HSSE Management Framework or supporting procedures?
Stakeholder engagement	
Social acceptability	Have stakeholders raised any concerns about activity impacts or risks, and if so, are measures in place to manage those concerns?
Legislation, industry standards and best practice	
Laws and standards	Is the risk or impact being managed in accordance with existing Australian or international laws or standards such as MARPOL, Flag State Marine Orders (MOs), API standards, etc?
Industry practice	Is the impact or risk being managed in line with industry practice, such as Oslo-Paris Conventions (OSPAR), Offshore Chemical Notification Scheme (OCNS), Industry Codes of Environmental Practice, etc?
Environmental context	Is the impact or risk being managed pursuant to the nature of the receiving environment (e.g., sensitive or unique environmental features generally require more management measures to protect them than environments widely represented in a region)?
Environmentally Sustainable Development (ESD) Principles	Does the proposed risk or impact comply with the accepted industry principles of conduct that ESD principles be integrated into company decision-making?
ALARP	Are there any further reasonable and practicable controls that can be implemented to further reduce the risk or impact?

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5.3 Risk Monitoring and Review

To support the risk management system, it is necessary to have a process of monitoring and review. Ongoing review is required to ensure that risks and treatment plans remain relevant. Factors impacting upon risk assessments and control practices can be identified through regular monitoring.

Priority should be given to monitoring risks that are rated as 'high' or above (as defined in Table 5-4).

Factors that should be considered as part of the monitoring and review process are:

- has there been a change to the context established that impacts on this risk
- are there any events that could lead to a change in likelihood or consequence or the level of risk
- are treatments being followed through and meeting timelines, key performance indicators and requirements
- what events have impacted on the progress of treatment
- is the treatment impacting on the level of risk as identified
- is it the right treatment?

The monitoring and review process is undertaken to support the reporting process and is an opportunity to identify emerging risks that have arisen, that need to be analysed and addressed, if required.

Monitoring and review aspects are described in the Implementation Strategy (Chapter 7) of this EP Summary.

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6 Environmental Impact and Risk Assessment

This section presents the EIA and ERA for the environmental impacts and risks identified for the Activity using the methodology described in Chapter 5.

A summary of the impact and risk ratings for each impact and risk identified and assessed in this chapter is presented in Table 6-1.

Table 6-1 Environmental impact and risk rating summary

Hazard		Inherent	Residual
Impacts (planned events)		Consequence rating	
1	Seabed disturbance	Negligible	Negligible
2	Generation of sound	Negligible	Negligible
	• Biological Receptors	Negligible	Negligible
	• Commercial fisheries	Negligible	Negligible
	• Community	Negligible	Negligible
3	Discharge of drill cutting and muds	Negligible	Negligible
4	Discharge of cement	Negligible	Negligible
5	Displacement of Other Marine Users	Negligible	Negligible
6	Atmospheric emissions	Negligible	Negligible
7	Light emissions - Environment	Minor	Minor
	- Community	Minor	minor
8	Discharge of sewage and grey water	Negligible	Negligible
9	Discharge of cooling and brine water	Negligible	Negligible
10	Discharge of bilge water and deck drainage	Negligible	Negligible
Risks (unplanned events)		Risk rating	
1	Accidental overboard release of waste	Low	Low
2	Introduction of IMS	Medium	Low
3	Interference with Other Marine Users	Low	Low
4	Vessel Strike or Entanglement with Megafauna	Low	Low
5	Accidental Bulk Discharge of Drilling Fluid	Medium	Low
6	Dry Gas Release from Loss of Well Control	Low	Low
7	Marine diesel oil spill	Medium	Low
8	Oil Spill Response - Surveillance and Tracking	Low	Low
9	Oil Spill Response Methods - Deflection and protection booms	Low	Low
10	Oil Spill Response Methods - Shoreline Assessment and Clean-up	Low	Low
11	Oil Spill Response Methods - Oiled wildlife response	Low	Low

Table 6-2 presents a summary of the environmental hazards associated with the Activity, the impacts and risks of these hazards, the impact and risk ratings and the environmental performance standards (EPS) required to manage the identified impacts and risks. An EPS is defined as a statement of the performance required of a control measure.

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Table 6-2 Environmental impact and risk assessment for geophysical surveys

Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk
Impacts (planned events)			

Seabed disturbance	Physical damage to sensitive habitats (such as rocky reef).	• a pre-acceptance inspection/audit of the JUDR/vessels will take place
		• the JUDR will be moved/installed in accordance with the approved installation procedure
		• GB Energy will provide rocky reef data to vessel contractors to enter into their GPS
		  ○ vessel Masters will use bathymetric mapping and GPS to avoid mapped rocky reef
		  ○ ensure there is clearance at all times between the vessel and rocky reef; and
		  ○ no anchor or anchor chain placement on or drag over the reef
		• GB Energy will provide rocky reef data to vessel contractors to enter into their GPS and vessel master's will use bathymetric mapping and GPS to avoid mapped rocky reef.
		• Ensure there is vessel clearance at all times between the vessel and rocky reef
		• No anchor or anchor chain placement on or drag over the reef.
		• GB Energy will conduct a due diligence of the selected contractors
		• crane operations are undertaken in accordance with rig-specific lifting procedures
		• secure large bulky items by fastening or storing on the JUDR deck and support vessel decks to prevent loss to sea
		• PMS records verify that cranes and lifting equipment are maintained to schedule
		• ensure crane operators are trained to be competent in the handling and transfer procedure to prevent dropped objects
		• all lifting gear will be supplied with test certifications
		• any large object dropped overboard will be retrieved wherever possible.
			Negligible

Generation of sound	Physiological or pathological impacts to local populations of marine fauna and avifauna.	• JUDR and support vessel crews will implement EPBC Regulations 2000 (Part 8, Division 8.1), embodied in The Australian National Guidelines for Whale and Dolphin Watching (DoEE, 2017b), which means maintaining watch for cetaceans such that:
		  ○ caution zone (300 m either side of observed whales and 150 m either side of observed dolphins) – vessels must operate at speeds <6 knots within this zone
		  ○ no approach zone (100 m either side of observed whales and 50 m either side of observed dolphins) – vessels must operate at speeds <6 knots within this zone and 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
		• all crew aboard the JUDR and support vessels have completed an environmental induction covering the above-listed requirements
		• GB Energy will implement environmental reporting
			Negligible

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk
		○ GB Energy will report whale sightings online to the DCCEEW within 3 months of activity completion using the online Cetacean Sightings Application. ○ GB Energy will report any collisions with marine fauna or adverse interactions to DEECA within 24 hours of the incident occurring • engines and thrusters are maintained in accordance with manufacturer's instructions via the Planned Maintenance System (PMS) to ensure they are operating efficiently • inform potential affected stakeholders about the nature of the project activities ○ giving notice as early as possible for periods of noisier works such as flaring. Describing the activities and how long they are expected to take. Keeping affected stakeholders informed of progress. ○ appointing a principal contact person for community queries. ○ providing 24-hour contact details through letters and site signage. Recording complaints and following a complaint response procedure suitable to the scale of works.	
Discharge of drill cuttings and muds	Change in water quality (increased turbidity and potential toxicity) Change in habitat.	• only ONCS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals are used in the drilling fluids • mud operations are managed to ensure cuttings discharges are optimised to minimise adhered muds • bulk drilling mud and cement will be managed in accordance with Environment Protection Regs 2021, Part 4.2 –Industrial waste & Priority waste.	Negligible
Discharge of cement	Change in water quality (increase turbidity and potential toxicity) Change in habitat	• only ONCS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals are used in the drilling cement • drilling operations are undertaken in accordance with drilling procedures • bulk drilling mud and cement will be managed in accordance with Environment Protection Regs 2021, Part 4.2 – Industrial waste & Priority waste.	Negligible
Displacement of other marine users	Temporary exclusion for fisheries, locals, tourism and shipping.	• the AHO/TSV will be notified of the Activity no less than four weeks prior to the Activity commencing to enable the promulgation of NTM and AusCoast navigational warnings • GB Energy will use SETFIA short message service (SMS) service to notify fishers of the Activity, timing and caution zone at least 2 weeks prior to the Activity commencing • GB Energy has undertaken pre-activity consultation with fishing stakeholders to ensure that commercial and recreational fishers are aware of the Activity operations, timing, and PSZ requirements • notifications are provided to residents (i.e., Golden Beach, Paradise Beach) at least four weeks prior to the start of the Activity • the temporary PSZ is gazetted in the Victorian Government Gazette, effective from the JUDR's arrival on location (to include the JUDR as a temporary fixture and the Xmas trees as permanent fixtures) • GB Energy will prevent damage to commercial fishing equipment and the wellheads.	Negligible

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk
Atmospheric emissions	Decrease in air quality due to gaseous emissions and particulates from MDO combustion and contribution to the incremental build-up of GHG in the atmosphere (influencing climate change).	• Vessels are compliant with MARPOL Annex VI appropriate to vessel class, which includes the following: • only low-sulphur (<0.5% m/m) marine-grade diesel will be used in order to minimise SOx emissions • if the vessel has a gross tonnage of >400 tonnes it must possess equipment, systems, fittings, arrangements, and materials that comply with the applicable requirements of MARPOL Annex VI • if the vessel is >400 gross tonnes and involved in an international voyage, it must implement their Ship Energy Efficiency Management Plan (SEEMP) to monitor and reduce air emissions • if the vessel is >400 gross tonnes firefighting and refrigeration systems must be managed to minimise ODS • all combustion equipment is maintained in accordance with the PMS (or equivalent) • flaring equipment is maintained in good operational order to ensure optimal efficiency • oil and other noxious substances will not be incinerated • fuel use will be measured, recorded and reported for abnormal consumption, and in the event of abnormal fuel use, corrective action is taken to minimise air pollution • drilling operations are undertaken in accordance with drilling procedures ○ well clean up and testing will be conducted in accordance with drilling program ○ no sustained black smoke will be generated during flaring ○ using a high efficiency burner head (e.g., EverGreen) to maximise hydrocarbon combustion and eliminate smoke generation and liquids drop out ○ keeping the duration of flaring to the shortest time possible, in accordance with the Well Test Plan. Well testing is estimated as 12-hour clean up and then an additional 12- hour flow period ○ the procedure includes continuous watch to observe and monitor flaring operations and function testing of ignition to ensure burning efficiency.	Negligible
Light emissions	Light glow may act as an attractant to light-sensitive species (e.g., seabirds, fish, migratory and non-migratory birds, sea turtles and zooplankton), in turn affecting predator-prey and population dynamics (due to attraction to or disorientation from light).	• Lighting will be minimised to that required for safe navigation and operational requirements including: • lighting is directed to working areas (rather than overboard) to minimise light spill to the ocean • lighting directed overboard can be manually over-ridden (with a local switch were possible) such that it is only switched on as required (e.g., man overboard) • light glow is minimised by managing external vessel lighting in accordance with: ○ AMSA MOs Part 30 (Prevention of Collisions) ○ AMSA MOs Part 59 (Offshore Support Vessel Operations) • drilling operations are undertaken in accordance with drilling procedures ○ well clean up and testing will be conducted in accordance with drilling program ○ using a high efficiency burner head (e.g., EverGreen) to maximise hydrocarbon combustion and eliminate smoke generation and liquids drop out ○ keeping the duration of flaring to the shortest time possible, in accordance with the Well Test Plan. Well testing is estimated as 12-hour clean up and then an additional 12- hour flow period	Negligible

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk

		• the drilling procedure includes continuous watch to observe and monitor flaring operations and function testing of ignition to ensure burning efficiency.
		• The AHO/TSV will be notified of the activity no less than four weeks prior to the activity commencing to enable the generation and distribution of NTM and AusCoast navigational warnings.
		• SETFIA SMS service will be used to notify fishers of the activity, timing and PSZ at least two weeks prior to the activity commencing.
		• Pre-activity consultation undertaken with fishing stakeholders (commercial & recreational) at least four weeks prior to the activity commencing to ensure that commercial fishers are aware of the activity operations, timing, and PSZ requirements.
		• all crew are informed of their reporting responsibilities for grounded or injured birds/mega and microbats during the environmental induction
		• GB Energy Offshore Representative will report grounded or injured birds/mega and micro bats on the JUDR or support vessels to the GB Energy Environmental Specialist
		• incidents of grounded or injured birds/mega and micro bats on the JUDR or support vessel will be handled in accordance with the grounded or injured bird procedure below
		• at least one experienced seabird subject matter expert (SME) handler will be on call to provide advice and support to the GB Energy Offshore Representative
		• if required, the seabird SME handler will travel to the vessel and provide advice and training to the GB Energy Offshore Representative (and other personnel on board the vessel, as necessary) regarding handling of grounded birds
		• inform potential affected stakeholders about the nature of the project activities
		  ○ giving notice as early as possible for periods of increased light during flaring. Describing the activities and how long they are expected to take. Keeping affected stakeholders informed of progress
		  ○ appointing a principal contact person for community queries
		  ○ providing 24-hour contact details through letters and site signage. Recording complaints and following a complaint response procedure suitable to the scale of works.	

Discharge of sewage and greywater	Temporary and localised increase in nutrient content of surface waters around the vessels.	• sewage and grey water are treated in a MARPOL-compliant STP prior to overboard discharge • the STP is maintained in accordance with the PMS • in the event of a STP malfunction, untreated sewage will only be discharged when the vessel is >12 nm from shore. • treated sewage and grey water is not discharged within 500 m of the shoreline.	Negligible
Discharge of cooling and brine water	Increased sea surface temperature and salinity around the discharge point.	• engines and associated equipment that require cooling by water will be maintained in accordance with the vessel PMS so that they are operating within accepted parameters • only ONCS ‘Gold’/’Silver’ (CHARM) or ‘D’/’E’ (non-CHARM)-rated chemicals are used in the cooling and brine water systems	Negligible

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk
	Potential toxicity impacts to marine fauna from residual biocide and scale inhibitors.	• biocide dosing is kept to a minimum in accordance with the equipment manufacturer's specifications • freshwater generation will be limited to volumes necessary for operational requirements.	
Discharge of bilge water and deck drainage	Reduction of surface water quality around the discharge point. Acute toxicity to marine fauna through ingestion of, or contact with, heavily contaminated water (in the event of malfunction of the OWS or an uncontrolled spill on an un-bunded deck).	• hydrocarbon and chemical storage areas (process areas) are bunded and drain to the bilge tank (or equivalent) • all hydrocarbons and chemicals will be stored within secure receptacles within bunded areas or dedicated chemical lockers that drain to bilge tanks • portable bunds/drip trays used in non-process areas • JUDR and support vessels have class certification • 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 PMS to ensure the 15 ppm OIW limit is met. • the residual oil from the OWS is pumped to tanks and disposed of onshore (no whole residual bilge oil is discharged overboard) • in the event of OWS malfunction, all oily water is retained onboard for transfer to shore or discharged in waters >12 nm from the shore • through regular training, the vessel crews are competent in spill response and have appropriate response resources in order to prevent or minimise hydrocarbon or chemical spills discharging overboard • fully stocked SMPEP response kits and scupper plugs or equivalent drainage control measures are readily available to the crew and used in the event of a spill to deck to prevent or minimise discharge overboard • deck cleaning detergents are biodegradable • housekeeping of the decks is maintained to a high standard to ensure open drains do not carry residual hydrocarbons and chemicals to sea • the vessel-specific SMPEP is implemented in the event of a large spill of hydrocarbons or chemicals overboard.	Negligible
Risks (unplanned events)			Residual risk assessment
			C / L / RR
Accidental overboard release of hazardous and non-	Marine pollution (litter and a temporary and localised reduction in water quality), injury and entanglement of individual animals	• a MARPOL Annex V-compliant GMP is in place for 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 will include measures such as:	Negligible / Unlikely / Low

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
hazardous waste	(such as seabirds and seals) and smothering or pollution of benthic habitats.	○ 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 • all crew aboard the JUDR and support vessels will complete an environmental induction including waste management procedures at the start of the drilling program to ensure they understand how to implement the GMP • secure large bulky items by fastening or storing on the JUDR deck and support vessel decks to prevent loss to sea • crane transfers are undertaken in accordance with the JUDR and support vessel-specific lifting procedures • the JUDR and support vessel crane and lifting equipment are maintained fit for use at all times in accordance with the PMS to minimise the risk of dropped objects • solid waste that is accidentally discharged overboard is recovered if reasonably practicable • no putrescible waste is discharged in the Activity area (or state waters in general). All putrescible waste is transferred to shore for suitable disposal.			
Introduction of invasive marine species	Reduction in native marine species diversity and abundance, displacement of native marine species, socio-economic impacts on commercial fisheries and changes to conservation values of protected areas.	• the JUDR and support vessels are managed in accordance with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (AQIS, 2009). This means: ○ conducting in-water inspection by divers or inspection in drydock if deemed necessary ○ biofouling risk will be assessed, with cleaning of hull and internal seawater systems undertaken if deemed necessary ○ anti-fouling coating status taken into account, with antifouling renewal undertaken if deemed necessary • vessels that are >400 gross tonnes carry a current IAFS Certificate that is complaint with and MO Part 98 (Anti-fouling Systems) • the EMGPS will be maintained in accordance with the PMS to ensure it is operating efficiently (without the use of chemicals) • an IMS evaluation takes place for the JUDR and support vessels prior to mobilising to site based on the following: ○ inspecting the IAFS certificates to ensure they are current ○ determining 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 coating	Minor	Unlikely	Low

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
		○ implementing the guidance provided in the Australian Biofouling Management Requirements (Version 1, 2022) • submersible equipment will be cleaned (e.g., biofouling is removed) prior to initial use for the project • a JUDR/vessel contractor pre-qualification is undertaken to ensure biofouling and ballast water controls meet project requirements • JUDR and support vessels will fulfil the requirements of the Australian Ballast Water Management Requirements (DAWE, 2020, v8). 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) ○ hold a Ballast Water Management Certificate (BWMC) ○ ensure all ballast water exchange operations are recorded in a Ballast Water Record System (BWRS)			
Interference with other marine users	Collision with third-party vessels. Damage or loss of fishing equipment and/or loss of commercial fish catches.	• the JUDR and support vessels use anti-collision monitoring equipment (24-hour radar watch, Global Maritime Distress Safety System [GMDSS] and AIS) • visual and radar watch is maintained on the bridge of the geophysical vessel at all times • Vessel Masters and deck officers hold valid International Convention on Standards of Training, Certification and Watchkeeping for Seafarers STCW certificates (or equivalent) in accordance with AMSA Marine Order 70. The support vessel maintains communication with nearby vessels to ensure the caution zone is enforced • the JUDR and support vessels maintains communication with third-party vessels to enforce the PSZ • the Vessel Masters issue warnings (e.g., radio warning, flares, lights/horns) to third-party vessels approaching the caution zone in order to prevent a collision with the geophysical vessel • for vessels >200 tonnes, GB Energy will apply to NOPSEMA for a Bass Strait ATBA authorisation for the vessels to operate within the ATBA • The EMGPS will be maintained in accordance with the PMS to ensure it is operating efficiently (without the use of chemicals). • collisions (or near misses) are managed in accordance with JUDR and support vessels emergency procedures.	Negligible	Remote	Low
Vessel strike or entanglement with megafauna	Injury or death of megafauna	• JUDR and support vessel crews will implement EPBC Regulations 2000 (Part 8, Division 8.1), embodied in The Australian National Guidelines for Whale and Dolphin Watching (DoEE, 2017b), which means maintaining watch for cetaceans such that: ○ caution zone (300 m either side of observed whales and 150 m either side of observed dolphins) – vessels must operate at speeds <6 knots within this zone ○ no approach zone (100 m either side of observed whales and 50 m either side of observed dolphins) – vessels must operate at speeds <6 knots within this zone and 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	Minor	Remote	Low

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
		○ if animals are bow riding, do not change course or speed suddenly ○ if there is a need to stop, reduce speed gradually • all crew aboard the JUDR and support vessels have completed an environmental induction covering the above-listed requirements • GB Energy will implement environmental reporting ○ GB Energy will report injury to megafauna serious enough to require intervention/rescue is **reported** to the **Whale and Dolphin Emergency Hotline** on 1300 136 017 as soon as possible ○ vessel strike causing injury to or death of a cetacean is reported to the DCCEEW via the online National Ship Strike Database (https://data.marinemammals.gov.au/report/ship strike) within 72 hours of the incident ○ GB Energy will report whale sightings online to the DCCEEW within 3 months of activity completion using the online Cetacean Sightings Application.			
Accidental Bulk discharge of Drilling Fluid		• a pre-acceptance inspection/audit of the JUDR/vessels will take place • all hydrocarbons, chemicals and waste storage tanks are stored in bunded areas • JUDR and support vessels will have a PMS for the storage systems (bunds, hoppers), hose fittings and so forth • the operation of the dump valve/s for the mud tanks will be managed under a PTW system. The mud dump valve/s are locked, with the keys remaining secure in a key locker • drilling operations are undertaken in accordance with drilling procedures ○ the procedure includes continuous watch to observe and monitor flaring operations and function testing of ignition to ensure burning efficiency to prevent hydrocarbon flare drop out. • JUDR and Support vessels have class certification ○ the JUDR and support vessel has a current and class-appropriate SMPEP implemented in the event of a spill • vessel crews are inducted into spill response procedures • all JUDR and support vessel crews will be trained and competent • GB Energy will implement environmental reporting.	Minor	Unlikely	Low
Dry Gas Release from Loss of Well Control		• the wells will be drilled in accordance with the NOPSEMA-accepted WOMP • wells must be operated in accordance with the NOPSEMA-accepted Safety Cases • the well will be safely drilled in accordance with designs and documents prepared specifically for the project. The well will be physically isolated from the environment • a JUDR, well engineering and well control specialists will be readily mobilised to location. A contract will be in place between GB Energy and a well control specialist to ensure mobilisation of well control specialist personnel upon request • a pre-acceptance inspection/audit of the JUDR/vessels will take place			

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
		• the SCERP will be implemented to contain the well • all JUDR and support vessel crews will be trained and competent • the Drilling Supervisor will run at least one (frequency determined by the Emergency Response Plan [ERP]) well control exercise during the drilling campaign • GB Energy will implement environmental reporting ○ should a well blowout occur, GB Energy will report the incident ASAP to NOPSEMA and DEECA (RVRO) within 2 hours of the loss of well containment			
Diesel spill	Pollution of sea surface, water column and shoreline. Injury or death of marine fauna, avifauna and macroalgae through ingestion or contact. Contamination of fish stocks and potential closure of fisheries.	• GB Energy will conduct a due diligence of the selected contractors • the JUDR Bunkering Procedure will be implemented • no support vessel refuelling will be undertaken at sea (this will be done in port) • the vessels have an approved SMPEP (or equivalent appropriate to class) that is implemented in the event of a fuel tank rupture and spill • all crew aboard the JUDR/vessels crews are inducted into spill response procedures • vessel crews are trained in spill response techniques in accordance with the SMPEP and vessel training matrix • prior to the vessel contractor(s) commencing the Activity, a desktop diesel spill response exercise will be conducted to test interfaces between the SMPEP, OPEP, NatPlan and VicPlan • GB Energy will report the spill to regulatory authorities within 2 hours of becoming aware of the spill • the Vessel Master will authorise actions in accordance with the vessel-specific SMPEP (or equivalent according to class) and the Activity-specific OPEP to limit the release of MDO.	Minor	Unlikely	Low
Oil spill response activities					
Source Control	Release of flammable gas. Explosion. Pollution of the atmosphere, water surface and water column Toxicity impacts to exposed fauna.	• the wells will be drilled in accordance with the NOPSEMA-accepted WOMP • wells must be operated in accordance with the NOPSEMA-accepted Safety Cases • the well will be safely drilled in accordance with designs and documents prepared specifically for the project. The well will be physically isolated from the environment • a JUDR, well engineering and well control specialists will be readily mobilised to location. A contract will be in place between GB Energy and a well control specialist to ensure mobilisation of well control specialist personnel upon request • a pre-acceptance inspection/audit of the JUDR/vessels will take place • the SCERP will be implemented to contain the well • all JUDR and support vessel crews will be trained and competent • the Drilling Supervisor will run at least one (frequency determined by the Emergency Response Plan [ERP]) well control exercise during the drilling campaign • GB Energy will implement environmental reporting • should a well blowout occur, GB Energy will report the incident ASAP to NOPSEMA and DEECA (RVRO) within 2 hours of the loss of well containment	Unlikely	Negligible	Low

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
Oil spill surveillance and tracking	Routine and non-routine impacts and risks associated with vessel operations. Noise disturbance to marine fauna and shoreline species by aerial flights.	• access to operational response capabilities is maintained through GB Energy's contract with ORCA • GB Energy undertakes a pre-Activity desktop drill to test response capability • GB Energy ensures that ORCA undertakes regular inspection, and testing is undertaken for its oil spill response equipment • visual observations from the JUDR/vessels are initiated immediately following a spill • an Incident Action Plan (IAP) is prepared by the IMT Planning Officer within the first 24 hours after the spill starts, which is used to guide response activities • vectoring undertaken by an onsite spill assessor within 3 hours of spill report • real-time OSTM results are provided by RPS to GB Energy within 4 hours of notification of the spill • surveillance aircraft will ensure buffer distances of 500 m (helicopters) and 300 m (fixed wing) are maintained around cetaceans in accordance with EPBC Regulations 2000 (Part 8).	Negligible	Likely	Low

Oil spill protection and deflection	Damage to nearshore habitats from inshore shallow draught vessel activities and boom anchoring.
	Damage to shoreline environments from vehicle, machinery and or/foot access and associated land use.
	Deeper mixing of hydrocarbons within beach sediments.
	Secondary contamination of the shoreline.
		• within 6 hrs of spill event notification, SCAT have mobilised to areas of predicted impact (daylight permitting) in consultation with East Gippsland Shire Council. SCAT information and the status of estuaries is provided to IMT for inclusion in operational NEBA
		• an operational NEBA is prepared by the IMT to determine the net benefits of the booming strategy for the estuarine areas predicted to be contacted by MDO within 4 hours of receiving OSTM
		• personnel and equipment resources are deployed to site to undertake the protection and deflection activities within timeframes outlined in the IAP
		• booming operations continue until such time as no further sheen is visible on the sea surface, at the direction of the IMT Leader
		• environmental briefings are conducted prior to work commencing in order to identify risks and suitable controls
		• access to estuarine areas is via established tracks, non-native vegetation or via the ocean
		• 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)
		• vessel Masters maintain the following buffer distances around cetaceans (in accordance with the Australian Guidelines for Whale and Dolphin Watching for sea-faring activities):
		  ○ '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
		• waste storage tanks and hoses are located within a contained, impervious area
		• spill kits are available at oil recovery area and are under supervision and secured from public access
		• collected waste is disposed in accordance with Victorian EPA waste disposal requirements.
			Negligible	Remote	Low

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
Shoreline Assessment and clean-up	Damage to foreshore and backshore environments from vehicle, machinery and/or foot access and associated land use (e.g., waste storage). Disturbance to Indigenous Cultural Heritage. Temporary exclusion of the public from amenity beaches. Increased demand for what may be limited resources in small coastal towns. Deeper mixing of hydrocarbons within beach sediments. Secondary contamination of foreshore and backshore areas from personnel and equipment movement.	• SCAT teams mobilised to site within 6-24 hours of the notification of the spill (daylight hours permitting) • SCAT information is provided to the IMT Leader for inclusion into the NEBA. An operational NEBA is undertaken to determine net benefits • if an operational NEBA identifies that shoreline clean-up is required, the IAP includes this information to guide the response, with personnel and equipment deployed to relevant locations • shoreline clean-up resources are deployed to site within timeframes identified in the IAP • environmental briefings are conducted prior to clean-up commencing in order to identify risks and suitable controls • access to shoreline is via established tracks (with track edges fenced with bunting if required). Access outside of existing tracks and pathways is determined in consultation with local DEECA representatives • mobile equipment to be driven as close to the water's edge as possible to prevent impacts to shoreline birds • clean-up will keep to the inter-tidal zone as far as possible • in consultation with local DEECA representatives, known occurrences of Aboriginal cultural heritage are flagged for avoidance • waste storage is located within a contained, impervious area • area is under supervision and secured from the public • oiled waste is transported in accordance with EPA waste disposal requirements • all access points (personnel and equipment) will be controlled via designated access points through decontamination facilities.	Negligible	Unlikely	Low
Oiled wildlife response	Disturbance, injury or death of fauna.	• DEECA personnel are mobilised to site within 12 hours of the notification from the SCAT team that fauna is at risk • OWR kits are mobilised to site within 12 hours of the notification from the SCAT team that fauna is at risk • an operational NEBA is undertaken to determine net benefits of undertaking OWR • if an operational NEBA identifies that OWR is required, the IAP includes measures to guide the response, with personnel and equipment deployed to relevant locations • environmental briefings are conducted prior to clean-up commencing in order to identify risks and suitable controls • access to shoreline is via established tracks (with track edges fenced with bunting if required). Access outside of existing tracks and pathways is determined in consultation with local DEECA representatives	Negligible	Remote	Low

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Hazard	Potential impacts and risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk		
		• mobile equipment to be driven as close to the water's edge as possible to prevent impacts to shoreline birds • wildlife is only handled and treated by DEECA-trained or Phillip Island Nature Park wildlife clinic oiled wildlife responders.			

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7 Implementation Strategy

GB Energy retains full and ultimate responsibility as the Titleholder of the Activity and is responsible for ensuring that the mitigation measures outlined throughout Chapter 6 are implemented.

GB Energy has overall responsibility for the management of the Activity to ensure that:

- design and execution of the activities is in accordance with industry best practice and legislated standards
- all regulatory approvals are obtained prior to Activity commencement
- contractors have been pre-qualified by GB Energy as having appropriate equipment and resources to undertake the investigations and have appropriate systems in place to ensure that these activities are undertaken in accordance with all legislative requirements;
- the environmental impacts and risks of the Activity are minimised and reduced to ALARP and environmental performance is monitored
- the day-to-day direction of work and the monitoring and auditing of work by contractors is undertaken in accordance with the accepted EP.

The rig contractor will have the day-to-day control and management of the rig through the OIM and the support vessels through the respective Vessel Master. The OIM and Vessel Masters has over-riding authority and responsibility to make decisions with respect to environment protection and pollution prevention and to request assistance as may be necessary.

GB Energy will use its Health, Safety, Security and Environmental Framework and associated procedures to guide the management of the activity. The manner in which the Framework will guide the drilling program is described in this chapter.

GB Energy has an agreement with ORCA Pty Ltd regarding MDO spill response arrangements for the activity.

GB Energy and the rig contractor will agree to undertake the Activity as follows:

- GB Energy is the Titleholder for the permit, and is the Permit Operator and Project Manager
- GB Energy has principal responsibility for the engineering design and project management of the Activity, along with contracting services
- the rig contractor is responsible for operating the JUDR and the vessel contractor for operating the vessels while conducting the activity and interfacing with service contractor at the operations level on the rig
- the OIM and Vessel Master are responsible for ensuring the safety of all personnel on board their vessel
- the OIM and Vessel Masters are responsible for the implementing their SMPEPs
- GB Energy is responsible for the onshore management of emergency incidents
- the GB Energy Onboard Representative will be the designated representative on the rig and will have a direct interface with the OIM.

7.1 Roles and Responsibilities

The organisation structure for the Activity consists of onshore and offshore GB Energy and contractor personnel. The organisation structure for the Activity is illustrated in Figure 7.1.

Day-to-day implementation of the EP will occur on the vessel under the leadership of the OIM and Vessel Masters, and the Onboard GB Energy Representative. The GB Energy Project Manager will have oversight of the performance of the activity against the EP and other project plans and will initiate reviews and audits as required.

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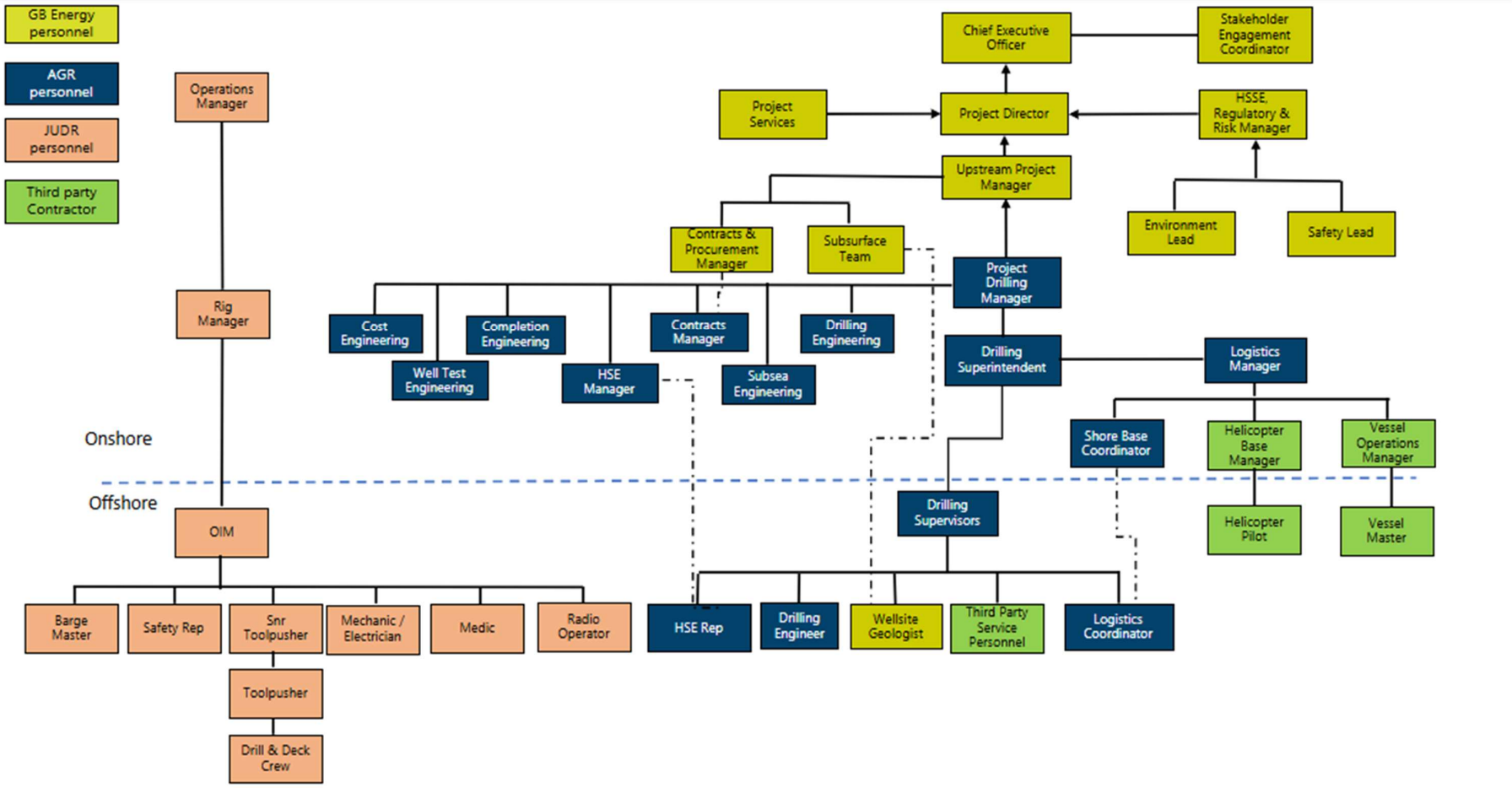


Figure 7-1 The organisation structure for the Activity

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7.2 Environmental Management Systems

7.2.1 GB Energy

GB Energy has in place a Health, Safety, Security and Environmental Management System (HSSEMS) that is aligned with ISO 14001:2015 (Environmental Management Systems – requirements with guidance for use).

The HSSEMS contains 14 elements for identifying, managing and reducing the company's impact on health, safety and the environment, based on the principle of continual improvement and the 'plan, do, check, act' cycle in line with ISO14001.

7.2.2 Well Engineering and Operations Services (AGR)

GB Energy has engaged the services of AGR to provide Well Engineering and Operations Supervision during well construction. AGR's Management System Manual (AGR-HSEQ-M-01), which is accredited with ISO 9001:2015 and ISO 14001:2015 uses a standardised process to ensure that project activities are planned and managed efficiently and with due consideration to good oilfield practice, local and international standards as they relate to well design, operations planning, construction and then subsequent suspension or abandonment operations. This process is known as the Well Delivery process (WDP). The AGR WDP is a central component of the AGR Management System and is being used by GB Energy for this activity.

7.2.3 JUDR and Vessel Contractors

The JUDR and support vessel contractors will be required to have an HSSEMS that meets the requirements of the GB Energy HSE Policy, is broadly aligned with the GB Energy HSSE Framework and meets the requirements of the AGR WDP.

7.3 Training and Awareness

7.3.1 Recruitment and Training

A competent, fully resourced organisation for the rig and support vessels are a key component to ensure all personnel are aware of the environmental obligations.

GB Energy will conduct a due diligence review to ensure that the chosen contractors have procedures in place to ensure the correct selection, placement, training and ongoing assessment of employees.

Third-party contractors (such as drilling fluids suppliers) will be contracted to GB Energy via the AGR WDP. AGR has procedures in place to identify the training needs of an individual to competently perform their role, which will be assessed as part of the tender evaluation process.

Procedures will also be in place to identify the training needs of an individual to competently perform their role, and evidence of corporate and/or rig inductions will also be required.

7.3.2 Environmental Induction

An activity-specific HSSE induction for all personnel working on the activity will be undertaken prior to its commencement. The Drilling Supervisor is responsible for ensuring personnel receive this induction prior to the commencement of the activity. All personnel are required to sign an attendance sheet to confirm their participation in and understanding of the induction.

The rig and vessel contractors will conduct their own company and vessel-specific inductions independently of the activity-specific HSSE induction.

7.3.3 Oil Spill Response Training

Quarterly training of vessel crews in SMPEP procedures is a MARPOL requirement for vessels over 400 GRT (Annex 1, Regulation 37).

During its contractor audit process, GB Energy will assess the JUDR and support vessel contractors' implementation of their SMPEPs (or equivalent, relevant to class).

An office-based desktop spill response exercise of the activity-specific OPEP will be conducted by GB Energy, involving key contractors such as key AGR, JUDR, third party contractors and support vessel personnel, prior

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to the activity commencing (and dependent on logistics, no earlier than four weeks prior to the commencement of drilling).

7.3.4 Toolbox Talks and HSE Meetings

Environmental matters will be included in daily toolbox talks as required by the specific task being risk assessed (e.g., waste management).

Environmental issues will also be addressed in daily operations meetings, where each shift will participate in discussing HSSE matters that have arisen in the previous week, and issues to consider for the following week.

Records associated with activity-specific training, environmental training, inductions and attendance at toolbox meetings will be recorded and maintained on board the rig and support vessel.

7.3.5 Communications

The JUDR contractor, support Vessel Masters and Drilling Supervisor are jointly responsible for keeping their personnel informed about HSSE issues, acting as a focal point for personnel to raise issues and concerns.

7.4 Environmental Emergencies and Preparedness

In the event of an emergency of any type, the JUDR OIM and support Vessel Masters will assume overall onsite command and act as the Emergency Response Coordinator (ERC). All persons aboard the JUDR and support vessels will be required to act under the ERC's directions. The Drilling Supervisor will maintain communications with the IMT Leader and will also coordinate with GB Energy's Oil Spill Response Team OSRT in the event of an emergency involving an MDO spill. Oil spill emergency response support will be provided by ORCA.

7.4.1 Adverse Weather Protocols

It is the duty of the JUDR OIM and support Vessel Masters to act as the focal point for all actions and communications with regards to any emergency, including response to adverse weather or sea state, to ensure safety of their vessel all personnel onboard and environment.

The JUDR and support vessel will use the Very High Frequency (VHF) Marine Radio Weather Services and/or obtain daily weather forecasting from the Bureau of Meteorology (BoM) to monitor weather within the Activity area in the lead up to and for the duration of the activity.

7.4.2 JUDR and Support Vessel Emergencies and MDO Spills

Activity specific emergency response procedures will be developed via a Bridging ERP that incorporates JUDR and support vessel contractors' vessel specific ERPs and Gb Energy Emergency Response manual. The Bridging ERP will contain instructions for JUDR and support vessel emergency, medical emergency, search and rescue, reportable incidents, incident notification and emergency contact information. Given the various vessel types and JUDR/vessel operating companies that exist, by necessity these ERPs must be vessel specific.

Prior to conducting the activity, GB Energy will review the vessel's ERPs with the JUDR and support vessel contractors to ensure that appropriate emergency procedures considered in those plans have been put into place for all relevant environmental emergency events (including the assignment of emergency management roles for particular events). Environmental emergencies that may be considered include, but are not limited to, the following. It is noted that not all listed scenarios will necessarily be applicable or require response actions during the activity:

- introduction of animal diseases into aquaculture (noting there are no aquaculture operations in or around the Activity area)
- loss of well control (addressed in this EP)
- MDO spill (addressed in the full EP)
- IMS incursions (addressed in the full EP)
- cetacean stranding and vessel strike (addressed in the full EP)
- maritime casualties requiring salvage and intervention, emergency towage and requests for a place of refuge

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- marine pollution from floating or sunken containers of hazardous materials
- debris originating from a maritime casualty
- physical damage caused by vessels
- fire or explosion on the vessel
- hijack/terrorism
- public protest
- adverse weather

SMPEPs and ERPs typically include vessel-specific procedures for the following:

- fire and explosion
- incidents – collision, grounding, hull damage, man overboard, equipment failure
- waste management
- hazardous materials and handling
- hydrocarbon and chemical spills.

The JUDR OIM and support Vessel Master will ensure that their crews are fully aware of the vessel-specific requirements and that exercises for vessel-related incidents are conducted.

7.4.3 Emergency Response Training

An office-based desktop spill response exercise of the activity-specific OPEP will be conducted by GB Energy, involving key contractors such as key AGR, JUDR, third party contractors and support vessel personnel, prior to the activity commencing (and dependent on logistics, no earlier than four weeks prior to the commencement of drilling).

A scenario will be chosen that combines an emergency with risk to human life (such as fire) and risk to the environment (large hydrocarbon spill). This way several plans (i.e., the ERP and OPEP) can be tested simultaneously.

7.4.4 JUDR specific Training

The JUDR OIM is responsible for ensuring that personnel fulfilling emergency response roles are competent in crisis and emergency procedures related to the protection of HSSE and integrity. The level of training and associated competency demonstration is dependent on individual roles in a crisis or emergency situation.

The JUDR OIM is also responsible for ensuring relevant personnel undertake oil spill preparedness and response training in line with the JUDR's personnel training and qualifications matrix. This includes identification and development of approved competency and noncompetency-based courses, and ensuring training is undertaken to schedule and records are maintained.

7.5 Simultaneous Operations

The Activity area overlaps the GHG Assessment Permit GGAP006386(V), operated by the CarbonNet Project on behalf of the Crown in right of Victoria. As part of the stakeholder consultation process, GB Energy has informed the CarbonNet Project of the activity location and timing. GB Energy remains in contact with the CarbonNet Project so that SIMOPS issues can be addressed if and as required Recording and Reporting – Internally.

7.6 Recording and Reporting

7.6.1 Routine Recording and Reporting

Routine internal recording and reporting of Activity HSE matters will encompass the following:

- daily teleconferences – held between GB Energy upstream project Manager, AGR the JUDR OIM third party contractors, support Vessel Masters and other personnel each morning for an update on progress from the previous day and the forward plan, including any HSSE matters that have arisen

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- daily reports – the Drilling Supervisor will prepare a Daily Drilling Report (DDR), including data on activities conducted for the day and any HSSE issues arising and distributed to the extended project team. Daily reports will be provided to DEECA (RVRO)
- weekly report will be prepared and submitted to DEECA, including data on activities conducted for the week;
- HSSE reporting – the HSSE Lead will collate key HSSE performance statistics daily and report those to the wider project team during daily teleconferences
- monthly environmental report – GB Energy will prepare and submit a monthly environmental report no later than 15 days after the end of the calendar month that details all recordable incidents (in accordance with OPGGS Regulations reg 31(3))
- EP performance report – the Environmental Lead will prepare an end-of-activity performance report that reports on the outcomes of each EPS in the EP. This will be submitted to DEECA RVRO within 3 months of completion of the activity.

7.6.2 Incident Recording and Reporting

All environmental near-misses and incidents, including non-compliances with the EP, EPO and EPS, must be communicated immediately to the GB Energy Onboard Representative who will then report to the GB Energy Regulatory & Compliance Manager. This expectation will be reinforced at inductions, daily toolbox meetings and weekly HSSE meetings.

The OIM / Vessel Master will lead an investigation into the cause, effect and learnings of the incident as per their investigation procedures. Where circumstances warrant it, this investigation will be conducted jointly with the GB Energy HSSE, Regulatory & Risk Manager and GB Energy Onboard Representative. Following an investigation, the vessel contractor and GB Energy will develop remedial actions and communicate these to the team (and wider organisations, as appropriate) to prevent recurrence. These actions will be tracked to completion.

Regulation 6 of the OPGGS defines the following incident types:

- **Recordable incident** – a breach of an EPO or EPS in the EP that applies to the Activity that is not a reportable incident.
- **Reportable incident –** an incident relating to the Activity, whether or not described in the EP in force for the Activity, that has caused, or has the potential to cause, moderate to catastrophic environmental consequences and a breach of or non-compliance with the Act or the EPO, which is outlined in the full EP.

In accordance with the regulations, GB Energy will report any reportable incidents to ERR within 2 hours of becoming aware of the incident, and recordable incidents will be reported to ERR no later than 15 days after the end of the calendar month.

7.7 Record Keeping

In accordance with Regulations 32 and 33 of the OPGGS, GB Energy will store and maintain the documents or records relevant to the EP implementation (including the accepted EP itself) for a period of 5 years in a way that makes retrieval reasonably practicable. These records will be stored on GB Energy's document management system and will be made available to DEECA in electronic or printed form upon written request.

7.8 Management of Change

GB Energy's Project Management of Change (PMoC) form (GBES-GBE-00-GN-PM-TMP-0004) will be used as the over-arching document that will guide the MoC process for the activity. The GB Energy PMoC form will be used to determine whether any changes to the design of the activity (or other factors) trigger revisions to the EP that require re-submission to DEECA RVRO.

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7.9 Monitoring

7.9.1 Field Environmental Monitoring

GB Energy will maintain a quantitative record of emissions and discharges, and other environmental matters generated on location during the Activity.

7.9.2 Auditing, Assurance and Inspections

Environmental performance of the Activity will be reviewed in a number of ways. These reviews are undertaken to ensure that:

- EPS to achieve the EPO are being implemented
- potential non-compliances and opportunities for improvement are identified
- all environmental monitoring requirements have been met before completing the Activity

The following arrangements will be established to ensure environmental performance is in line with the EP.

Onboard Environmental Audit

GB Energy will undertake an EP compliance audit onboard the JUDR and support vessel prior to mobilisation and/or during drilling operations to assess compliance with the EPS in the EP. The scope and timing of the audit, along with details of the suitably qualified person undertaking the auditor, will be provided by GB Energy to DEECA for their approval prior to the audit.

Onboard Inspections

The GB Energy Onboard Representative will continuously supervise the Activity, ensuring adherence to the EPS specified in the EP. This will be facilitated by completing an environmental inspection checklist developed by the Environmental Lead. A completed checklist will be provided to the Environmental Lead on a weekly basis so that environmental compliance is continuously monitored. The findings and recommendations of inspections and audits will be documented and distributed to relevant personnel for comments. Any non-compliances or opportunities for improvement will be communicated to the OIM, Vessel Masters and Project Manager at the time of the inspection or audit to ensure there is adequate time to implement corrective actions. Results will be summarised in the EP performance report submitted to DEECA after the completion of the Activity.

7.9.3 Contractor Monitoring and Review

GB Energy will have in place commitment registers to assist in monitoring against contractors' plans. Learnings from this monitoring will inform continued operations and the development of EPs for future phases of the Golden Beach Gas Storage Project.

7.10 Environment Plan Review

GB Energy may determine that an internal review of the EP is necessary based on any one or all of the following factors:

- changes to hazards and/or controls identified in the review of the EP
- implementation of corrective actions to address internal or external inspection or audit findings
- an environmental incident and subsequent investigation identify issues in the EP that require review and/or updating
- a modification of the Activity is proposed that is not significant but needs to be documented in the EP
- changes identified through the MoC process, such as hazards or controls, organisational changes affecting personnel in safety critical roles
- changes to any of the relevant legislation.

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7.10.1 Revisions Triggering EP re-submission

GB Energy will revise and re-submit the EP for assessment as required by the OPGGS Regulation listed in Table 7-1.

Table 7-1 OPGGS EP revision requirements

Regulation requirement	OPGGS Regulation
Submission of a revised EP before the commencement of a **new Activity.**	20(1)
Submission of a revised EP when any **significant modification** or **new stage** of the Activity that is not provided for in the EP is proposed.	20(2)
Submission of a revised EP before, or as soon as practicable after, the **occurrence of any significant new or significant increase in environmental** impact or risk not provided for in the EP.	20(3)
Submission of a revised EP if a **change in Titleholder** will result in a change in the manner in which the environmental impacts and risks of an Activity are managed.	20(4)
At least **14 days before the end of each period of 5 years** commencing on the day in which the original and subsequent revisions of the EP are accepted.	20(1)

7.10.2 Minor EP Revisions

Minor revisions to that do not require resubmission to DEECA will be made where:

- minor administrative changes are identified that do not impact on the environment (e.g., document references, contact details, etc.)
- a review of the Activity and the environmental risks and impacts of the Activity do not trigger a requirement for a revision, as outlined in Table 7-1.

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