



GOLDEN BEACH GEOPHYSICAL AND GEOTECHNICAL INVESTIGATIONS

ENVIRONMENT PLAN SUMMARY

Vic/RL1(V)

Revision 1

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Acronyms

Acronym	Definition
2D	Two-dimensional
3D	Three-dimensional
ABS	Australian Bureau of Statistics
AFMA	Australian Fisheries Management Authority
AHO	Australian Hydrographic Office
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
AMP	Australian Marine Park
APPEA	Australian Petroleum Production and Exploration Association
AS/NZS	Australian Standard/New Zealand Standard
ASBTIA	Australian Southern Bluefin Tuna Industry Association
BACI	Before-After-Control-Impact
BIA	Biologically Important Area
BMG	Basker-Manta-Gummy
BOD	Biological Oxygen Demand
BOEM	Bureau of Ocean Energy Management
BPEM	Best Practice Environmental Management
BWMC	Ballast Water Management Certificate
BWMP	Ballast Water Management Plan
BWR	Ballast Water Report
CAMBA	Agreement between the Government and Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment
CER	Commission for Energy Regulation (UK)
CFA	Commonwealth Fisheries Association
CFSR	National Centre for Environmental Prediction Climate Forecast System Reanalysis
CHARM	Chemical Hazard and Risk Management
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMID	Common Marine Inspection Document
CoEP	Code of Environmental Practice
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
CPUE	Catch Per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTD	Conductivity, Temperature and Depth
DAWR	Department of Agriculture and Water Resources (Cth)

Acronym	Definition
DEDJTR	Victorian Department of Economic Development, Jobs, Transport and Resources (Vic)
DELWP	Department of Environment, Land, Water and Planning (Vic)
DGPS	Differential Global Positioning System
DIIS	Department of Industry, Innovation and Science (Cth)
DoD	Department of Defence (Cth)
DoE	Department of the Environment (Cth) (<i>former</i>)
DoEE	Department of Environment and Energy (Cth)
DoF	Department of Fisheries (WA)
DP	Dynamic Positioning
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (Cth) (<i>former</i>)
EAC	East Australian Current
EARPL	Esso Australia Resources Pty Ltd
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAPP	Engine International Air Pollution Prevention
EMBA	Environment that May Be Affected
EMD	Emergency Management Division (of DEDJTR)
EMS	Environmental Management System
EP	Environment Plan
EPA	Environment Protection Authority (Vic)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EPO	Environmental Performance Outcome
EPS	Environmental Performance Standard
ERC	Emergency Response Coordinator
ERP	Emergency Response Plan
ERR	Earth Resources Regulation (division of DEDJTR)
ESD	Environmentally Sustainable Development
FAQ	Frequently Asked Questions
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i> (Vic)
FPSO	Floating Production Storage Offloading
FRDC	Fisheries Research Development Corporation
GA	Geoscience Australia
GAB	Great Australian Bight
GDP	Gross Domestic Product
GIS	Geographic Information System
GLaWAC	Gunaikurnai Land & Waters Aboriginal Corporation
GMDSS	Global Maritime Distress Safety System
GMP	Garbage Management Plan
GoM	Gulf of Mexico
GPS	Global Positioning System
GPBRA	Golden Paradise Beach Rate Payers Association
HDD	Horizontal Directional Drill / Horizontally Directionally Drill(ed)

Acronym	Definition
HFC	High Frequency Cetacean
HFO	Heavy Fuel Oil
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
IAGC	International Association of Geophysical Contractors
IAP	Incident Action Plan
IAP2	International Association for Public Participation
IAPP	International Air Pollution Prevention
IBA	Important Bird Area
ICC	Incident Control Centre
IEE	International Energy Efficiency
ILUA	Indigenous Land Use Agreements
IMAS	Institute for Marine and Antarctic Studies
IMCA	International Marine Contractors Association
IMO	International Maritime Organisation
IMS	Invasive Marine Species
IMT	Incident Management Team
IOGP	International Oil & Gas Producers Association
IOPP	International Oil Pollution Prevention
IPP	International Pollution Prevention
ISB	In-situ burning
ISPP	International Sewage Pollution Prevention
ITT	Invite To Tender
IUCN	International Union for the Conservation of Nature
JAMBA	Agreement between the Government and Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment
LCC	Latrobe City Council
LEFCOL	Lakes Entrance Fisherman's Cooperative
LFC	Low Frequency Cetacean
LiDAR	Light Detection and Ranging
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
MFC	Mid Frequency Cetacean
MGO	Marine Gas Oil
MISW	Marine Inspection for Small Workboats
MMO	Marine Mammal Observer
MMV	Measurement, Monitoring and Verification
MNES	Matter/s of National Environmental Significance
MNP	Marine National Park
MO	Marine Order
MoC	Management of Change

Acronym	Definition
MoU	Memorandum of Understanding
MSV	Maritime Safety Victoria
NEBA	Net Environmental Benefit Analysis
NGOs	Non-Government Organisation
NNTT	National Native Title Tribunal
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Authority
NRT	National Response Team
OCIMF	Oil Companies International Marine Forum
OCNS	Offshore Chemical Notification Scheme
ODS	Ozone-Depleting Substance
OHS	Occupational Health and Safety
OIW	Oil-in-Water
OPEP	Oil Pollution Emergency Plan
OPGGS Act	<i>Offshore Petroleum and Greenhouse Gas Storage Act (Cth & Vic)</i>
OPGGS	Offshore Petroleum and Greenhouse Gas Storage
OSMP	Oil Spill Monitoring Program
OSPAR	Oslo-Paris Conventions
OSRA	Oil Spill Response Atlas
OVID	Offshore Vessel Inspection Document
OWR	Oiled Wildlife Response
OWS	Oily Water Separator
PAH	Polyaromatic Hydrocarbon
PAM	Passive Acoustic Monitoring
PCBs	Polychlorinated Biphenyls
PFW	Produced Formation Water
PLEM	Pipeline End Manifold
PMS	Planned Maintenance System
PNEC	Predicted No Effect Concentration
POWBONS	Pollution of Waters by Oil and Noxious Substances
PPE	Personal Protective Equipment
PTS	Permanent Threshold Shift
PVCs	Polyvinyl Chlorides
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
RO	Reverse Osmosis
ROKAMBA	Republic of Korea Migratory Birds Agreement
ROS	Regional Outfall Sewer
ROV	Remotely Operated (underwater) Vehicle
SA	South Australia/n
SCAT	Shoreline Clean-up and Assessment Technique
SEEMP	Ship Energy Efficiency Management Plan
SEP	Stakeholder Engagement Plan
SES	State Emergency Service (Vic)

Acronym	Definition
SESS	Southern and Eastern Scalefish and Shark
SETFIA	South-East Trawl Fishing Industry Association
SHS	Scalefish Hook Sector
SIMOPS	Simultaneous Operations
SIMS	Safety Incident Management System
SIV	Seafood Industry Victoria
SMPEP	Shipboard Marine Pollution Emergency Plan
SOLAS	International Convention for the Safety of Life at Sea
SOP	Standard Operating Procedure
SRT	State Response Team
SSFAssn	Sustainable Shark Fishing Association
SSIA	Southern Shark Industry Alliance
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
STLM	Sound Transmission Loss Modelling
STP	Sewage Treatment Plant
SWOP	Saline Wastewater Outfall Pipeline
TACC	Total Allowable Commercial Catch
TEC	Threatened Ecological Community
THC	Total Hydrocarbons
TSV	Transport Safety Victoria
TTS	Temporary Threshold Shift
UAV	Underwater Autonomous Vehicle
UHF	Ultra-High Frequency
UNCLOS	United Nations Convention on the Law of the Sea
UNEP IE	United Nations Environment Programme Industry and Environment
VADA	Victorian Abalone Divers Association
VBA	Victorian Biodiversity Atlas
VFA	Victorian Fisheries Authority
VHF	Very High Frequency
VNPA	Victorian National Parks Association
VoO	Vessel/s of Opportunity
VRLA	Victorian Rock Lobster Association
VSFA	Victorian Scallop Fisherman's Association
WA	Western Australia/n

1 Introduction

1.1 Background

GB Energy (Vic) Pty Ltd (hereafter referred to as GB Energy) (ABN 60 615 552 693), as Titleholder of Retention Lease Vic/RL1(V), proposes to appraise and develop the natural gas held in the Golden Beach gas field located within Victorian waters approximately four kilometres off Ninety Mile Beach, in the Gippsland Basin (Figure 1.1). The project is referred to as the Golden Beach Gas Project (hereafter referred to as 'the Project'). Vic/RL1(V) was acquired by GB Energy in 2017.

1.2 Purpose

GB Energy is proposing to conduct geotechnical and geophysical (G&G) investigations (hereafter referred to as 'the activity') in Vic/RL1(V) (see Figure 1.1). The purpose of the investigation is to assess and characterise the seabed to support a jack-up Mobile Offshore Drilling Unit (MODU) that will be used to drill a well at the Golden Beach Gas Field and to determine the suitability of the seabed for an offshore pipeline route.

The activity area covers an area of 6.8 km², ranging in water depths from 5 m to 21 m Lowest Astronomical Tide (LAT). The activity is expected to take place over two campaigns, taking a total of 15-17 days and commencing between Q2 2019 and Q3 2019. The exact timing of the activity is contingent on the receipt of environmental approvals, the contract of suitable vessels and fair sea state conditions suitable for G&G investigations. The G&G investigations will be conducted separately, using different vessels.

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

1.3 Proponent

GB Energy is an independent Australian energy company formed in 2017 that is focused on the development of domestic gas production and energy infrastructure. GB Energy's objective is to provide a new source of local gas supply in one of Australia's oldest and most prolific gas-producing regions, the Gippsland Basin. This gas will serve domestic markets.

The Titleholder's nominated liaison contact details are:

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1.4 Scope of this Plan

The activity will be conducted in accordance with all applicable legislation and regulations, and specifically to meet the requirements of the OPGGS Act and its associated Regulations. This petroleum activity (as defined in Regulation 6 of the OPGGS Regulations) is defined as:

The physical collection of geophysical and geotechnical data, from the time that the vessel first deploys equipment within the activity area, until

the time the vessel retrieves the equipment and departs the activity area for the last time.

GB Energy submitted the revised EP (to account for the addition of the pipeline route) to the to Earth Resources Regulation (ERR) branch of the then Victorian Department of Economic Development, Jobs, Transport and Resources (DEDJTR) (now the Department of Jobs, Precincts and Regions (DJPR) for assessment on the 22nd of March 2019, and it was subsequently accepted on the 18th of April 2019.

This Summary EP is prepared in accordance with Regulation 13E of the OPGGS Regulations 2011.

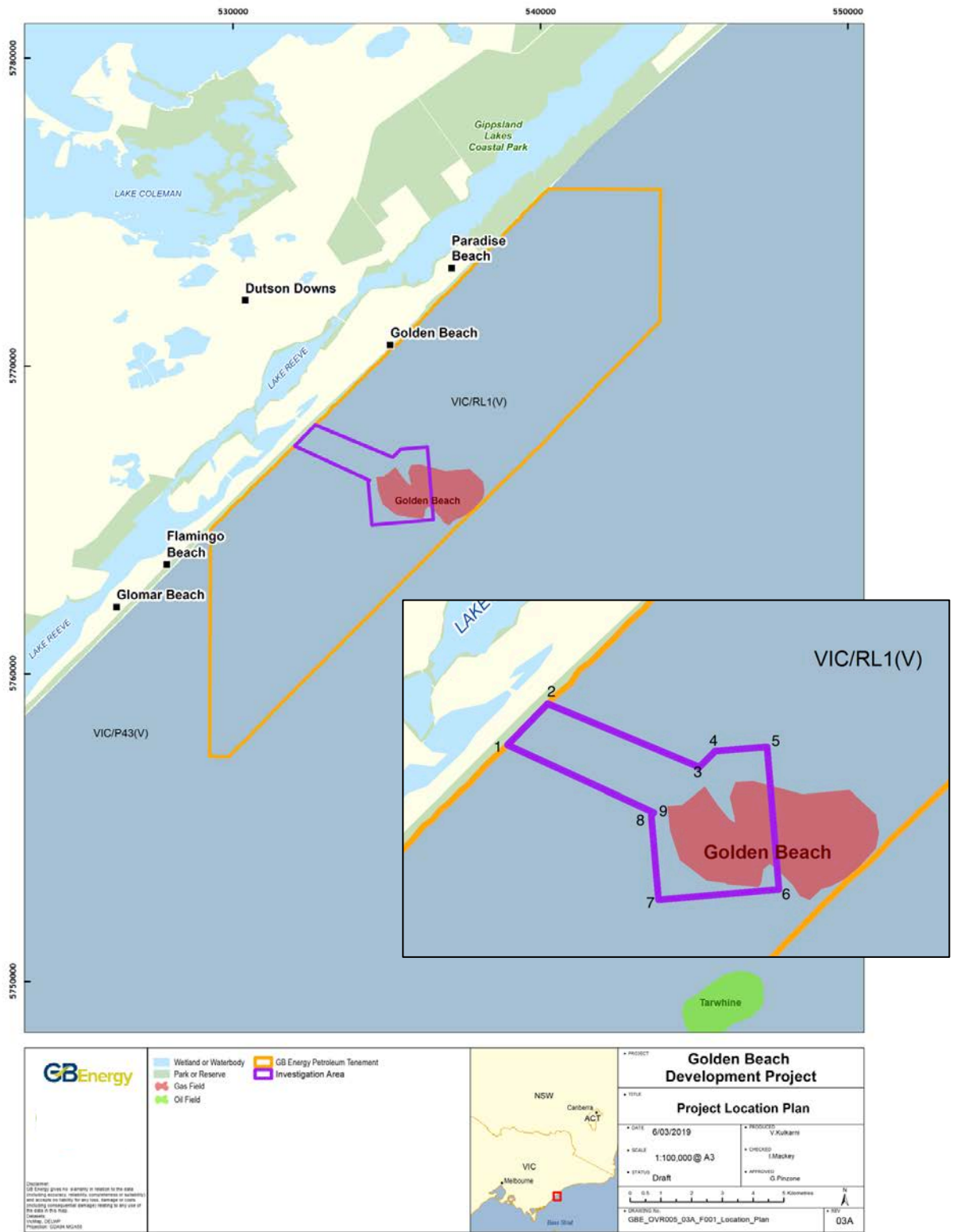


Figure 1.1. Activity location

2 Project Description

2.1 Project Location

The VIC RL1 (V) permit is located entirely in Victorian State waters, with the activity covering an area of 6.8 km². The activity area can be divided into two parts:

- A 4.1 km² area of G&G investigations to assess the suitability of the seabed to support a jack-up MODU in water depths ranging between 19 m and 21 m Lowest Astronomical Tide (LAT), which is 1.8 km at its widest (east-west) point and 2.4 km long at its longest (north-south) point (this was the focus of the previous version of the EP); and
- A 2.7 km² area of G&G investigations to assess the suitability of the seabed to support a pipeline, 1 km wide and 2.5 km long, in water depths ranging from 5 m to 19 m LAT.

The activity area encompasses the area covered by the polygon bounded by the geographic coordinates provided in Table 2.1 (see Figure 1.1 for the corresponding location points). The activity area defines the spatial boundary of the G&G investigations as described in the EP.

Table 2.1. Activity location coordinates

Point	Longitude	Latitude
1	147° 21' 56.6"	- 38° 14' 27.0"
2	147° 22' 24.0"	-38° 14' 04.5"
3	147° 24' 07.6"	-38° 14' 38.5"
4	147° 24' 18.5"	-38° 14' 38.5"
5	147° 24' 54.0"	-38° 14' 27.4"
6	147° 25' 02.6"	- 38° 15' 44.0"
7	147° 23' 40.2"	- 38° 15' 49.8"
8	147° 23' 35.1"	- 38° 15' 04.3"
9	147° 23' 36.8"	-38° 15' 02.9"

GDA 94, MGA Zone 55. See Figure 1.1 for the corresponding location points.

At its closest point, the activity area is located 2.7 km southwest of centre of the township of Golden Beach, midway along the Ninety Mile Beach between Loch Sport and Seaspray in south Gippsland. Distances from the activity area to nearby features are provided in Table 2.2.

Table 2.2 Distance to key features from the activity area

Feature	Distance and direction from the nearest point of the activity area to the nearest point of the feature	
	MODU investigation area	Pipeline route investigation area
Towns		
Golden Beach (town centre)	2.7 km northeast	250 m from beach
Paradise Beach	4.9 km northeast	5.2 km northeast
Loch Sport	25 km northeast	
Honeysuckles	17.8 km southwest	17.1 km southwest
Seaspray	21 km southwest	20.5 km southwest
Longford	29 km northwest	26 km northwest
Sale	33 km northwest	27 km northwest
Lakes Entrance	64 km northeast	
Petroleum infrastructure		
Golden Beach-1/-1A	570 m east	2.5 km southeast
Bream to shore pipeline: Vic/PL32 & Vic/PL32(V) (gas)	5 km northeast	6.4 km northeast
Barracouta to shore pipeline: Vic/PL1 & Vic/PL1(V) (gas)	6.6 km northeast	7.5 km northeast
Barracouta to shore pipeline: Vic/PL4 & Vic/PL4(V) (oil & condensate)	12 km northeast	12.8 km northeast
Seahorse subsea wells (nearest) (oil)	18 km east	19 km east
Tarwhine to Barracouta A pipeline (oil)	18 km south-southeast	20 km southeast
Seahorse to Barracouta A pipeline (oil)	22 km east	24 km east
Barracouta platform (oil & gas)	22 km southeast	24 km southeast
Tarwhine subsea completion (oil)	18 km south-southeast	20 km southeast
Dolphin to shore pipeline (oil)	19 km southwest	20 km southwest
Tasmanian gas pipeline	20 km southwest	20.5 km southwest
Dolphin monopod (oil)	25 km south-southwest	26 km south-southwest
Bream A platform (oil and gas)	40 km southeast	43 km southeast
Perch monopod (oil)	34 km southwest	35 km southwest
Longtom gas pipeline	82 km east	80 km east
Patricia Baleen gas pipeline	94 km east	100 km northeast
Non-petroleum infrastructure		
Regional Outfall Sewer (ROS) (Delray Beach)	1.5 km northwest	Overlapped (for a distance of about 600 m)

Saline Wastewater Outfall Pipeline (SWOP) (McGaurans Beach)	32 km southwest	
Basslink electricity interconnector cable	32 km southwest	
Australian Marine Parks		
Beagle	96 km southwest	97 km southwest
East Gippsland	215 km east-southeast	216 km east-southeast
Victorian marine parks		
Ninety Mile Beach Marine National Park	22 km southwest	23 km southwest
Nooramunga Marine and Coastal Park	55 km southwest	54 km southwest
Corner Inlet Marine Park	102 km southwest	97 km southwest
Wilson's Promontory Marine Park	105 km west	98 km southwest
Wilson's Promontory Marine National Park	120 km southwest	121 km southwest
Point Hicks Marine National Park	169 km northeast	166 km northeast
Natural features		
Lakes Entrance (channel)	62 km northeast	64 km northeast
Hogan Island group	110 km southwest	111 km southwest
Beware Reef (off Cape Conran)	129 km northeast	130 km northeast
Wilson's Promontory (southern tip)	130 km southwest	129 km southwest
Westernport Bay (eastern entrance)	180 km west	178 km west
Westernport Bay (western entrance)	202 km west	200 km west
Gabo Island	232 km east	233 km east
Port Phillip Bay (entrance)	240 km west	239 km west

2.2 Timing

The activity is scheduled to commence in Q2 or Q3 2019 and the total duration is expected to take 15-17 days over two campaigns to complete (subject to weather and work scope progress).

The geophysical investigation (which will be conducted first) will use a small, locally-based vessel, while a larger specialist vessel will undertake the geotechnical investigation. There is the potential that some aspects of the geophysical investigation (e.g. side-scan sonar and/or ROV survey) may need to be undertaken again immediately prior to the MODU mobilisation on to location (to re-confirm the absence of seabed hazards), depending on the warranty requirements of the MODU owner.

2.3 Objective of the Activity

The purpose of the activity is to identify constraints and hazards that may affect the mobilisation and pre-loading of the MODU on location, the drilling of the well and the installation of a gas pipeline, specifically:

- Acquisition of seabed and shallow geology data to support the safe placement of the MODU's jack-up legs and riserless drilling and the pipeline (especially with regard to the shoreline horizontally directionally drilled [HDD] section);
- Identify seabed terrain features and hazards that may impact on the exact positioning of the MODU and pipeline (such as pipelines, shipwrecks, dropped objects, craters or reefs); and
- Confirmation of the absence of anomalous features, such as shallow gas, throughout the activity area.

2.4 Geophysical Program Description

The geophysical investigation program will involve the investigations described herein. The geophysical investigations will take place ahead of the geotechnical investigations (noting that some components of the geotechnical investigation, such as grab sampling, may be undertaken using the geophysical vessel). The survey vessel and various geophysical equipment types are very accurately positioned using Global Navigation Satellite System (GNSS) receivers on the vessel and underwater positioning techniques known as Ultrashort Base Line (USBL). A simplified pictorial representation of geophysical investigation techniques is provided in Figure 2.1.

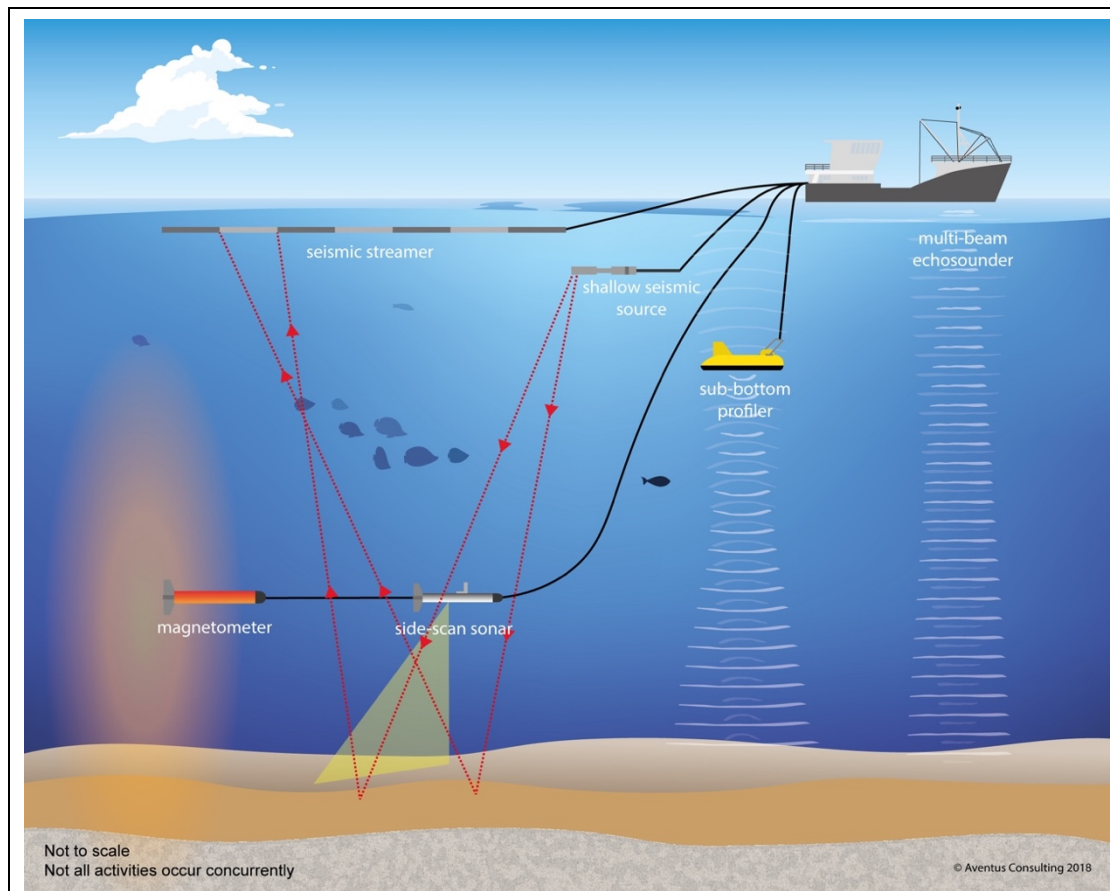


Figure 2.1. Simplified representation of geophysical investigation techniques

2.4.1 Single-beam echo sounder

A single-beam echo sounder (SBES) may be used, primarily for confirming depths at site locations. The SBES transmits sound energy and analyses the return signal (echo) from the seabed or other objects. The single beam bathymetry received sound exposure level is not likely to exceed 160 dB.

2.4.2 Multi-beam echo sounder

A multi-beam echo sounder (MBES) is similar to SBES except that coverage on the seabed is wider than a single beam and typically in the order of 3-12 times the water depth. The backscatter data from the MBES is used to characterise the seabed and to assist in seabed classification.

2.4.3 Side scan sonar

Side scan sonar (SSS) is a hydro-acoustic technique used to detect hazards such as pipelines, lost shipping containers, boulders, debris, unmarked wrecks, reefs and craters. A SSS survey is undertaken by towing a sonar tow-fish over the investigation area. The tow-fish is equipped with a linear array of transducers that emit and later receive an acoustic energy pulse in a specific frequency range. Typically, a dual-channel, dual-frequency SSS is used.

2.4.4 Sub-bottom profiler

Sub-bottom Profilers (SBPs) are devices for converting electrical energy into acoustic energy. They produce an acoustic profile which extends from the seabed down to the limit of penetration. SBPs are used to survey the shallow geology of an area, and as such have a lower output of acoustic energy compared to other geological survey techniques such as seismic surveys. The SBP system is towed and operated at the same time as the MBES and SSS. The SBP investigation is likely to be undertaken in two passes in conjunction with the MBES and SSS.

2.4.5 Magnetometer

A towed marine magnetometer will be used to provide a means of detecting ferromagnetic infrastructure and objects (typically iron or steel) both exposed at the seabed and buried in the top few metres of sediment which are invisible to acoustic and seismic techniques. The magnetometer survey will be conducted simultaneously with the MBES, SSS and SBP, as it can be powered using the same tow cable and power supply.

2.4.6 High Resolution Shallow Seismic

High resolution (HR) shallow seismic data may be required to obtain information on the presence of shallow gas to a depth of about 500 m below the seabed. Pneumatically generated sources are mainly used for multi-channel seismic acquisition, using one airgun with a volume of 20 cubic inches (cui) and a 300-m long hydrophone streamer to receive the acoustic signals. A total of about 63.5 line kilometres of data will be acquired.

2.5 Geotechnical Program Description

Geotechnical investigation methods collect detailed information on the properties of the seabed and the underlying shallow sediments to build up a picture of the local geology of the activity area. The collected sediments are photographed, described and tested to determine the load bearing properties of the seabed at potential MODU spud can locations and 4-6 locations along the pipeline investigation route (beach end, mid-

way and the Pipeline End Manifold [PLEM] point), and also validate the results of the geophysical investigations. The location and total number of sampling sites is ultimately dependent on the results of the geophysical investigations. A description of the proposed geotechnical equipment and techniques is provided herein.

A simplified pictorial representation of geotechnical investigation techniques is provided in Figure 2.2. The geotechnical investigations will take place after the geophysical investigations.

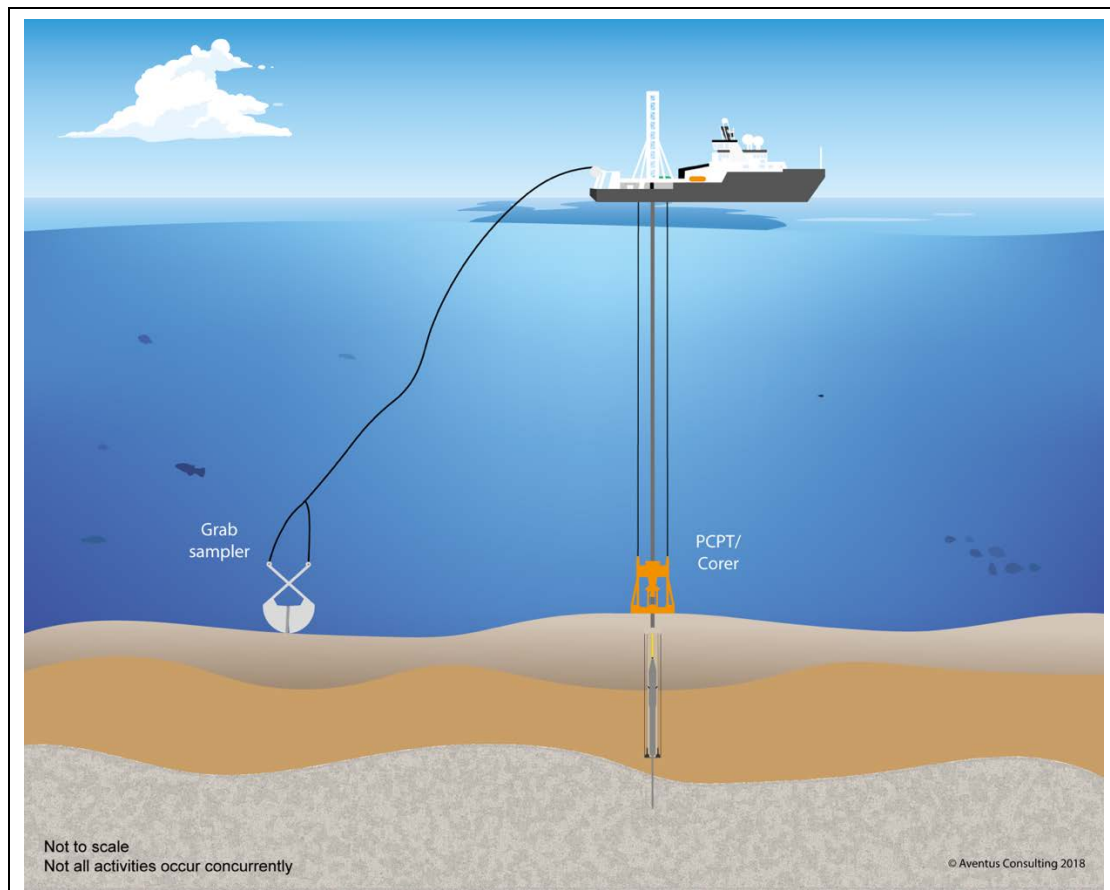


Figure 2.2. Simplified representation of geotechnical investigation techniques

2.5.1 Grab Samplers

Grab sampling is a process of collecting small samples of unconsolidated surface sediments from the seafloor. Only surface sediments are collected and the sampler has no ability to penetrate to depth.

2.5.2 Coring

The various types of coring (vibro, box and piston) provide samples for undertaking geological analysis of formations below the seabed. One or more of these types of coring may be employed for this activity, so each is described here:

- Box corers are designed to take 'undisturbed' samples from the top of the seabed and are suitable for almost every type of sediment.

- Gravity corers may be used to obtain a continuous soil sample in a wide range of water depths and are normally used on soft, unconsolidated sediments.
- Vibrocoring is a technique for collecting core samples in unconsolidated sediments by using a vibrating device to drive a coring tube into the seabed. Vibrocoring is only likely to be used where gravity coring has been unable to reach the required sample recovery depths.

Typically, one core sample is collected from the centre of the MODU location (with a contingency for one sample at each MODU spud can location [i.e., four in total]) and at up to six pipeline route sampling locations, which is used to ground-truth the geophysical data. No drilling muds are required in the coring process and no drill cuttings are generated.

2.5.3 Cone penetration testing (CPT)

Cone Penetration Testing (CPT) determines soil strength and helps to delineate soil stratigraphy. CPTs work on the principle of an instrumented cone on the end of a series of rods or a coiled rod being pushed into the ground at a constant rate (usually 2 cm per second). Sensors mounted in the cone measure cone end resistance, local side friction and pore pressure.

2.5.4 Borehole Sampling

Borehole sampling gathers geotechnical soil data to a minimum depth of the jack-up MODU spud can penetration plus 1.5 x the spud can diameter. Up to four rotary boreholes will be drilled to coincide with the potential locations of the MODU's spud can locations. A small hole will be created in the seabed, which will eventually collapse and infill with the movement of seabed sediments.

Drill Cuttings

Cuttings are discharged directly to the seabed during borehole sampling. Drill cuttings are inert pieces of rock, sand and other particles removed from the borehole during the sampling process. Cuttings range in size from very coarse to very fine particles. The coring for this activity will generate a very small volume of cuttings at a few locations, as outlined in Table 2.3.

Table 2.3. Approximate cutting discharge volumes for borehole sampling

Total depth (m)	Borehole diameter (mm)	Number of holes per investigation site	Total drill cuttings volume (m ³)
Up to 50 (more likely 30-40)	228	Up to 10	Up to 3.2 each hole A total of 32 for 10 boreholes

Drill Fluids

Drilling fluid will be used during the borehole sampling and CPT process to lubricate the drill bit, transport cuttings out of the borehole to keep the borehole clean and to prevent the borehole from collapsing during the coring process. For a borehole 80 m deep, the volume of drilling fluid would be in the order of 30 m³. Seawater is the primary constituent of geotechnical drilling fluids. Inert drilling fluid additives may be added to the seawater to form a water-based mud (WBM) if challenging boring conditions are encountered.

2.5.5 Laboratory Testing

Laboratory analysis of the nature and composition of seabed sediments will be undertaken onboard the geotechnical vessel and in onshore laboratories. Offshore laboratory testing has the benefit of informing the need for additional testing while the vessel is on location if results indicate variable seabed profiles.

2.6 Associated Non-invasive Investigations

A CTD device provides a measurement of how variable the physical properties of seawater are relative to depth. Conductivity is a measure of how well a solution conducts electricity and is directly related to salinity, which is the concentration of salt and other inorganic compounds in seawater. When combined with temperature data, salinity measurements are used to determine seawater density. In the context of geophysical and geotechnical investigations, such measurements are required in order to calibrate the acoustic equipment.

A 'drop camera', housed in water-proof casing and mounted in a stainless-steel frame may be deployed from the vessel to take representative photos of the seabed types encountered in the activity area. The camera is simply lowered to the seabed and the camera triggered. Additionally, if video images are required, a similar frame may be towed behind the vessel close to the seabed using a weighted towfish and communications cable.

2.7 Investigation Vessels

2.7.1 Vessels

Different vessels will be used to perform the activity, as follows:

- Geophysical investigations – a small, locally-based vessel (e.g., from Lakes Entrance) capable of towing light-weight equipment; and
- Geotechnical investigations – a larger, specialist vessel, with a large deck area and drilling derrick. This is likely to be mobilised from outside Victoria, either from elsewhere in Australia or from a global pool of suitable vessels.

The vessels will use dynamic positioning (DP) to remain on location, anchoring only in emergency scenarios.

For work in the shallower parts of the activity area (e.g., in depths less than 10 m), use a smaller vessel with a shallow draft (e.g., less than 2 m) will be used in order to minimise the risk of vessel interactions with the seabed (thereby reducing the risk of hull damage or vessel grounding and consequential fuel spill).

GB Energy will conduct a pre-qualification audit of all tenderers to ensure that the contractors and their nominated vessels meet GB Energy's HSE requirements. A kick-off meeting will be held prior to the commencement of operations to ensure all operational personnel are aware of the details of the EP and other GB Energy HSE protocols.

Initial mobilisation of crew to the vessels will be via port call, which will be selected post-contract award. Given the short duration of the activity, crew changes will not be required while on site. No helicopter transfers are planned (although they may be required in the event of medical emergencies).

2.7.2 Vessel Positioning

An Ultra-short Base Line (USBL) acoustic positioning system will be utilised on board the geotechnical vessel (and may be an option on the geophysical vessel). This tool is used to locate the position of equipment lowered to the seabed. The USBL system uses a vessel-mounted transceiver to detect the range and bearing to a target using acoustic signals. This range and bearing technique is based on two principles:

- An accurate range can be determined by knowing precisely the time taken for an acoustic signal to travel between the target and the transceiver and the speed at which the signal travelled (sound speed).
- The bearing can be determined by recognising the discrete difference in phase between the reception of the signal at the multiple transducers present in the transceiver. This allows the USBL system to determine a time-phase difference for each transducer and therefore, calculate the angle of the arriving signal.

Table 2.4 summarises the proposed activity parameters.

Table 2.4. Project Summary

Parameter	Details		
Earliest commencement date	Q2 2019		
Duration of survey	15-17 days in total over two campaigns		
Water depths	5 - 21 m LAT		
Activity area	6.8 km ²		
Geophysical investigation	Estimated duration	Sound frequency range (kHz)	Sound source levels (dB re 1uPa @ 1 m)
SBES	7-8 days (undertaken concurrently)	120-170	160
MBES		200-700	236-242
SSS		100-1,600	210-220
SBP		0.2-24	100-225
Magnetometer		N/A	N/A
HR shallow seismic	Up to 2 days, undertaken separately to above	0.3-5	228-240
Geotechnical investigation	Estimated duration	Depth of penetration (m)	Number of investigation sites
Grab sampling	Several hours	0.1-0.2	Up to 10 sites within the activity area
Coring	Several hours	Up to 50	
CPT	Several hours	Up to 25	
Borehole sampling	4 days	Up to 50	

3 Stakeholder Consultation

3.1 Stakeholder Consultation Objectives

The overarching objective of the Project's stakeholder and community engagement is to enable the delivery of work consistent with regulatory requirements and good practice engagement.

In further detail, the objective of the engagement for this activity is to:

- Build stakeholder and community awareness and understanding of the drilling process;
- Avoid stakeholder fatigue (there are several offshore projects underway in the offshore Gippsland Basin that are engaging with the same group of stakeholders);
- Avoid confusion with the other projects proposed in the offshore Gippsland Basin;
- Identify stakeholders that require any special or additional information;
- Build GB Energy's understanding of community sentiment toward the Project and to use this feedback to mitigate community concerns;
- Ensure the Project meets (and exceeds, where possible) regulatory requirements in relation to stakeholder and community engagement; and
- Demonstrate GB Energy's commitment to working with the local community, guided by its Vision and Values Statement.

Throughout the consultation period, GB Energy has committed to meeting these objectives by:

- Identifying stakeholders whose functions, interests or activities may be affected the activity (and the wider Project);
- Confirming, through consultation, the 'relevant persons' (stakeholders) in accordance with the regulations and engaging those stakeholders at the earliest opportunity;
- Ensuring stakeholders 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 this EP; and
- 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.

3.2 Stakeholder Identification

The stakeholders identified for the G&G investigations are listed in Table 3.1.

Table 3.1. Stakeholders identified for the activity

Department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant	
Australian Maritime Safety Authority (AMSA) - Nautical and Regulation Section	Australian Fisheries Management Authority (AFMA)
Department of Agriculture and Water Resources (DAWR)	Department of Defence (DoD) – Defence Support Group
Australian Hydrographic Office (AHO)	Department of Communications and ACMA
Department of Immigration and Border Protection - Maritime Border Command	National Offshore Petroleum Titles Administrator (NOPTA)
Each Department or agency of a State to which the activities to be carried out under the EP may be relevant	
Environment Protection Authority (EPA)	Department of Environment, Land, Water and Planning (DELWP)
Parks Victoria	
Maritime Safety Victoria	
The Department of the responsible State Minister	
DEDJTR - Earth Resources Regulation (ERR)	Victorian Fisheries Authority (VFA)
A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP	
<i>Fisheries</i>	
Commonwealth Fisheries Association (CFA)	Seafood Industry Victoria (SIV)
South-East Trawl Fishing Industry Association (SETFIA)	Eastern Zone Abalone Industry Association
Lakes Entrance Fisherman's Cooperative (LEFCOL)	Australian Southern Bluefin Tuna Industry Association (ASBTIA)
Victorian Scallop Fisherman's Association (VSFA)	Sustainable Shark Fishing Association (SSFAssn)
Southern Shark Industry Alliance (SSIA)	VRFish
Victorian Abalone Council	Small Pelagic Fishery

Eastern Rock Lobster Industry Association	Victorian Rock Lobster Association (VRLA)
Victorian Abalone Divers Association (VADA)	
<i>Nearby Titleholders</i>	
ExxonMobil (Esso Australia Resources Pty Ltd) – VIC/RL1 and VIC/L1 in particular	CarbonNet Project (GGAP006386(V) and VIC-GIP-002)
Carnarvon Hibiscus Pty Ltd – VIC/P57	Lakes Oil – VIC/P44(V), VIC/P43(V)
<i>Oil spill preparedness and response agencies</i>	
DEDJTR – Emergency Management Division (EMD)	AMSA – Marine Environmental Pollution Response
Gippsland Ports	Lakes Entrance Coastguard
Gippsland Emergency Management Planning Committee	
Any other person or organisation that the Titleholder considers relevant	
Wellington Shire Council	

3.3 Engagement Method and Approach

3.3.1 Engagement Approach

Consultation has been broadly undertaken in line with the International Association for Public Participation (IAP2) spectrum, which is considered best practice for consultation.

This activity includes four main phases of stakeholder engagement, these being:

1. Planning and conducting engagement activities until the EP is approved by ERR;
2. Pre-mobilisation communications;
3. Communications during the activity; and
4. Post-activity communications.

3.3.2 Engagement Methodology

A range of stakeholder engagement and communications methods and tools have been used (and will continue to be used) throughout the engagement process, including (but not limited to) the following:

- Emails;
- Letters;
- Face-to-face meetings;
- Fact sheets;

- Outgoing phone calls;
- Community meetings; and
- The GB Energy website (www.gbenergy.com.au).

GB Energy has made contact with the identified stakeholders and organisations as listed in Table 3.1. The consultation included GB Energy personnel conducting face-to-face meetings with stakeholders.

3.3.3 Fact Sheet and Invite to Comment

An initial overview of the proposed activity was provided to relevant stakeholders on the 18th of October 2018. This overview consisted of an email with an attached information sheet and invited feedback to formally seek stakeholder views and provide an opportunity to ask questions. The email was then followed by a phone call to confirm receipt of the original email, or a follow-up email should a phone number not be available. GB Energy will continue to consult with stakeholders as required.

3.3.4 Fisheries Associations

GB Energy has consulted with all relevant fishing industry groups who may be present in the area during the activity. GB Energy has provided a letter, project information and the community meeting notice to SIV in early November and again on the 22nd of November 2018, who in turn distributed this information to 400+ fishing licence holders who may work in the area. GB Energy understands that SIV also distributed a letter to potentially affected fishing licence holders via the VFA. GB Energy has also consulted with SETFIA, who has distributed project information via their Facebook page, emails to members and utilisation of its SMS service.

3.3.5 Dedicated Project Email and Customer Service Centre

The GB Energy team has a dedicated email address (info@gbenergy.com) and toll free 1800 telephone number (1800 423 637) for all enquiries relating to the project (these details are included on all collateral). The email inbox and 1800 telephone number are managed by the Stakeholder Engagement Coordinator. All correspondence and feedback is recorded in Consultation Manager.

3.3.6 GB Energy Website

Information on the Golden Beach Development Project, including the fact sheet for this activity, has been made available on the GB Energy website (www.gbenergy.com.au) for all stakeholders to access. Contact information for the team is also available. Flyers prepared for future project milestones will also be made available on the website.

3.3.7 Community Information Sessions

Two community information sessions have taken place thus far in Golden Beach; the first at the Golden Beach community hall on Saturday the 8th of December 2018 and the second on the 2nd of March 2019 at the Golden Beach Golf Club. Each session was attended by approximately 25 people. Attendees were provided fact sheets and access to project personnel.

3.3.8 Media

Media interviews with ABC Radio and a briefing of *The Gippsland Times* newspaper undertaken on the 6th of November 2018 to provide background information on the project and planned upcoming activities, and to encourage local residents to attend a

project briefing in Golden Beach on the 8th of December 2018. This was also supported by quarter-page advertisements (23 & 27 November 2018) in *The Gippsland Times* encouraging interested parties to the information session. Meeting flyers were also distributed to community organisations and interest groups.

As part of the program to keep local media advised of its activities, GB Energy provided information to the editor of *The Gippsland Times* on the announcement of the gas offtake and gas storage agreement signed with Origin Energy on the 28th of February 2019. This led to an article about the project being published on page 3 of the newspaper's 1st of March 2019 edition.

3.4 Summary of Stakeholder Consultation

GB Energy has undertaken consultation with all relevant stakeholders potentially affected by this activity.

GB Energy is consulting with stakeholders to communicate the project and provide an opportunity to integrate stakeholder values and concerns into the activity design. In accordance with GB Energy's HSE Policy, GB Energy is also committed to open and on-going consultation with the communities in which it operates and providing relevant, easily understandable information.

A summary of the consultation undertaken by GB Energy is presented in Table 3.2.

Table 3.2. Summary of stakeholder consultation undertaken Highlights/Formatting

Stakeholder	Functions, interests and/or activities	Date	Feedback, concerns, impacts or claims raised by stakeholder	GB Energy assessment of merit
Category 1 - Department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant				
Australian Hydrographic Office (AHO)	Issue Notice to Mariners	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. An automatic receipt of acknowledgement was provided. No other response has been provided to date.	No follow up is required at this stage as GB Energy is aware of the AHO's pre-activity notification requirements. GB Energy will continue to provide regular and timely project activity updates.
Department of Defence (DoD) – Support Group	Manage all Australian defence activities. The DoD has operations in Sale, Gippsland	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. An automatic receipt of acknowledgement was provided. No other response has been provided to date.	No follow up is required at this stage as GB Energy is aware of the location of defence training areas. GB Energy will continue to provide regular and timely project activity updates.
Australian Fisheries Management Authority (AFMA)	Manage Commonwealth fisheries	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. No response to date.	No follow up is required at this stage as GB Energy is aware of the Commonwealth-managed fisheries operating in the EMBA. GB Energy will continue to provide regular and timely project activity updates.
Australian Maritime Safety Authority (AMSA)	Key regulator for marine safety, advises on shipping lanes and safety in Commonwealth waters	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. No response to date.	No follow up is required at this stage as GB Energy is aware of AMSAs pre-activity notification requirements. GB Energy will continue to provide regular and timely project activity updates.

Category 2 - Each Department or agency of a State to which the activities to be carried out under the EP may be relevant				
Geoscience Australia	Geoscientific research. Advisor on the geology and geography of Australia	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December.	GB Energy will continue to provide regular and timely project activity updates. No follow up is required at this stage as there will be no impacts on Geoscience Australia's functions.
		28/11/18	GB Energy received a response from Client Services to confirm receipt of email notifying that an initial response within 5 working days for standard enquiries and within 10 working days for more complex enquiries would be provided. No response to date.	
East Gippsland Catchment Management Authority	Waterways, catchment and flood management	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. No response to date.	GB Energy will continue to provide regular and timely project activity updates. No follow up is required at this stage as there will be no impacts on Geoscience Australia's functions.
Victorian Fisheries Authority (VFA)	Victorian fisheries and individual fishers	28/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. No response to date.	GB Energy will continue to provide regular and timely project activity updates. No follow up is required at this stage as GB Energy's research into Victorian fisheries and consultation with fisheries associations has provided adequate information on fishing in and around the activity area.
DEDJTR ERR	Regulator for offshore petroleum activities in Victorian State waters	2/10/18	GB Energy called ERR's Senior Approvals Officer to confirm a meeting date.	N/A
		4/10/18	GB Energy's Regulatory & HSE Manager and AGR's HSE Manager attended meeting at the DJPR office at Bendigo to meet with the with Senior Approvals Officer. GB Energy provided an overview of the project, including timelines and milestones, including the planned G&G investigations.	GB Energy committed to providing the project information flyers.
		12/10/18	GB Energy issued the project information flyers to the Senior Approvals Officer via email.	N/A

		20/11/18	GB Energy called ERR to provide an update on GB Energy's progress on this EP and OPEP and an update on consultation activities undertaken to date. GB Energy asked to meet to provide an update in person.	GB Energy will continue to provide regular and timely project activity updates.
		23/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December.	N/A
		6/12/18	GB Energy's Regulatory & HSE Manager and AGR's HSE Manager attended meeting at DJPR office at Bendigo to meet with the with Senior Approvals Officer. GB Energy provided an update on the project, including planned timelines for the G&G EP and drilling EP submissions, and an update on consultation activities.	N/A
		16/01/19	ERR issued a letter to GB Energy providing assessment comments on the EP.	The comments are addressed in this revised EP. A table cross-referencing ERR's assessment comments with changes to the EP was provided to ERR with this re-submitted EP.
		21/01/19	GB Energy and ERR met via teleconference to discuss the assessment comments provided on the EP and proposed measures to address these. ERR was comfortable with the approach proposed to address the comments and re-submit the EP.	
DJPR	Regulatory authority	11/10/18	GB Energy called the DJPR Earth Resources - Executive Director, Deputy Secretary Resources to introduce the company and the project. The discussion focussed on whether there was an ability for government agency coordination, stakeholder engagement and opportunities that may exist with other Titleholders to share a MODU for the planned drilling activities.	Continue to provide regular and timely, high-level project activity updates.
		12/10/18	GB Energy called the DEDJTR Head of Approvals to introduce the company and the project.	GB Energy will continue to provide regular and timely project activity updates via DEDJTR ERR personnel.
Parks Victoria, EMD, ERR	Part of the OPEP consultation group	2/11/18	GB Energy met with representatives of EMD, ParksVic and ERR to discuss the oil spill response strategies being developed in the OPEP and confirm their availability to respond to a spill. GB Energy provided the electronic version of presentation material. No response to date.	GB Energy will continue to provide regular and timely project activity updates.

Parks Victoria	Manage Gippsland Lakes Coastal Park, including the Golden Beach foreshore	31/10/18	GB Energy issued information flyer via email to the Chief Ranger of the Gippsland area.	N/A
		7/11/18	Parks Victoria raised concerns that the oil spill modelling maps did not include the Ninety Mile Beach Marine National Park (MNP). Oil spill response strategy was discussed and provided.	GB Energy revised the mapping to include the Ninety Mile Beach MNP and provided it to ParksVic.
		23/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December. No response to date.	GB Energy will continue to provide regular and timely project activity updates.
DELWP	Manage the environmental approvals process for onshore pipeline developments. DELWP also manages the foreshore adjacent to the activity area.	26/11/18	GB Energy emailed DELWP's Principal Advisor, Impact Assessment and issued information flyer. A request was made to meet in late November/early December. No response to date.	GB Energy will continue to provide regular and timely project activity updates.
		18/10/18	GB Energy emailed DELWP's Acting Manager Pipeline Regulation and issued information flyer. No response to date.	N/A
		18/02/19	GB Energy contacted Gippsland's Program Manager for Planning & Approvals by phone and email to discuss how DELWP's review of the G&G EP was progressing. ERR advised that DELWP was sent the G&G EP for review on the 8 th of February and DELWP has 21 days to review.	N/A
		20/02/19	DELWP Gippsland contacted GB Energy to advise that the Natural Environments team has the referred document and is aware of the 21-day deadline.	N/A
		4/03/19	DELWP Gippsland advised that G&G EP has been sent back to ERR. DELWP also advised that GB Energy is required to apply for a consent under the Marine and Coastal Act (MACA). MACA consents are handled through DELWP office.	GB Energy will prepare a MACA application immediately.
		6/03/19	GB Energy submitted the MACA consent application to DELWP Gippsland.	N/A
		19/03/19	DEWLP issued its Consent for Use and Development of Coastal Crown Land under the MACA to GB Energy.	GB Energy confirms that the works will be conducted in accordance with the consent document.

Geological Survey of Victoria (GSV)	Regulatory authority	12/10/18	GB Energy called the GSV Director to introduce the company and the project.	GB Energy will continue to provide regular and timely project activity updates.
Category 3 - The Department of the responsible State Minister				
Advisor to Hon. Tim Bull MP – The National Party of Australia	State Member for Gippsland East	22/10/18	GB Energy called Tim Bull MP to arrange a project briefing. Website information provided.	N/A
		12/11/18	GB Energy called regarding arranging a project briefing in Bairnsdale on the 14th of November.	N/A
		29/10/18	GB Energy met with the MP's adviser to provide a project briefing. The advisor expressed interest in opportunities for local and regional businesses. GB Energy advised that it was talking with local business and tourism representatives about potential opportunities and that GB Energy is developing a contracting plan (as part of an overall commitment to developing a Local Content Plan) for use of local goods and services.	GB Energy committed to the development of a Local Content Plan, including a commitment to sourcing local goods and services wherever possible.
		14/11/18	GB Energy emailed the advisor a project press release and notice of the upcoming information session on the 8th of December.	GB Energy commits to continued consultation and updates.
The Hon. Danny O'Brien MP – The National Party of Australia	State Member for South Gippsland	22/10/18	GB Energy called Danny O'Brien MP to arrange a project briefing. Website information provided.	N/A
		23/10/18	GB Energy called the MP's office. Project information was provided to the office manager. Electronic copies sent email with a request for GB Energy to provide a project briefing.	Project background information provided.
		29/10/18	GB Energy conducted a briefing over the phone with the Minister. The MP was interested in opportunities for locals on the project. GB Energy advised that it is talking with fishermen and others about this. GB Energy advised that it was talking with local business and tourism representatives about potential opportunities and that GB Energy is developing a contracting plan (as part of an overall commitment to developing a Local Content Plan) for use of local goods and services.	GB Energy committed to the development of a Local Content Plan, including a commitment to sourcing local goods and services wherever possible.
		12/11/18	GB Energy called Danny O'Brien's office and sent an email requesting the opportunity to provide a project briefing.	N/A

		14/11/18	GB Energy provided a briefing to the MP and provided him with GB Energy's press release and an invitation to the information session on the 8th of December.	N/A
Wellington Shire Council	Local Government Area that includes the towns of Golden Beach and Paradise Beach	22/10/18	GB Energy called Wellington Shire Council to arrange a project briefing. Website information provided.	N/A
		23/10/18	GB Energy met at the Shire offices in Sale and provided project information via email in preparation for a meeting on November 13 in Sale.	N/A
		13/11/18	GB Energy met with Council representatives (Acting CEO and GM Development, Business Development Manager, Land Use and Planning Manager) to provide a project briefing, press release and invitation to the information session on the 8th of December. GBE advised Shire of its briefings of local stakeholders (media and business groups) and preparations for the information session at Golden Beach. The Shire advised that it would assist, on a cost recovery basis, with mail outs to Golden Beach ratepayers once the Project had an approved offshore work plan.	N/A
Hon Darren Chester MP – The National Party of Australia	Federal Member of Parliament (Member for Gippsland)	22/10/18	GB Energy called the MP's office to arrange a project briefing. Website information provided.	N/A
		23/10/18	GB Energy emailed the MP's office with project background. The Minister's office emailed GB Energy to confirm the information has been passed to the Minister.	N/A
		25/10/18	GB Energy called the MP's office to arrange a project briefing. No response to date.	N/A
Category 4 - A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP				
<i>Fisheries</i>				
Seafood Industry Victoria (SIV)	Peak industry body for Victorian Fisheries	29/10/18	GB Energy had a meeting with the SIV CEO in West Melbourne to provide a project overview. SIV raised concerns about the impact of G&G investigations on fisheries. GB Energy agreed to provide simple information on the small shallow seismic program component for mail out to fishermen by SIV. One Lakes Entrance fisherman requested more information. GB Energy provided this information with an offer of a face-to-face meeting if required.	SIV advises that the material was issued to 400+ permit holders interested in the GB area.

		31/10/18	SIV thanked GB Energy for the meeting and provided a plan to disseminate project information to over 467 Victorian licence holders, including the Rock Lobster Eastern Zone, Scallop, Abalone Central Zone, Inshore Trawl, Wrasse, Purse Seine (Ocean) and Ocean Access fisheries.	N/A
		21/11/18	SIV requested a brief fact sheet to go out under SIV cover letter, seeking the response of members if they have any questions, comments or concerns.	GB Energy agreed to this request.
		21/11/18	GB Energy issued information flyer via email along with notice of community meeting in Golden Beach on the 8th of December.	N/A
		18/01/19	GB Energy sent email to the SIV CEO requesting an update on the SIV's December mail out to its 400+ members about the Project to determine whether there were any concerns.	N/A
		19/01/19	GB Energy telephoned the CEO to seek an update on the December mail out referred to above. The CEO responded that the project information had been provided to its members and that they were encouraged to contact GB Energy directly if they had any concerns. Only one SIV member contacted GB Energy, as noted below. No further concerns have been raised by SIV members to date.	N/A
		21/01/19	GB Energy responded with thanks to SIV via email and committed to keep SIV updated on its activities and to respond to its members directly. GB Energy's HSE & Regulatory Manager and Stakeholder Engagement Coordinator committed to meet with the CEO soon to update SIV once project timelines become clearer.	GB Energy will continue to provide regular and timely project activity updates.
VRFish - Victorian Recreational Fishing peak body	Victorian recreational fisheries representative	28/11/18	Notice of the community meeting on the 8th of December provided. No response to date.	GB Energy commits to continued consultation and updates. No follow up is required at this stage as GB Energy is aware of the recreational fishing taking place along the coastline.
Mitchelson Fisheries	Fishing company based in Lakes Entrance who work extensively in and	26/11/18	Mitchelson Fisheries requested an overview and detailed information on the project following the circulation of project information via SIV. The company made the request for further information via the 1800 telephone number. GB Energy offered a briefing in Lakes Entrance on the 11th of December.	Project information provided including invitation to community meeting on the 8th of December and a one-on-one briefing, if requested.

	around the activity area	11/12/18	<p>GB Energy attended the Mitchelson Fisheries office in Lakes Entrance to provide project information and answer queries.</p> <p>The principle (Mr Mitchelson) advised that Mitchelson Fisheries is the primary fishing operation for the area.</p> <p>No additional requests for information have been received to date.</p>	Following the meeting, GB Energy provided the coordinates for the Golden Beach-1A wellhead as requested.
South-East Trawl Fishing Industry Association (SETFIA)	Peak industry body representing trawl fishers in SE Australia	19/10/18	GB Energy called SETFIA (Executive Officer) and left a message, requesting a meeting in Lakes Entrance the following week.	N/A
		22/10/18	SETFIA called back to confirm a meeting time and location.	N/A
		24/10/18	<p>Meeting held in Lakes Entrance with the SETFIA Executive Officer. Discussed contracting opportunities with Lakes Entrance operators and SETFIA provided contact numbers. The Executive Officer suggested meeting with SIV to discuss issues regarding scallop, octopus, inshore trawl and purse seine fisheries.</p> <p>GB Energy also sought information on capabilities of local fishing companies to undertake offshore support work.</p>	GB Energy will progress contracting possibilities with local fishers and has consulted with SIV.
		24/10/18	<p>SETFIA sent an email confirming who they represent. Advised Danish seine sub-sector of the SE trawl fishery does operate off Golden Beach and a lobster fisherman operates near the G&G activity area.</p> <p>SETFIA advised that they can provide SMS notice to their eastern fishing vessel list.</p> <p>They also raised questions regarding a future subsea pipeline route and measures to prevent snagging of fishing equipment.</p>	<p>GB Energy will provide more information about the subsea pipeline route and design as the project progresses.</p> <p>GB Energy issued an electronic version of the project flyer and agreed to use SETFIA's SMS service to fishers.</p>
		25/10/18	GB Energy called the CEO to arrange for a meeting in Bairnsdale on the 13th of November.	N/A
		13/11/18	Meeting held in Bairnsdale with SETFIA CEO and Polaris Managing Director. Hardcopies of the project flyer were provided and discussions held on Polaris' offshore capabilities.	GB Energy will investigate opportunities for local marine industry as part of Local Content Plan and will continue regular consultation.
		15/11/18	GB Energy called the Executive Officer about the SMS service to fishermen. GB Energy provided maps, project details and contacts.	N/A

		15/11/18	Email to fishermen sent by SETFIA on behalf of the GB Project. Project information was distributed via SETFIA email to all SEFTIA members.	N/A
		21/11/18	GB Energy called the Executive Officer to discuss notice to members about the information session to be held on the 8th of December. Issued the meeting flyer for SETFIA distribution to its members.	N/A
		26/11/18	SETFIA issued an SMS to all SETFIA members to provide notification of the information session on the 8th of December and added this information to the SETFIA Facebook page.	N/A
		12/12/18	GB Energy met with SETFIA in Lakes Entrance to provide a project briefing. No concerns were raised.	N/A
Lakes Entrance Fishermans Co-Operative Ltd (LEFCOL)	Commercial co-operative of fishers in Lake Entrance	18/10/18	GB Energy called to arrange a meeting with LEFCOL in Lakes Entrance to introduce the project. The LEFCOL MD advised that SETFIA represented their interests in the area and provided the contact details for SETFGIA's Executive Officer. No additional communications to date.	GB Energy will continue to engage via SETFIA.
<i>Nearby titleholders</i>				
Hibiscus Petroleum Ltd	Carnarvon Hibiscus hold a nearby permit (VIC/L31)	26/11/18	GB Energy emailed project information, contact points and an invitation to the information session on the 8th of December. No response provided to date.	No follow up is required at this stage as GB Energy does not envisage any impacts on the nearby permit area from this activity.
Lakes Oil Ltd	Lakes Oil holds nearby permits VIC/P43(V) and Vic/P44(V)	26/11/18	GB Energy emailed project information, E contact points and an invitation to the information session on the 8th of December. No response provided to date.	No follow up is required at this stage as GB Energy does not envisage any impacts on the nearby permit area from this activity.
Esso Australia Resources Pty Ltd (EARPL)	EARPL (an ExxonMobil subsidiary) is the operator of extensive oil and gas facilities In Bass Strait and the Longford Gas Plant	31/10/18	GB Energy visited the Sale office and left hard copies of the project flyers and offered to provide a project briefing. Follow up phone call on the 1st of November and project materials emailed.	GB Energy commits to continued consultation and updates.
		12/11/18	GB Energy called Esso (Sale) to advise of their visit to Sale and offer a project briefing.	N/A
		23/11/18	GB Energy emailed project information, contact points and an invitation to the information session on the 8th of December.	No follow up is required at this stage as GB Energy does not envisage any

			An email response was received, advising that the project information had been sent to Esso's head office in Melbourne.	impacts on the nearby operations from this activity.
Cooper Energy	Cooper Energy is developing the Sole Gas Project	23/11/18	GB Energy called Cooper Energy's IR Manager to discuss the project and provided information via email. Cooper identified its Victorian Environmental Manager to act a focal point between the projects. Cooper emailed to thank GB Energy for the project information and establishing contact for information sharing on Gippsland activities.	GB Energy plans to meet Cooper Energy representatives on the 12th of December.
		12/12/18	GB Energy met with Cooper Energy's Environmental Manager in Lakes Entrance to discuss the project. No concerns were raised.	N/A
Oil spill response organisations				
Gippsland Ports	Local authority responsible for managing Gippsland ports and waterways	28/11/18	GB Energy emailed project information and contact points. No response provided to date.	No follow up is required at this stage as GB Energy is familiar with Gippsland Port's role in oil spill response.
Category 5 - Any other person or organisation that the Titleholder considers relevant				
GipNet – The Gippsland Monitoring Network - CO2CRC	Leading a research initiative in Gippsland, Victoria	26/11/18	GB Energy met with the GipNet Project Manager to discuss the G&G investigations and GipNet's environmental monitoring project.	GB Energy committed to continued consultation and updates.
Gippsland Water Police	Search and rescue, law enforcement	28/11/18	GB Energy issued information flyer via email. Water Police acknowledged provision of information and provided additional contact email. No issues raised.	GB Energy committed to continued consultation and updates.
National Native Title Tribunal (NNTT)	Native title applications, and Indigenous land use agreements (ILUAs)	28/11/18	GB Energy issued information flyer via email. Automatic reply received acknowledging receipt of email, which will be forwarded to the responsible team who will be in contact. No response received to date.	No chase up required at this stage as it is known that there are no Native Title claims extending into the activity area.
Aboriginal Affairs Victoria	Responsible for the implementation of the Aboriginal Heritage Act 2006	28/11/18	GB Energy issued information flyer via email.	No chase up required at this stage as it is known that there are no Aboriginal heritage issues in the activity area.
		29/11/18	Automatic reply received acknowledging receipt of email. No response received to date.	
Gunaikurnai Land and Waters Aboriginal	Prescribed body corporate (PBC) for the	22/10/18	Contact made with GLaWAC's Chief Executive Officer (CEO) for a meeting. Website information provided.	N/A

Corporation (GLaWAC)	Gunaikurnai people and land claim area	24/10/18	GB Energy met with GLaWAC CEO and Lands Manager to provide preliminary project information. GB Energy said they would continue to keep GLaWAC advised of its development activities.	Project background information provided. Commitment made to meet Elders when project plans firm.
		26/11/18	GB Energy issued information flyer via email. Notification provided regarding the community meeting on the 8th of December.	N/A
		26/11/18	CEO thanked GB Energy for notice and advised of a possible meeting with NTCH subcommittee in the new year.	GB Energy committed to continued consultation and updates. A meeting with GLaWAC has been arranged for the 25th of January.
		25/01/19	GB Energy met with GLaWAC's Land Manager and Registered Aboriginal Party Manager in Lakes Entrance to provide copies of the onshore pipeline consultation plan and pipeline route maps. This was followed up with electronic copies of the plan and maps. GLaWAC thanked GB Energy for the update and provided contact details for their legal representatives.	GB Energy will continue to liaise with GLaWAC about the project and impacts on their areas of interest.
East Gippsland Catchment Management Authority (CMA)	Waterways, catchment and flood management	26/11/18	Project information emailed and telephones call made. Notice of community meeting also provided. Messages were left on the main office phone and on the mobile phone for the CMA's Project Manager. No response received to date.	GB Energy committed to continued consultation and updates.
Golden Paradise Beach Ratepayers Association (GPBRA)	Local Ratepayers association for Golden Beach	12/11/18	GB Energy called the GPBRA President and left a message. Email sent on the 8th November with project information and request for meeting 13/14 November.	N/A
		13/11/18	GB Energy received a call from the GPBRA president. A meeting was organised for the 14th of November in Sale.	N/A
		14/11/18	The planned meeting was cancelled by the GPBRA President and an alternative date was suggested by GB Energy. GB Energy agreed to write again to the GPBRA with project information and details of the information session on the 8th of December for circulation to its members.	N/A
		19/11/18	GB Energy issued a letter to GPBRA with information regarding the information session on 8th of December. No response received to date.	N/A

The Gippsland Times newspaper	Gippsland Media	12/11/18	Call to The Gippsland Times Editor seeking a meeting on the 12th of November with the Editor to discuss the GB Project.	N/A
		13/11/18	GB Energy met The Gippsland Times editor for a project briefing, providing project information and a GB Energy media release advising of consultation activities.	N/A
		16/11/18	Front-page article published in The Gippsland Times on the project and December 8 meeting.	Continued regular consultation and updates.
		19/11/18	GB Energy placed an order for an advertisement for Friday 23rd November regarding the information session in Golden Beach on the 8th of December.	N/A
Sale Business and Tourism Association	Sale business and tourism association	31/10/18	Call to the President of the association. Agreed to email project information and to liaise with her to meet with the Board.	N/A
		12/11/18	Email correspondence confirming meeting date and location.	N/A
		13/11/18	GB Energy met with Sale Tourism and Business Association and provided project background, press release and notice of the information session on the 8th of December. Discussions were held regarding local business opportunities.	GB Energy committed to continued consultation and updates.
ABC Radio, Sale	Gippsland Media	4/11/18	ABC Radio (Sale) requested a radio interview with GB Energy via the 1800 phone line.	GB Energy agreed to phone interview.
		6/11/18	ABC Radio was provided with a GB Energy Press Release and they conducted an interview with GB Energy's HSE Manager.	Provided project activity update via phone interview.
		12/11/18	GB Energy called ABC Radio (Sale) called to organise a follow up briefing while in Sale on the 12th and 13th of November. A telephone message was left but no response was forthcoming.	N/A
Bairnsdale Chamber of Commerce and Industry (CCI)	Local business group	1/11/18	GB Energy emailed letter and project information to Bairnsdale CCI President requesting a meeting. No response to date, but GB Energy is preparing to meet with the CCI in mid-December.	N/A
Gippsland Water	Operator of waste water outfall and owner of Dutson Downs	24/10/18	GB Energy contacted Gippsland Water about the outflow sewerage line and pipeline easement across Lake Reeve. Email sent and a meeting organised for 31st of October at Traralgon.	Continued regular consultation and updates.

		26/10/18	Email confirming meeting in Traralgon on 31st of October.	N/A
		31/10/18	GB Energy met with Gippsland Water in Traralgon to discuss the project and GB Energy's interest in the Golden Beach shore crossing and Gippsland Water easement. GB Energy and Gippsland Water would need to consider a joint utilisation of the easement.	Develop Confidentiality Agreement to progress easement and land access. Continued regular consultation and updates.
		11/11/18	Gippsland Water responded requesting the development of a Confidentiality Agreement.	GB Energy is pursuing this opportunity.
		15/01/19	GB Energy met with Gippsland Water in Traralgon where GB Energy was provided with a draft Confidentiality Agreement. This is now being progressed.	GB Energy will continue discussions with Gippsland Water regarding the Confidentiality Agreement.

4 Description of the Existing Environment

The 'environment that may be affected' (EMBA) by this activity is described in this section, together with its values and sensitivities. The 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 vessel/s. The EMBA (Figure 4.1) is therefore defined as:

The extent of low-level hydrocarbon exposure to the sea surface ($1 \mu\text{m}$) and contact to shorelines ($>10\text{-}100 \text{ g/m}^2$) as a result of the loss of 155 m^3 of marine diesel oil over 6 hours from a project vessel within the proposed activity area during annualised metocean conditions.

The key sources of information utilised in developing this section include the:

- EPBC Act Protected Matters Search Tool (PMST) database;
- Victorian Biodiversity Atlas (VBA);
- South-east Marine Region Profile;
- South-east Bioregional Plan;
- Marine Natural Areas Values Study Vol 2: Marine Protected Areas of the Flinders and Twofold Shelf Bioregions;
- National Conservation Values Atlas;
- Victorian Oil Spill Response Atlas (OSRA); and
- Eastern Victorian Ocean Scallop Fishery 2017-18 Abundance Survey.

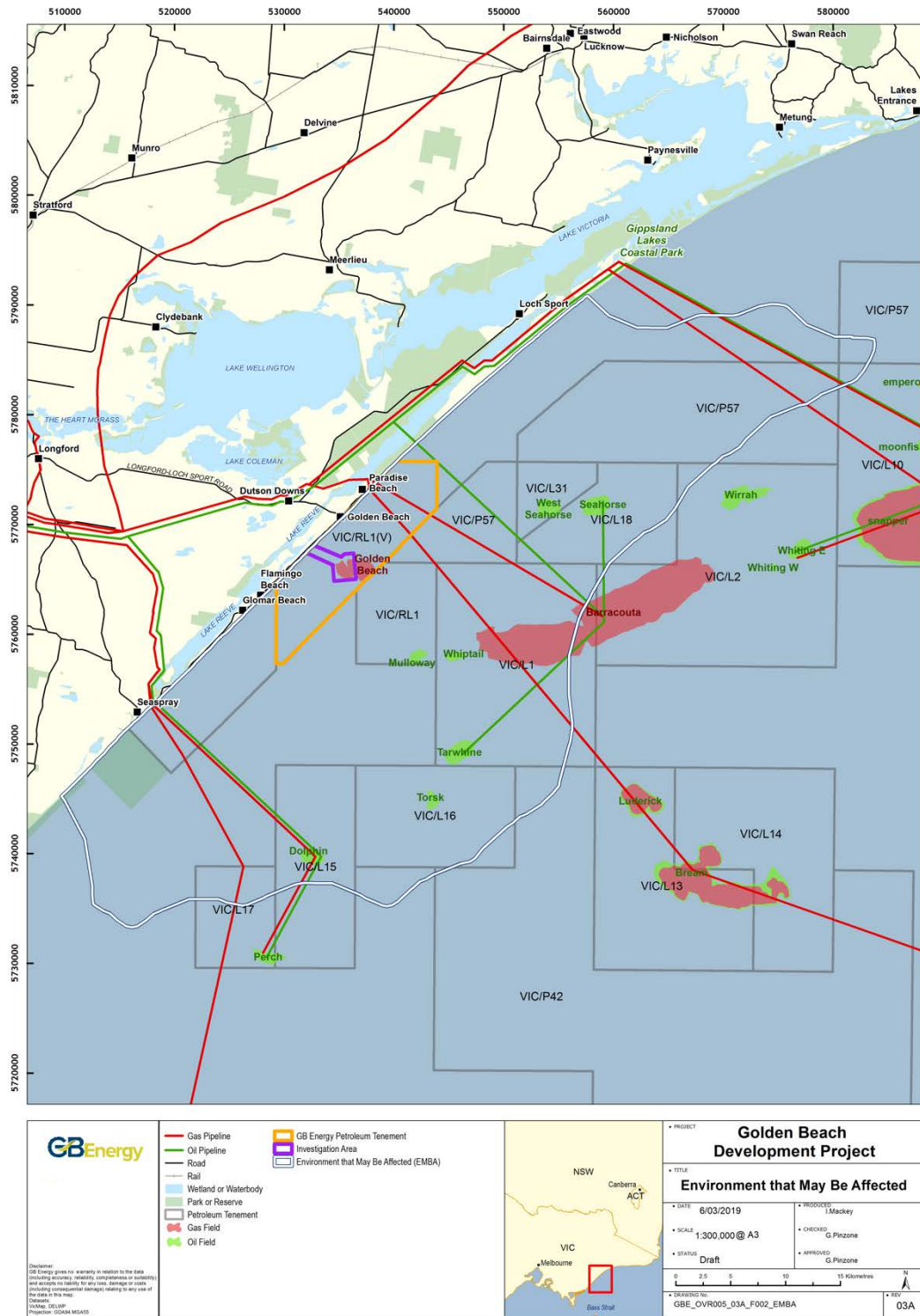


Figure 4.1. The EMBA for the activity area

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	Pipeline route	Patchy
Sponge garden	Patchy	Patchy
Conservation values		
Australian Marine Parks (AMPs)		
World Heritage-listed properties		
National Heritage-listed properties		
Threatened Ecological Communities (TECs)		
Key Ecological Features (KEFs)		Upwelling East of Eden
Nationally Important Wetlands		
Victorian marine protected areas		Ninety Mile Beach
Onshore protected areas		
Biological environment		
Plankton		
Benthic species:		
- commercial scallops	Isolated individuals	No beds that are commercially viable
- rock lobsters	Likely along pipeline route	
Seagrass beds	Isolated & sparse	
Biologically Important Area (BIA) for fish:		
- Great white shark		
BIA for cetaceans:		
- Pygmy blue whale		
- Southern right whale		State waters only
- Humpback whale		
Pinnipeds	Foraging only	Foraging only
Reptiles	Vagrants only	Vagrants only
Seabirds		
Shorebirds		
Marine pests	Possible	Possible
Cultural Heritage Values		
Shipwrecks		
Indigenous heritage		
Socio-economic Environment		

Receptor	Activity area	EMBA
Native Title		
Tourism	Possible game fishing	
Petroleum infrastructure		
Commercial fishing	Shark gillnet/hook (Cth) Ocean access (Vic) Ocean purse seine (Vic)	Shark gillnet/hook (Cth) Trawl (Cth) Rock lobster (Vic) Ocean access (Vic) Ocean purse seine (Vic) Inshore trawl (Vic)
Recreational fishing	Possible game fishing	
Commercial shipping		

Red shading denotes no presence, green shading denotes presence.

4.1 Regional Context

The activity area is located within the Southeast Shelf Transition provincial bioregion within the South-east marine region. The coastline adjacent to the bioregions (as classified at the Commonwealth and state scales) is exposed, with long sandy beaches broken by rocky headlands and numerous coastal lagoons.

4.1.1 Climate

The region's climate is moist cool temperate, with cool wet winters and cool summers. It is influenced by rain bearing cold fronts that move from south-west to north-east across the region, producing strong winds from the west, north-west and south-west. In winter, cold fronts generally create sustained west to south-westerly winds and frequent rainfall in the region. In summer, frontal systems are often more shallow and occur between two ridges of high pressure, bringing more variable winds and rainfall.

Temperature and Rainfall

Average monthly air temperatures at Lakes Entrance (62 km northeast of the activity area, but the closest coastal town with a Bureau of Meteorology [BoM] weather station) range from 14.6°C in July to 23.8°C in February (1965 to 2006). Mean annual rainfall is 713 mm with the rainfall fairly evenly distributed throughout the year, with a mean minimum of 41.5 mm in February and a maximum of 71 mm in November.

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.

4.1.2 Physical Environment

Geomorphology

The activity area overlaps the seafloor 'slope' geomorphic unit, as classified in the South-east Marine Region Profile.

Seabed

Regional

The substrate across Bass Strait comprises a variety of sediment types related to tidal currents, with sediment grain size linked to wave energy, and sediments becoming progressively finer with increasing distance from the shore, consisting of fine, muddy sands in the mid-shelf regions.

Activity Area

The gradient of the activity area is a very flat, ranging from 5 m near the beach to 20 m at its deepest point over a distance of 4.8 km from the coast.

A 2017 marine habitat assessment commissioned by the CarbonNet Project for their Pelican 3D marine seismic survey (which included GB Energy's activity area) indicates that the seabed is dominated by soft sediments (sand).

4.1.3 Oceanography

Water depths

The activity area is located in shallow water in the Gippsland Basin. The bathymetry contours run consistently parallel to the coast across the activity area.

Water Currents

Currents within Bass Strait are primarily driven by tides, winds and density-driven flows. The region is oceanographically complex, with sub-tropical influences from the north and sub-polar influences from the south. There is a slow easterly flow of waters in Bass Strait and a large anti-clockwise circulation.

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. The sea surface temperatures in the area reflect the influence of warmer waters brought into Bass Strait by the EAC.

Salinity

Salinity in the region consistently ranges from 35-36 practical salinity units (psu) throughout the year (based on the World Ocean Atlas database).

Tides

Bass Strait has a reputation for high winds and strong tidal currents. Tidal currents run parallel to the coast and follow a semi-diurnal pattern, with some diurnal inequalities, and speeds generally range from 0.1 to 2.5 m/s. However, strong tidal currents (2 to 2.5 knots) are characteristic of the area.

Waves

Bass Strait is a high-energy environment exposed to frequent storms and significant wave heights, although wave energy in the Twofold Shelf Bioregion is 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) has a discharge point at Delray Beach that extends into nearshore waters about 1.7 km shoreward of the activity area. While no data is publicly available regarding the water quality of this release, it is expected to result in increased turbidity and nutrient levels (particularly nitrogen and phosphorous) within a mixing zone around the discharge point.

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.

4.2 Conservation Values and Sensitivities

4.2.1 Commonwealth Marine Reserves

The Beagle AMP and East Gippsland AMP are located 96 km southwest and 215 km east-southeast respectively of the activity area. Neither of these AMPs are located within the EMBA.

4.2.2 World-Heritage Listed Properties

No properties on the World Heritage List occur within the EMBA.

4.2.3 National Heritage-Listed Places

There are no National Heritage-listed places in Bass Strait.

4.2.4 Wetlands of International Importance

There are no Ramsar wetlands in the EMBA. However, the 'Gippsland Lakes' Ramsar site is located in very close proximity to the shoreline contact points of the EMBA and, as such, is described below. Its boundary, in parts (not those intersected by the EMBA), extends to the high-water mark.

The Gippsland Lakes are separated from the sea by sand dunes and fringed on the seaward side by the Ninety Mile Beach. The Gippsland Lakes form the largest navigable inland waterway in Australia. These features create a distinctive regional landscape of wetlands and flat coastal plains that is of considerable environmental significance in terms of its landforms, vegetation and fauna. The lakes are linked to the sea by an artificial entrance at its eastern end, being Lakes Entrance.

The Gippsland Lakes Ramsar site contains three main habitat types; permanent saline/brackish pools, coastal brackish/saline lagoons and permanent freshwater marshes. A significant quantity of threatened, endangered, vulnerable or rare native fish communities, and mammal, amphibian and plant species exist within these habitats.

Parts of the Lakes system are heavily used for commercial and recreational fisheries and for other water-based recreation, while the immediate hinterland has been developed for agricultural uses and limited residential and tourism purposes.

4.2.5 Threatened Ecological Communities

The nearest Threatened Ecological Community (TEC) to the activity area is the Giant Kelp Marine Forests of South East Australia, mapped as possibly occurring within the nearshore parts of eastern Gippsland, and is protected as a matter of NES under the EPBC Act. Mapping indicates that this TEC does not occur within the activity area or the EMBA.

4.2.6 Commonwealth Heritage-listed Places

No properties on the Commonwealth Heritage List occur within the EMBA.

4.2.7 Key Ecological Features

The EMBA does not intersect the western-most portion of the 'Upwelling East of Eden' Key Ecological Feature (KEF) (located 1.5 km to the east). However, given this close proximity, this KEF is described below.

Dynamic eddies of the EAC cause episodic productivity events when they interact with the continental shelf and headlands. The episodic mixing and nutrient enrichment events drive phytoplankton blooms that are the basis of productive food chains, including zooplankton, copepods, krill and small pelagic fish. The key value of the KEF is therefore its high productivity and aggregations of marine life.

The upwelling is one of two feeding areas for blue whales and humpback whales, known to arrive when significant krill aggregations form. The area is also important for seals, other cetaceans, sharks and seabirds.

4.2.8 Nationally Important Wetlands

Several nationally important wetlands occur along the Victorian coast, although none of these occur within the EMBA.

4.2.9 Victorian Marine Protected Areas

There is one marine protected area located in the EMBA, being the Ninety Mile Beach Marine National Park (MNP), 22 km southwest of the activity area.

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 seastar (*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.

The Ninety Mile Beach MNP supports four distinct marine ecological communities; these being intertidal sandy beach, subtidal sandy sediment, subtidal reef and open waters.

4.2.10 Onshore Protected Areas

There is one onshore protected area in the EMBA, this being the 'Gippsland Lakes Coastal Park'. It is included in the EMBA (and therefore described here) because its boundary, in parts, extends to the high-water mark.

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.

4.3 Coastal Environment

4.3.1 Shoreline Types

The western part of the coastline within the EMBA is dominated by the Ninety Mile Beach, a 90-mile (145 km) long stretch of sandy beach on the seaward side of a narrow, tall, vegetated sand dune system.

Around the Lake Tyers area, the coastline is intermittently interspersed with short sections of mixed sand/shore platforms.

There are no estuaries along the coastline of the EMBA, with the nearest being Merriman Creek (at Seaspray). This is only intermittently open. There are also no offshore islands in the EMBA.

Table 4.2. Coastal sensitivities within the EMBA

Environmental receptor	Ninety Mile Beach West	Ninety Mile Beach East
Shoreline types		
Sandy beach		
Mixed sand beach/shore platform		
Intertidal shore platform		
Nearshore substrates		
Intertidal sand flat		
Subtidal sand flat		
Subtidal low-profile patch reef		
Rocky reef		
Rock platform		
Species presence		
Australian fur seal haul-out sites		
Australian fur seal breeding colony		
New Zealand fur seal colony		
Little penguin colony		
Estuarine fish habitat		
Hooded plover habitat		
Tern nesting sites		
Shorebird roosting sites		
Estuaries/river openings	Merriman Creek	None

* Green shading indicates presence of the receptor, red indicates an absence (as per OSRA mapping).

4.3.2 Intertidal Habitats

Sand is the dominant intertidal substrate within the EMBA, with intertidal shore platforms intermittently found along the coastline much further east (from Cape Conran). Intertidal and subtidal rock reefs are also intermittently found further east along the coastline, appearing just east of the Snowy River estuary. Rocky reef substrates are also found further east of the EMBA, starting just west of Cape Conran.

4.4 Biological Environment

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. The sediment flats are generally devoid of emergent fauna but benthic invertebrates such as polychaetes, bivalves, molluscs and echinoderms are present. There are also a

number of burrowing species that inhabit the soft seabed, including tubeworms, small crustaceans, nematodes and seapens.

Bass Strait

Surveys of benthic invertebrates in Bass Strait 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, suggesting heterogeneous sediments and many microhabitats.
- 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.

A search of the VBA database for the project 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).

Activity Area

A 2017 marine habitat assessment commissioned by the CarbonNet Project (which included GB Energy's activity area) indicated that the seabed is dominated by bare fine sand, with isolated and sparse seagrass beds, isolated sponge gardens and no commercial scallops.

Scallops

Commercial scallops (*Pecten fumatus*) are present throughout Bass Strait, with a distribution along the southeast Australian coast from central NSW, Victoria, SA and Tasmania. They are found partially buried in soft sediment ranging from mud to coarse sand.

VFA data indicates that very little commercial fishing for scallops has been undertaken in the proposed activity area in the last five years.

While the dominance of sandy sediments throughout the activity area and surrounds provides abundant suitable scallop habitat and makes it possible that scallops occur, recent surveys indicate that the presence of commercial scallops is nil to low and commercially viable scallop beds are not present:

- The CarbonNet-commissioned marine habitat assessment observed only one location within the former Pelican 3DMSS area where commercial scallops were present (outside of this activity area), but in very low abundance that would not be considered a commercial bed for fishing purposes.
- The VFA undertook a scallop stock assessment survey in December 2017 and January 2018 (extending from the shoreline out to 20 nm and between Wilsons Promontory in the east and Point Hicks in the west, with a total area of 4,859

km². Of the 148 survey tows in this area, several were undertaken near the proposed activity area (but not within it). The closest intensely towed area, referred to as LE1, resulted in no scallop catches. Twenty-five (25) random tows were undertaken in this area, with a mean density of 27.7 kg/1,000 m² from all tows, or 0.51 individuals per square metre based on non-zero tows.

Southern Rock Lobster

The southern rock lobster (*Jasus edwardsii*) is found on coastal reefs from the south-west coast of WA to the south coast of NSW, including Tasmania and the New Zealand coastline. Southern rock lobsters are found to depths of 150 m. In the Gippsland region, southern rock lobster habitat occurs as patchy, discontinuous low-profile reef running parallel to the coast. It is assumed that the patchy low-profile rocky reef likely to be located within the pipeline investigation section of the activity area provides rock lobster habitat. A search of the VBA database reveals no recordings of benthic species in the EMBA. However, polychaete worms, tube worms, feather stars, sea snails and crabs are all likely to be present.

4.4.2 Flora

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.

4.4.3 Plankton

Plankton is a key component in oceanic food chains and comprises two elements; phytoplankton and zooplankton, as described herein.

Phytoplankton (photosynthetic microalgae) comprise 13 divisions of mainly microscopic algae, including diatoms, dinoflagellates, gold-brown flagellates, green flagellates and cyanobacteria and prochlorophytes. Phytoplankton biomass is greatest at the extremities of Bass Strait (particularly in the northeast) where water is shallow and nutrient levels are high.

Zooplankton is the faunal component of plankton, comprising small crustaceans (such as krill) and fish larvae that feed on zooplankton. Zooplankton includes species that drift with the currents and also those that are motile. More than 170 species of zooplankton have been recorded in eastern and central Bass Strait, with copepods making up approximately half of the species encountered.

It is expected that the suite of plankton species present in and around the activity area will be typical of those expected for temperate coastal waters.

4.4.4 Fish

It is estimated that there are over 500 species of fish found in the waters of Bass Strait, including a number of species of importance to commercial and recreational fisheries. There are 34 fish species (28 of which are seahorses and pipefish) recorded in the EPBC Act PMST as potentially occurring in the activity area (Table 4.3). The threatened and migratory species are described in this section.

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

Table 4.3. EPBC Act-listed fish that may occur in the EMBA

Scientific name	Common name	EPBC Act status			BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species		
Freshwater						
<i>Galaxiella pusilla</i>	Dwarf galaxias	V	-	-	-	AS
<i>Prototroctes maraena</i>	Australian grayling	V	-	-	-	RP, AS
Oceanic						
<i>Carcharodon carcharias</i>	Great white shark	V	Yes	-	B/N	RP, AS
<i>Isurus oxyrinchus</i>	Shortfin mako	-	Yes	-	-	-
<i>Lamna nasus</i>	Porbeagle	-	Yes	-	-	-
<i>Rhincodon typus</i>	Whale shark	V	Yes	-	-	Expired
Pipefish, seahorses and seadragons						
<i>Heraldia nocturna</i>	Upside-down pipefish	-	-	Yes	-	-
<i>Hippocampus abdominalis</i>	Big-belly seahorse	-	-	Yes	-	-
<i>Hippocampus breviceps</i>	Short-head seahorse	-	-	Yes	-	-
<i>Hippocampus minotaur</i>	Bullneck seahorse	-	-	Yes	-	-
<i>Hippocampus whitei</i>	White's seahorse	-	-	Yes	-	-
<i>Histiogamphelus briggsii</i>	Crested pipefish	-	-	Yes	-	-
<i>Histiogamphelus cristatus</i>	Rhino pipefish	-	-	Yes	-	-
<i>Hypselognathus rostratus</i>	Knifesnout pipefish	-	-	Yes	-	-
<i>Kaupus costatus</i>	Deepbody pipefish	-	-	Yes	-	-
<i>Kimblaeus bassensis</i>	Trawl pipefish	-	-	Yes	-	-
<i>Leptoichthys fistularius</i>	Brushtail pipefish	-	-	Yes	-	-
<i>Lissocampus runa</i>	Javelin pipefish	-	-	Yes	-	-

Scientific name	Common name	EPBC Act status			BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species		
<i>Maroubra perserrata</i>	Sawtooth pipefish	-	-	Yes	-	-
<i>Mitotichthys semistriatus</i>	Halfbanded pipefish	-	-	Yes	-	-
<i>Mitotichthys tuckeri</i>	Tucker's Pipefish	-	-	Yes	-	-
<i>Notiocampus ruber</i>	Red pipefish	-	-	Yes	-	-
<i>Phyllopteryx taeniolatus</i>	Common seadragon	-	-	Yes	-	-
<i>Solegnathus robustus</i>	Robust pipehorse	-	-	Yes	-	-
<i>Solegnathus spinosissimus</i>	Spiny pipehorse	-	-	Yes	-	-
<i>Stigmatopora argus</i>	Spotted pipefish	-	-	Yes	-	-
<i>Stigmatopora nigra</i>	Widebody pipefish	-	-	Yes	-	-
<i>Stigmatopora olivacea</i>	A pipefish	-	-	Yes	-	-
<i>Stipecampus cristatus</i>	Ringback pipefish	-	-	Yes	-	-
<i>Syngnathoides biaculeatus</i>	Double-end pipehorse	-	-	Yes	-	-
<i>Urocampus carinirostris</i>	Hairy pipefish	-	-	Yes	-	-
<i>Vanacampus margaritifer</i>	Mother-of-pearl pipefish	-	-	Yes	-	-
<i>Vanacampus phillipi</i>	Port Phillip pipefish	-	-	Yes	-	-
<i>Vanacampus poecilolaemus</i>	Longsnout pipefish	-	-	Yes	-	-

Definitions

<i>Listed threatened species:</i>	A native species listed in Section 178 of the <i>EPBC Act</i> as either extinct, extinct in the wild, critically endangered, endangered, and vulnerable or conservation dependent.
<i>Listed migratory species:</i>	A native species that from time to time is included in the appendices to the Bonn Convention and the annexes of JAMBA, CAMBA and ROKAMBA, as listed in Section 209 of the <i>EPBC Act</i> .
<i>Listed marine species:</i>	As listed in Section 248 of the <i>EPBC Act</i> .

Key

EPBC status (@ October 2018)	V	Vulnerable
	E	Endangered

	CE	Critically endangered
BIA	A	Aggregation
	D	Distribution (i.e., presence only)
	F	Foraging
	M	Migration
Recovery plans (under the EPBC Act 1999)	CA	Conservation Advice
	CMP	Conservation Management Plan
	RP	Recovery Plan
(under the FFG Act 1988)	AS	Action Statement

- The **great white shark** (*Carcharodon carcharias*) (EPBC Act: Vulnerable, FFG Act: Threatened) is widely distributed and located throughout temperate and sub-tropical waters with their known range in Australian waters including all coastal areas except the Northern Territory. Studies of great white sharks indicate that they are largely transient. However, individuals are known to return to feeding grounds on a seasonal basis. Observations of adult sharks are more frequent around fur seal and sea lion colonies, several hundred kilometres from the survey area, with the closest area being Portland (approximately 105 km west of the acquisition area).
- The **porbeagle shark** (*Lamna nasus*) (EPBC Act: Listed Migratory, FFG Act: Not listed) is widely distributed in the southern waters of Australia including Victorian and Tasmanian waters. The species preys on bony fishes and cephalopods, and is an opportunistic hunter that regularly moves up and down in the water column, catching prey in mid-water as well as at the seafloor. It also conducts long-distance seasonal migrations, generally shifting between shallower and deeper water.
- The **Australian grayling** (*Prototroctes maraena*) (EPBC Act: Vulnerable, FFG Act: Threatened) is a dark brown to olive-green fish attaining 19 cm in length. The species typically inhabits the coastal streams of New South Wales, Victoria and Tasmania, migrating between streams and the ocean. Spawning occurs in freshwater from late summer to winter caused by an increase in river flows from seasonal rains. Most of its life is spent in fresh water, with parts of the larval or juvenile stages spent in coastal marine waters (approximately 6 months), though its precise marine habitat requirements remain unknown.
- Habitat suitable to the **dwarf galaxias** (*Galaxiella pusilla*) (EPBC Act: Vulnerable, FFG Act: Threatened) is slow flowing and still, shallow, permanent and temporary freshwater habitats such as swamps, drains and the backwaters of streams and creeks, often (but not always) containing dense aquatic macrophytes and emergent plants. Given the marine nature of this activity, this species will not be encountered.
- Most of the marine ray-finned fish species identified in the EPBC Act PMST are **sygnathiformes** (EPBC Act: Listed marine species, FFG Act: Not listed), which includes seahorses and their relatives (seadragon, pipehorse and pipefish). The majority of these fish species are associated with seagrass meadows, macroalgal seabed habitats, rocky reefs and sponge gardens located in shallow, inshore waters (e.g., protected coastal bays, harbours and jetties) less than 50 m deep. The PMST species profile and threats profiles indicate that the sygnathiforme species listed for the acquisition area are widely distributed throughout southern, south-eastern and south-western Australian waters. The diverse range of ecological niches afforded by the patch reefs across the

activity area would be expected to provide suitable habitat for these listed species, so these species may be present in the activity area.

- The **whale shark** (*Rhincodon typus*) (EPBC Act: Vulnerable, listed migratory, FFG Act: Not listed) is the world's largest fish and one of only three filter-feeding shark species. They have a broad distribution in warm and tropical waters of the world, and in Australia are known only to occur on the west coast of Western Australia, with a feeding aggregation occurring off the Ningaloo Reef between March and July each year. The species is not known to migrate through Bass Strait, and it is highly unlikely to occur within the activity area or the EMBA.
- The **shortfin mako** (*Isurus oxyrinchus*) (EPBC Act: Listed migratory, FFG Act: Not listed) shark is a pelagic species with a circum-global, wide-ranging oceanic distribution in tropical and temperate seas, though the timing of occurrence is not reported. It is widespread in Australian waters, commonly found in water with temperatures greater than 16°C. Populations of the shortfin mako are considered to have undergone a substantial decline globally. These sharks are common by-catch species of commercial fisheries. Due to their widespread distribution in Australian waters, shortfin mako sharks may be encountered in the activity area and EMBA, albeit in low numbers.

4.4.5 Cetaceans

The PMST indicates that eight whale species and six dolphin species may reside within or migrate through the activity area and EMBA (Table 4.4).

A search of the VBA database indicates that the southern right whale, humpback whale, killer whale, common dolphin and bottlenose dolphin have been recorded in the EMBA. These species are captured under the PMST as listed in Table 4.4.

Table 4.4. EPBC Act-listed cetaceans that may occur in the EMBA

Scientific name	Common name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
Whales							
<i>Balaenoptera acutorostrata</i>	Minke whale	-	-	Yes	-	-	-
<i>Balaenoptera borealis</i>	Sei whale	V	Yes	Yes	-	-	CA
<i>Balaenoptera musculus</i>	Blue whale (pygmy)	E	Yes	Yes	T	F	RP, AS
<i>Balaenoptera physalus</i>	Fin whale	V	Yes	Yes	-	-	CA
<i>Caperea marginata</i>	Pygmy right whale	-	Yes	Yes	-	F	-
<i>Eubalaena australis</i>	Southern right whale	E	Yes	Yes	T	M/R	CMP, AS
<i>Megaptera novaeangliae</i>	Humpback whale	V	Yes	Yes	T	-	CA, AS

Scientific name	Common name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
<i>Pseudorca crassidens</i>	False killer whale	-	-	Yes	-	-	-
Dolphins							
<i>Delphinus delphis</i>	Common dolphin	-	-	Yes	-	-	-
<i>Grampus griseus</i>	Risso's dolphin	-	-	Yes	-	-	-
<i>Lagenorhynchus obscurus</i>	Dusky dolphin	-	Yes	Yes	-	-	-
<i>Orcinus orca</i>	Killer whale	-	-	Yes	-	-	-
<i>Tursiops aduncus</i>	Indian Ocean bottlenose dolphin	-	-	Yes	-	-	-
<i>Tursiops truncatus</i>	Bottlenose dolphin	-	-	Yes	-	-	-

Definitions and key as per Table 4.3, except for: FFG Act status (T = threatened)

- The Tasman-Pacific **pygmy blue whale** (*B. musculus. brevicauda*) (EPBC Act: Endangered, listed migratory, FFG Act: Threatened) is the sub-species of blue whale that migrates through Bass Strait, found in waters north of 55°S. A BIA for 'likely foraging' for the pygmy blue whale covers most of Bass Strait, including the activity area, with known foraging areas (abundant food source/annual high use area) occurring off the southwest Victorian coast. Given the intersection of the foraging BIA with the activity area, it is possible that pygmy blue whales may occur in the activity area and the EMBA, though this possibility is low, and sightings would be most likely to occur during autumn.
- **Sei whales** (*Balaenoptera borealis*) (EPBC Act: Vulnerable, listed migratory, FFG Act: Not listed) are considered a cosmopolitan species, ranging from polar to tropical waters, but tend to be found in deeper waters (not often near the coast) than other species of large whales. There are no known mating or calving areas in Australian waters, with the species presumed to breed in low-latitude waters. Based upon the species preference for offshore waters, the absence of a BIA for the species in Australia, and the nearshore location of the activity area, it is considered unlikely that this species occurs within the activity area or the EMBA.
- The **fin whale** (*Balaenoptera physalus*) (EPBC Act: Vulnerable, listed migratory, FFG Act: Not listed) is the second-largest whale species after the blue whale, growing up to 27 m long and weighing up to 70 tonnes. It is a cosmopolitan species and is found from polar to tropical waters (more commonly in temperate waters). There are stranding records of this species

from most Australian states, but they are considered rare in Australian waters, with available information suggesting they are more common in deeper water. Based upon the species preference for offshore waters, the absence of a BIA in Australian waters and the nearshore location of the activity area, it is considered unlikely that this species occurs within the activity area or the EMBA.

- **Pygmy right whales** (*Caperea marginate*) (EPBC Act: Listed migratory, FFG Act: Not listed) are a little-studied baleen whale species found in temperate and sub-Antarctic waters in oceanic and inshore locations. There are few confirmed sightings of pygmy right whales at sea, with few or no records from eastern Victoria and no population estimates available for Australian waters. Based upon the lack of sightings off eastern Victoria, the absence of a BIA in Australian waters and the nearshore location of the activity area, it is considered unlikely that this species occurs within the activity area or the EMBA.
- **Southern right whales** (*Eubalaena australis*) (EPBC Act: Endangered, listed migratory, FFG Act: Threatened) are medium to large black (or less commonly grey-brown) baleen whales. The closest known calving/nursery grounds to the activity area occurs at Logan's Beach off the coast of Warrnambool in southwest Victoria (approximately 430 km west of the activity area) and intermittently at Portland (510 km west of the activity area). Due to the uncertainties associated with the exact migratory paths in eastern Bass Strait, there is a low potential that southern right whales may be encountered through the activity area and EMBA between May and October.
- **Humpback whales** (*Megaptera novaeangliae*) (EPBC Act: Vulnerable, listed migratory, FFG Act: Threatened) are found in Australian offshore and Antarctic waters. They primarily feed on krill in Antarctic waters south of 55°S. The eastern Australian population of humpback whales is referred to as Group E1 by the International Whaling Commission, one of seven distinct breeding stocks in the southern hemisphere. As the activity area and the EMBA represent a core range for humpback whales, there is a likelihood that they may be encountered, particularly during April, May, November and December, though this likelihood is considered low due to their preference for migrating along the edge of the continental shelf.

Dolphins (EPBC Act: Listed marine species)

None of the six dolphin species listed in the PMST are listed as threatened under the EPBC Act or FFG Act. Many dolphins are cosmopolitan species that are generally restricted to continental shelf environments. A brief description of these species is provided below:

- The **common dolphin** (*Delphinus delphis*) is an abundant species, widely distributed from tropical to cool temperate waters, and generally further offshore than the bottlenose, although small groups may venture close to the coast and enter bays and inlets. Stranding statistics indicate that common dolphins are active in Bass Strait at all times of the year, though less so in winter.
- **Risso's dolphin** (*Grampus griseus*) is a widely distributed species found in deep waters of the continental slope and outer shelf from the tropics to temperate regions. This species prefers warm temperate to tropical waters with

depths greater than 1,000 m, although they do sometimes extend their range into cooler latitudes in summer. The lack of resident populations in or near Bass Strait, and the lack of calving areas in Australia indicates there are no critical areas (and no BIA) for the species within the activity area or the EMBA.

- The **dusky dolphin** (*Lagenorhynchus obscurus*) is primarily found from approximately 55°S to 26°S, though sometimes further north associated with cold currents. Only 13 reports of the dusky dolphin have been made in Australia since 1828, and key locations are yet to be identified. No key localities or critical habitats in Australian waters have been identified. Given the lack of sightings in Australian waters, it is unlikely that significant numbers of dusky dolphins would be present in the activity area or EMBA.
- The **killer whale** (*Orcinus orca*) (the largest member of the dolphin family) is thought to be the most cosmopolitan of all cetaceans and appear to be more common in cold, deep waters, though they have often been observed along the continental slope and shelf particularly near seal colonies. The killer whale is widely distributed from polar to equatorial regions and has been recorded in all Australian waters with concentrations around Tasmania. The only recognised key locality in Australia is Macquarie Island and Heard Island in the Southern Ocean. It is possible that killer whales may occur in the EMBA, however given the distance to the nearest seal colonies, the activity area is unlikely to represent an important habitat for this species.
- The **Indian Ocean bottlenose dolphin** (*Tursiops aduncus*) is distributed around the entire Australian mainland, but as the common name suggests, occur mainly in tropical and sub-tropical waters, usually coastal and shallow offshore areas. The species is thought to be common in discreet areas of eastern, northern and Western Australia, though the total population size is not known. No critical habitats are known to occur within the activity area or EMBA.
- The **bottlenose dolphin** (*Tursiops truncatus*) has a worldwide distribution from tropical to temperate waters. While the species is primarily coastal, they are found inshore, on the shelf and open oceans. Most populations are relatively discrete and reside in particular areas, such as individual resident populations in Port Phillip Bay (240 km west of the activity area) and Westernport Bay (180 km west of the activity area). There may be some migration and exchange between the populations, but it is likely that most are local residents.

4.4.6 Pinnipeds

There are two pinniped species recorded under the EPBC Act PMST as potentially occurring within the activity area and EMBA (Table 4.5). These species are not listed as threatened under the FFG Act. The VBA database contains no records for pinnipeds in the EMBA.

Table 4.5. EPBC Act-listed pinnipeds that may occur in the EMBA

Scientific name	Common name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
<i>Arctocephalus forsteri</i>	New Zealand fur-seal	-	-	Yes	-	-	-
<i>Arctocephalus pusillus</i>	Australian fur-seal	-	-	Yes	-	-	-

Definitions and key as per Table 4.3

- **New Zealand fur-seals** (*Arctocephalus forsteri*) (EPBC Act: Listed marine, FFG Act: Not listed) are mostly found in central South Australian waters (Kangaroo Island to South Eyre Peninsula); 77% of their population is found here. 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.
- The **Australian fur-seal** (*Arctocephalus pusillus*) (EPBC Act: Listed marine, FFG Act: Not listed) 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. These areas are not located within the EMBA. There is no BIA for the Australian fur-seal in Bass Strait.

4.4.7 Reptiles

Three species of marine turtle are listed under the EPBC Act as potentially occurring in the activity area and EMBA, as listed in Table 4.6. No BIAs for turtles occur within Bass Strait. EA (2003) reports that the turtles known to occur in Victorian waters are considered to be rare vagrants outside their usual range. No turtles are listed as threatened under the FFG Act 1988 (Vic), except for the leatherback turtle.

Table 4.6. EPBC Act-listed marine reptiles that may occur in the EMBA

Scientific Name	Common Name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
<i>Caretta caretta</i>	Loggerhead turtle	Endangered	Yes	Yes	-	-	Generic RP in place for all marine turtle species, + AS for leather-back turtle
<i>Chelonia mydas</i>	Green turtle	Vulnerable	Yes	Yes	-	-	
<i>Dermochelys coriacea</i>	Leatherback turtle	Endangered	Yes	Yes	T	-	

Definitions and key as per Table 4.3

- The **loggerhead turtle** (*Caretta caretta*) (EPBC Act: Endangered, listed migratory, FFG Act: Not listed) is globally distributed in sub-tropical waters and is rarely seen off the Victorian coast. The main Australian breeding areas for loggerhead turtles are generally confined to southern Queensland and Western Australia. No known loggerhead foraging areas have been identified in Victoria waters although foraging areas have been infrequently identified in waters off South Australia. This species is not expected to be encountered during the survey.
- The **leatherback turtle** (*Dermochelys coriacea*) (EPBC Act: Endangered, listed migratory, FFG Act: Threatened) is a pelagic feeder found in tropical, sub-tropical and temperate waters throughout the world. No major nesting has been recorded in Australia, with isolated nesting recorded in Queensland and the Northern Territory. The waters of the acquisition area do not represent critical habitat for the species and the species is not expected to be encountered during survey activities.
- **Green turtles** (*Chelonia mydas*) (EPBC Act: Vulnerable, listed migratory, FFG Act: Not listed) nest, forage and migrate across tropical northern Australia. There are no known nesting or foraging grounds for green turtles offshore Victoria; they occur only as rare vagrants in these waters. This species is not expected to be encountered during the survey.

4.4.8 Avifauna

Seventy (70) bird species (seabirds and shorebirds) are listed under the EPBC Act as potentially occurring in the activity area and EMBA (Table 4.7). The majority of these are listed as migratory and marine species.

The VBA database records 11 seabirds and 31 shorebirds from the EMBA, with another 140 terrestrial birds also recorded. Seabirds and shorebirds recorded in the VBA that are also recorded under the EPBC Act are listed with an asterisk (*) in Table 4.7.

Table 4.7. EPBC Act-listed bird species that may occur in the EMBA

Scientific Name	Common Name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
True seabirds							
<i>Albatross (18 species)</i>							
<i>Diomedea antipodensis</i>	Antipodean albatross	V	Yes	Yes	-	Foraging	Generic RP in place for all albatross in Australia, + AS for all albatross
<i>Diomedea gibsoni</i>	Gibson's albatross	V	Yes	Yes	-	-	
<i>Diomedea epomophora (sensu stricto)</i>	Southern royal albatross	V	Yes	Yes	T	-	
<i>Diomedea epomophora (sensu stricto)</i>	Southern royal albatross	V	Yes	Yes	T	-	
<i>Diomedea exulans (sensu lato)</i>	Wandering albatross	V	Yes	Yes	T	Foraging	
<i>Diomedea sanfordi</i>	Northern royal albatross	E	Yes	Yes	-	-	
<i>Phoebastria fusca</i>	Sooty albatross	V	Yes	Yes	T	-	
<i>Thalassarche bulleri</i>	Buller's albatross	V	Yes	Yes	T	Foraging	
<i>Thalassarche bulleri platei</i>	Northern Buller's albatross	V	-	-	-	Foraging	
<i>Thalassarche cauta</i>	Shy albatross*	V	Yes	Yes	T	Foraging	
<i>Thalassarche cauta steadi</i>	White-capped albatross	V	Yes	Yes	-	-	
<i>Thalassarche chrysostoma</i>	Grey-headed albatross	E	Yes	Yes	T	-	
<i>Thalassarche eremita</i>	Chatham albatross	E	Yes	Yes	-	-	
<i>Thalassarche impavida</i>	Campbell albatross	V	Yes	Yes	-	Foraging	
<i>Thalassarche melanophris</i>	Black-browed albatross	V	Yes	Yes	-	Foraging	
<i>Thalassarche salvini</i>	Salvin's albatross	V	Yes	Yes	-	-	

Scientific Name	Common Name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
<i>Thalassarche sp. nov.</i>	Pacific albatross	V	Yes	Yes	-	-	
<i>Thalassarche steadi</i>	White-capped albatross	V	Yes	Yes	-	-	
Petrels (5 species)							
<i>Fregatta grallaria</i>	White-bellied storm-petrel	V	-	-	-	-	-
<i>Halobaena caerulea</i>	Blue petrel	V	-	Yes	-	-	-
<i>Macronectes giganteus</i>	Southern giant petrel	E	Yes	Yes	T	-	Generic RP and AS for giant petrels
<i>Macronectes halli</i>	Northern giant petrel	V	Yes	Yes	T	-	
<i>Pterodroma leucoptera</i>	Gould's petrel	E	-	-	-	-	RP
Other seabirds (5 species)							
<i>Ardenna carneipes</i>	Flesh-footed shearwater*	-	Yes	Yes	-	-	-
<i>Catharacta skua</i>	Great skua*	-	-	Yes	-	-	-
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle*	-	-	Yes	T	-	-
<i>Pachyptila turtur subantarctica</i>	Fairy prion (southern)	V	-	-	-	-	CA
<i>Pandion haliaetus</i>	Osprey	-	Yes	Yes	-	-	-
True shorebirds (42 species)							
<i>Actitis hypoleucos</i>	Common sandpiper*	-	Yes	Yes	-	-	-
<i>Ardea alba</i>	Great egret*	-	-	Yes	-	-	-
<i>Ardea ibis</i>	Cattle egret	-	-	Yes	-	-	AS
<i>Arenaria interpres</i>	Ruddy turnstone	-	Yes	Yes	-	-	-
<i>Botaurus poiciloptilus</i>	Australian bittern	E	-	-	T	-	CA
<i>Calidris acuminata</i>	Sharp-tailed sandpiper*	-	Yes	Yes	-	-	-

Scientific Name	Common Name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
<i>Calidris canutus</i>	Red knot*	E	Yes	Yes	-	-	
<i>Calidris ferruginea</i>	Curlew sandpiper*	CE	Yes	Yes	T	-	-
<i>Calidris melanotos</i>	Pectoral sandpiper	-	Yes	Yes	Yes	-	-
<i>Calidris ruficollis</i>	Red-necked stint*	-	Yes	Yes	-	-	-
<i>Charadrius bicinctus</i>	Double-banded plover*	-	-	Yes	-	-	
<i>Charadrius leschenaultii</i>	Greater sand plover	V	Yes	Yes	-	-	CA
<i>Charadrius mongolus</i>	Lesser sand plover	E	Yes	Yes	-	-	CA
<i>Charadrius mongolus</i>	Lesser sand plover	E	Yes	Yes	-	-	CA
<i>Charadrius ruficapillus</i>	Red-capped plover*	-	-	Yes	-	-	-
<i>Gallinago hardwickii</i>	Latham's snipe*	-	Yes	Yes	-	-	-
<i>Gallinago megala</i>	Swinhoe's snipe	-	Yes	Yes	-	-	-
<i>Gallinago stenura</i>	Pin-tailed snipe	-	Yes	Yes	-	-	-
<i>Heteroscelus brevipes</i>	Grey-tattler	-	Yes	Yes	T	-	-
<i>Himantopus himantopus</i>	Black-winged stilt	-	-	Yes	-	-	-
<i>Hirundapus caudacutus</i>	White-throated needletail	-	-	Yes	-	-	-
<i>Lathamus discolor</i>	Swift parrot	CE	-	Yes	-	-	AS
<i>Limosa lapponica bauera</i>	Bar-tailed godwit*	V	Yes	Yes	-	-	-
<i>Limosa lapponica menzbieri</i>	Northern Siberian bar-tailed godwit	CE	Yes	Yes	-	-	-
<i>Limosa limosa</i>	Black-tailed godwit	-	Yes	Yes	-	-	-

Scientific Name	Common Name	EPBC Act status			FFG Act status	BIA within the EMBA?	Recovery Plan in place?
		Listed threatened species	Listed migratory species	Listed marine species			
<i>Neophema chrysogaster</i>	Orange-bellied parrot	CE	-	Yes	T	-	RP, AS
<i>Numenius madagascariensis</i>	Eastern curlew	CE	Yes	Yes	T	-	CA
<i>Numenius minutus</i>	Little curlew	-	Yes	Yes	-	-	-
<i>Numenius phaeopus</i>	Whimbrel	-	Yes	Yes	-	-	-
<i>Philomachus pugnax</i>	Ruff (Reeve)	-	Yes	Yes	-	-	-
<i>Pluvialis fulva</i>	Pacific golden plover	-	Yes	Yes	-	-	-
<i>Pluvialis squatarola</i>	Grey plover*	-	Yes	Yes	-	-	-
<i>Recurvirostra novaehollandiae</i>	Red-necked avocet	-	-	Yes	-	-	-
<i>Rostratula australis</i>	Australian painted snipe	E	-	Yes	T	-	CA
<i>Sterna (Sternula) albifrons</i>	Little tern*	-	Yes	Yes	T	-	AS
<i>Sterna (Sternula) fuscata</i>	Sooty tern	-	-	Yes	-	-	-
<i>Sterna (Sternula) nereis nereis</i>	Australian fairy tern	V	-	-	T	-	CA
<i>Thinornis rubricollis rubricollis</i>	Hooded plover (eastern)*	V	-	Yes	T	-	AS
<i>Tringa glareola</i>	Wood sandpiper	-	Yes	Yes	-	-	-
<i>Tringa nebularia</i>	Common greenshank*	-	Yes	Yes	-	-	-
<i>Tringa stagnatilis</i>	Marsh sandpiper*	-	Yes	Yes	-	-	-
<i>Xenus cinereus</i>	Terek sandpiper	-	Yes	Yes	T	-	-

* Indicates species is also listed in the VBA for the EMBA.

Definitions and key as per Table 4.3

Exclusively Seabirds

- **Albatrosses** (and giant-petrels) (EPBC Act: Endangered & Vulnerable, listed migratory, FFG Act: many listed as threatened) are among the most dispersive and oceanic of all birds, spending more than 95% of their time foraging at sea in search of prey and usually only returning to land (remote islands) to breed. Breeding within Australian territory occurs on the isolated islands of Antarctica and the Southern Ocean, as well as islands off the south coast of Tasmania and Albatross Island off the north-west coast of Tasmania in Bass Strait. The National Conservation Values Atlas indicates that BIAs for foraging exist within various parts of the EMBA for six of the albatross species (black-browed, Buller's, Campbell, Indian yellow-nose, shy and wandering albatross), with foraging taking place throughout all of Bass Strait.
- The five **petrel** species (EPBC Act: Vulnerable and endangered, some listed migratory) listed in Table 4.7 as potentially occurring within the EMBA are widely distributed throughout the southern hemisphere. No breeding colonies or nesting areas for the listed petrel species are located in or near the project area or EMBA. The National Conservation Values Atlas indicates that there are no BIAs for the listed petrel species in or around Bass Strait, with the nearest being that of a foraging BIA for the southern giant petrel (*Macronectes giganteus*), which occurs off the southern NSW coast (outside the EMBA).

Other Seabirds

Other seabirds listed in the PMST that may occur within the activity area and EMBA are described here.

- The **fork-tailed swift** (*Apus pacificus*) is a medium-sized bird has a large global distribution and population and occurs throughout much of Australia. In Victoria, it is widespread but sparsely scattered, and occurs over cliffs, beaches and sometimes well out to sea. As a common species, the fork-tailed swift may occur in the activity area and EMBA from September to April.
- The **great skua** (*Catharacta skua*) is a large migratory seabird distributed throughout all southern Australian waters (though not listed as migratory under the EPBC Act). This species breeds in summer on nested elevated grasslands or sheltered rocky areas on sub-Antarctic islands. Great skuas feed on other seabirds, fish, molluscs and crustaceans, and may be present in the activity area and EMBA (though scarce) during winter.
- The **southern fairy prion** (*Pachyptila turtur subantarctica*) is mainly found offshore. In Australia, it is known to breed only on Macquarie Island (2,030 km southeast of the activity area), and on the nearby Bishop and Clerk islands. As a species, it is unlikely to occur in the EMBA.
- The **white-bellied sea eagle** (*Haliaeetus leucogaster*) is distributed along the coastline in coastal lowlands with breeding from Queensland to Victoria in coastal habitats and terrestrial wetlands in temperate regions. The species is widespread and makes long-distance movements. This species may be present along the adjacent coastline during the activity.
- The **osprey** (*Pandion haliaetus*) is a common, medium-sized raptor that is present around the entire Australian coastline, with the breeding range restricted to the north coast of Australia (including many offshore islands) and

an isolated breeding population in South Australia. Due to their broad habitat, osprey may be present in the activity area and EMBA.

- The **flesh-footed shearwater** (*Puffinus carneipes*) is a trans-equatorial migrant widely distributed across the south-western Pacific during breeding season (early September to early May) and is a common visitor to the waters of the continental shelf/slope and occasionally inshore waters. The species breeds in burrows on sloping ground in coastal forest, scrubland, shrubland or grassland. It is possible this species may overfly the activity area and EMBA.

Shorebirds and Coastal Birds

- The seven EPBC Act-listed **plovers** that may occur within the EMBA (double-banded, greater sand, lesser sand, red-capped, Pacific golden, grey and hooded) are medium to large sized migratory wading birds that have wide-ranging coastal habitats comprising estuaries, bays, mangroves, damp grasslands, sandy beaches, sand dunes, mudflats and lagoons, with roosting also taking place on sand bars and spits. The sandy beaches of the Ninety Mile Beach are recognised habitat for the hooded plovers. 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.
- There are three EPBC Act-listed **tern** species that may occur within the EMBA (fairy, little and sooty). Many of the tern species present along the southern Australian coastline are widespread and occupy beach, wetland, grassland and beach habitats. The National Conservation Values Atlas indicates that the foraging BIA for the fairy tern (*Sterna nereis*) (listed as vulnerable under the EPBC Act and threatened under the FFG Act) occur in and offshore of the gulfs of South Australia. There are two distinct populations of little tern (*S. albifrons*) in Australia, with the south-eastern population being that which occurs within the EMBA. Depending on the final timing of the project, the little tern may occur within the EMBA. The sooty tern (*S. fuscata*), listed as a marine species under the EPBC Act, is widely distributed along the west coast of Western Australia, South Australia and eastern Victoria. There is a paucity of publicly available information on this species, as such, it is not clear whether this species may occur within the EMBA, though the presence of suitable breeding habitats in the EMBA suggests it may be present.
- There are four EPBC Act-listed **sandpiper** species (EPBC Act: Listed migratory, marine) that may occur within the project area and a further three that may occur within the EMBA (wood, marsh, terek, curlew, common, sharp-tailed, pectoral). Up to 3,000 sharp-tailed sandpiper and up to 1,800 curlew sandpiper are known to congregate to feed at the Gippsland Lakes. Sandpipers may be present within the EMBA at the time of the project. Low numbers of four of these sandpipers are recorded in the VBA for the EMBA.
- There are four EPBC-Act listed **snipe** species (EPBC Act: listed as mostly migratory, marine) that may occur within the EMBA (Latham's, Swinhoe's, pin-tailed and Australian painted). There are few if no confirmed records of the pin-tailed and Swinhoe's snipe in Victoria, while the Australian painted snipe is known to occur at Mallacoota Inlet. Snipes may be present within the EMBA during the activity.
- There are three EPBC Act-listed **godwit** species that may occur within the EMBA (bar-tailed, Northern Siberian and black-tailed), with the bar-tailed

godwit also recorded in the VBA (though not listed as threatened under the FFG Act). Godwits are commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit where they forage on intertidal mudflats or sandflats, in soft mud or shallow water and occasionally in shallow estuaries. Godwits may be present within the EMBA during the activity.

- The **orange-bellied parrot** (*Neophema chrysogaster*) (EPBC Act: Critically endangered, FFG Act: Threatened) breeds in Tasmania during summer, migrates north across Bass Strait in autumn and over-winters on the mainland. In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries, or, rarely, saltworks. This species preferred habitat may occur around the Gippsland Lakes area, outside of the EMBA, particularly during winter. As such, this species is unlikely to occur in the EMBA during the activity.
- The **red knot** (*calidris canutus*) (EPBC Act; threatened, listed migratory and marine, FFG Act; endangered) is the only EPBC Act-listed species of knot that may occur within the activity area and EMBA (and is recorded in the VBA). This species has a coastal distribution around the entire Australian coastline when it is present during the southern hemisphere summer (breeding in eastern Siberia in the northern hemisphere summer). Knots may be present within the EMBA during the activity.
- The **swift parrot** (*Lathamus discolor*) (EPBC Act: Critically endangered) is a small parrot that has rapid, agile flight. During summer, it breeds in colonies in blue gum forest of south-east Tasmania. The entire population migrates to the mainland for winter. On the mainland it disperses widely and forages on flowers and psyllid lerps in eucalypts. The birds mostly occur on inland slopes, but occasionally occur on the coast. Given its habitat preferences, this species is unlikely to occur within the EMBA.
- **Little penguins** (*Eudyptula minor*) are not listed under the EPBC Act PMST or the VBA but are described here for their iconic nature. Little penguins are seabirds that don't fly, and are the smallest of the 17 penguin species in the world. They are permanent residents of the coastal and offshore islands of parts of the Victorian and Tasmanian coast and Bass Strait islands, with the South-east Marine Region representing about 60% of the species known breeding population. The nearest BIA for little penguins occurs at Curtis Island (south of Wilson's Promontory, 150 km southwest of the activity area), around Flinders Island (167 km south) and at Phillip Island (181 km west) (all located outside the EMBA). They may forage within the activity area and EMBA.

4.4.9 Marine Pests

The Marine Pests Interactive Map indicates that the ports likely to be used for the activity (either Portland, Geelong, Melbourne or Eden) are known to harbour the following species:

- Northern pacific seastar (*Asterias amurensis*).
- European shore crab (*Carcinus maenas*).
- New Zealand screw shell (*Maoricolpus roseus*).
- European fan worms (*Sabella spallanzanii* and *Euchone* sp).

- Japanese kelp (*Undaria pinnatifida*).
- Asian date mussel (*Musculista senhousia*).
- European shell clam (*Varicorbula gibba*).

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.

4.5 Cultural Heritage Values

4.5.1 Aboriginal Heritage

Aboriginal people have occupied Gippsland for at least 18,000 years and probably for over 40,000 years. The coastline adjacent to the project area is occupied by the Gunaikurnai language group. The Gippsland coastline is of significant Aboriginal cultural heritage significance. Coastal fishing is an important part of Aboriginal culture, with fishing methods including hand gathering, lines, rods and reels, nets, traps and spears. Crustaceans (e.g., rock lobster, crab) and shellfish formed an important part of the diet of Aboriginals living along the coast. There are numerous areas containing Aboriginal shell middens (i.e., the remains of shellfish eaten by Aboriginal people) along the sand dunes of the Gippsland coast. Other archaeological sites present along the Gippsland coast include scar trees and assorted artefact scatters.

4.5.2 Native Title

A search of the National Native Title Tribunal (NNTT) database identifies that there is Native Title Determination registered over much of the coastline adjacent to the project area, this being for the Gunai/Kurnai People (VCD2010/001). There are no Native Title Claims over the activity area or adjacent coastline. There are no Indigenous Land Use Agreements (ILUA) registered by the NNTT along the coastline adjacent to the project area.

4.5.3 Maritime Archaeological Heritage

There are no shipwrecks mapped as occurring in the activity area, or the marine portion of the EMBA. The geophysical investigations will, however, be able to detect any previously unrecorded shipwrecks.

Shipwrecks within the EMBA are stranded on the shoreline, these being:

- *Trinculo* (VHR S680); this wreck is the nearest to the activity area (4 km away).
- *Julius* (VHR S376); and
- *Norfolk* (VHR S493).

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.

The towns of Seaspray and The Honeysuckles are located further southwest on the coastline adjacent to the activity area. Similar to Golden Beach and Paradise Beach, these are essentially tourism-focused towns.

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;
- Eastern Tuna and Billfish Fishery;
- Eastern Skipjack Tuna Fishery;
- Southern Bluefin Tuna Fishery;
- Small Pelagic Fishery (eastern sub-area);
- Southern Squid Jig Fishery; and
- Southern and Eastern Scalefish and Shark (SESS), incorporating:
 - Gillnet and Shark Hook sector
 - South East Trawl sector
 - Scalefish Hook sector

Only the Southern Squid Jig Fishery and the SESS are likely to fish within the activity area or EMBA.

Victorian-managed Fisheries

Only one Victorian-managed commercial fisher operates in the activity area and immediate surrounds, targeting primarily sardines, salmon and mackerel using trawling methods.

The activity area overlaps a small portion (3.0%) of the VFA catch and effort grid cell E39 (Figure 4.2).

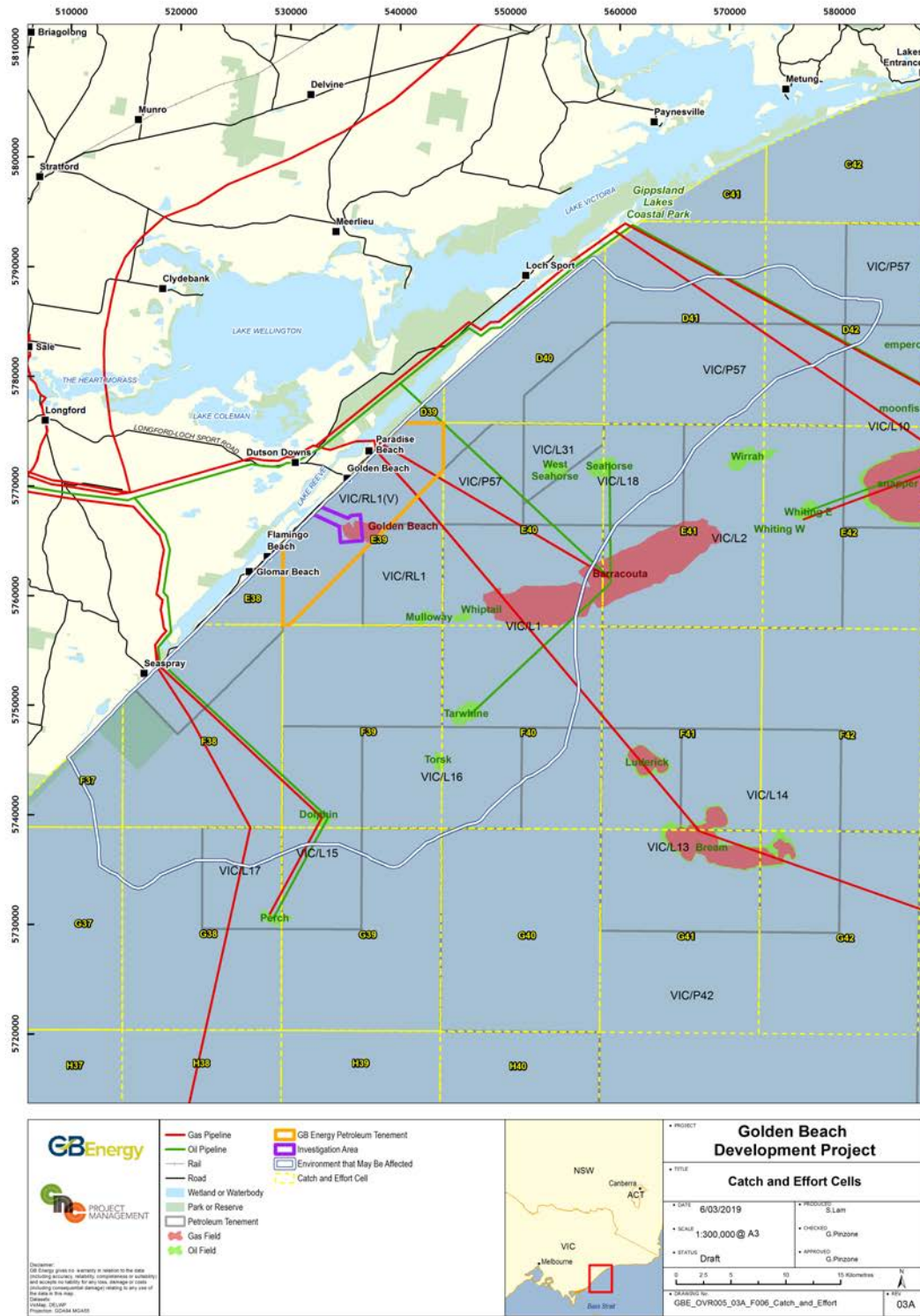


Figure 4.2. VFA catch and effort grid cells overlapped by the activity area and EMBA

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.

Surf fishing occurs along the beaches adjacent to the activity area. The Golden Beach Surf Fishing Competition takes place over the weekend nearest Australia Day and during the Easter long weekend (midnight Good Friday to midnight Easter Sunday) each year between Seaspray and Loch Sport. 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 Australia Day weekend are generally the busiest for recreational fishing.

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. In 2013-14, the tourism industry contributed an estimated \$1.2 billion to the Gippsland economy and employed about 12,400 people, representing 3.7% of the total Gippsland economy.

4.6.5 Petroleum Infrastructure

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

- Bream A to shore pipeline (EARPL) – 5 km northeast;
- Barracouta to shore pipeline (EARPL) – 6.9 km northeast;
- Seaspray to Dolphin to Perch pipeline (EARPL) – located 19 km southwest; and
- TasGas pipeline (Tasmanian Gas Pipeline Pty Ltd) – located 21 km southwest of the activity area.

There are no wells located in the activity area.

4.6.6 Other Infrastructure

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

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.

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.

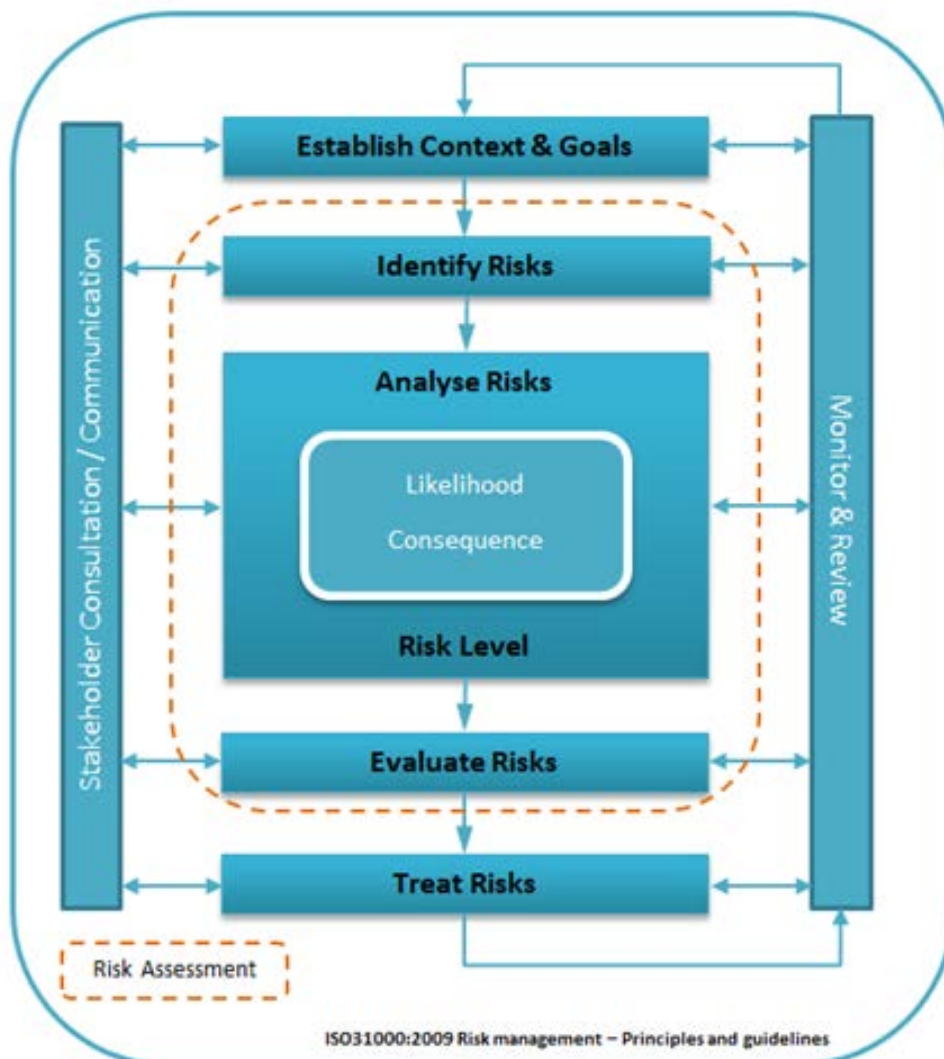


Figure 5.1. Risk management framework

5.2 Risk Management Process

GB Energy's environmental risk management methodology follows the ISO 31000 Risk Management Principles, which consists of the following steps:

- **Identifying** the environmental aspects of the activity (including stakeholders that may be affected by the activity);
- **Analysing** the environmental impacts and risks of the activity;
- **Evaluating** those impacts and risks;
- **Identifying** the treatments that can be incorporated into the activity to ensure the impacts and risks are managed to be as low as reasonably practicable (ALARP) and acceptable; and
- **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 Risk Analysis

Environmental impact is defined in Regulation 6 of the OPGGS as *any change to the environment, whether adverse or beneficial, that wholly or partially results from an activity.*

Risk is defined in Regulation 4 as *the likelihood of a specific undesired event occurring within a specific period or in specified circumstances and with specified consequences.*

As such, the difference between Environmental Impact Assessment (EIA) and Environmental Risk Assessment (ERA) is that EIA is concerned with events that are certain to occur (such as planned discharges to the air or water), while ERA is concerned with events that may occur (such as hydrocarbon spills, introduction of marine pests and loss of waste overboard).

GB Energy has therefore determined that environmental impacts and risks are defined as follows:

- Impacts result from activities that are an inherent part of the activity and will result in a change to the environment or a component of the environment, whether adverse or beneficial. For example, acoustic discharges from the geophysical investigations and disturbance to seabed sediments are impacts on the marine environment that cannot be avoided for the activity to achieve its aims.
- Risks result from activities where a change to the environment or component of the environment may occur as a result of an event associated with the activity (i.e., there may be impacts if the event actually occurs). Risk is a combination of the consequences of an event and the associated likelihood of the event occurring. For example, a hydrocarbon spill may occur if a vessel's fuel tank is punctured by a collision during the activity. The risk of this event is determined by assessing the consequence of the impact (using factors such as the type and volume of fuel and the nature of the receiving environment) and the likelihood of this event happening (which may be determined qualitatively or quantitatively).

5.2.2 Determining Risk Consequence

GB Energy defines consequence as:

The nature of the outcome of an event.

The consequence definitions are provided in Table 5.1.

Determining risk consequence is supported by qualitative and quantitative information:

- Qualitative analysis – uses words to describe the magnitude of potential consequences and the likelihood that those consequences will occur. The GB Energy HSE Risk Model is a qualitative analysis tool. Qualitative assessment may be used as an initial screening activity to identify risks that require more detailed analysis and may take the form of an informal risk assessment (e.g., a task review or a formal risk assessment such as a Job Hazard Analysis (JHA) or Job Safety Analysis (JSA)).
- Quantitative or semi-quantitative risk assessment (QRA or SQRA) – is conducted where more detail is required or where technical or operational complexity exists. SQRA involves assigning values to qualitative scales. QRA uses numerical values rather than descriptive scales and uses modelling based on historical data. SQRA uses a combination of both numerical and qualitative criteria. QRA should be carried out by HSE risk specialists with appropriate experience and competencies.

Table 5.1. Consequence definitions

	Safety <i>(impact to GB Energy or contracting personnel)</i>	Impact on the environment <i>(impact to the physical and ecological environment and cultural heritage)</i>	Financial <i>(loss of revenue, business interruption, commodity trading, asset loss)</i>	Reputation and social <i>(services and community interruption)</i>	Regulation <i>(OHS, environment, industrial relations, trade practices, industry acts)</i>
5. Catastrophic	Multiple fatalities or serious irreversible disability (>30%) to multiple persons.	<ul style="list-style-type: none"> • Effects at the landscape level (hundreds or thousands of square kilometres or hectares). • A very large group of plants or animals affected. Entire habitat type or species population. Several populations of one or more threatened species or habitats experiences mortalities. • Permanent impact (e.g., >50 years) and irreversible. Rehabilitation is unlikely to be successful. Habitat or species is highly unlikely to recolonise. • An extensive hydrocarbon spill (e.g., over 100,000 litres) that requires clean up over weeks or months. • Permanent loss of item/place of international or national cultural heritage significance. 	EBIT <ul style="list-style-type: none"> • Impact, loss or deterioration from expectation greater than \$30m. CASH FLOW <ul style="list-style-type: none"> • Severe cash flow crisis. • Difficult to source funds. • Probable credit rating downgrade. 	<ul style="list-style-type: none"> • State-wide or national interest/outrage beyond the area of operations. • Business or residency is no longer viable. • Permanent exclusion from operations or nuisance that cannot be mitigated. • Community outrage, conflict between neighbours/towns over months to years. 	<ul style="list-style-type: none"> • Very significant fines and prosecutions. • Prolonged multiple litigations and fines.
4. Major	Single fatality or major permanent injury/illness or moderate irreversible disability (<30%) to one or more persons.	<ul style="list-style-type: none"> • Extensive area of effect (hundreds of square kilometres or hectares). • Large group of plants or animals affected. Nearly an entire habitat type or species population affected. One or more populations of a threatened species or habitat experiences injuries or mortalities. 	EBIT <ul style="list-style-type: none"> • Impact, loss or deterioration from expectation >\$3m but <\$30m. CASH FLOW <ul style="list-style-type: none"> • Loss of flexibility and/or increase in cost to source funds. 	<ul style="list-style-type: none"> • Very large community affected (e.g., multiple suburbs/towns or city, entire fishery). • High increased cost of living or business operations (e.g., hundreds of thousands of dollars), high-level/long-term 	<ul style="list-style-type: none"> • Major breach of regulation and significant prosecution including class actions.

	Safety <i>(impact to GB Energy or contracting personnel)</i>	Impact on the environment <i>(impact to the physical and ecological environment and cultural heritage)</i>	Financial <i>(loss of revenue, business interruption, commodity trading, asset loss)</i>	Reputation and social <i>(services and community interruption)</i>	Regulation <i>(OHS, environment, industrial relations, trade practices, industry acts)</i>
		<ul style="list-style-type: none"> • Long-term duration of impact (e.g., 20-50 years), wholly or partially reversible damage. Active rehabilitation required over many years. Habitat or species is unlikely to recolonise. • A very large hydrocarbon spill (e.g., up to 100,000 litres) that requires clean up over weeks. • Damage to item/place of international or national cultural heritage significance that is very difficult to repair or may result in permanent scarring. Permanent impact. 		<p>nuisance. Business or residency unlikely to remain viable. Long-term (e.g., months) exclusion from operations.</p> <ul style="list-style-type: none"> • Community outrage, conflict between neighbours/towns. 	
3. Serious	<p>Serious reversible / temporary injury / illness (e.g., lost time >3 days or hospitalisation or Alternate/Restricted Duties >1 month).</p>	<ul style="list-style-type: none"> • Localised to extensive effect (tens of square kilometres or hectares). • Large group of plants or animals affected. Partial habitat or population loss. A small population of a threatened species is affected. • Long-term duration of impacts (e.g., 10-20 years), reversible damage. Active rehabilitation required over years. Habitat or species is likely to recolonise. • A large hydrocarbon spill (e.g., up to 10,000 litres) that takes several days to clean up. • Serious (e.g., extensive) but repairable damage to item/place of international or national cultural heritage significance. 	<p>EBIT</p> <ul style="list-style-type: none"> • Impact, loss or deterioration from expectation >\$300k but <\$3m. <p>CASH FLOW</p> <ul style="list-style-type: none"> • Material impact to cash flow. 	<ul style="list-style-type: none"> • Large community affected (e.g., town/s of several thousand people, dozens of fisheries licensees). • Moderate increased cost of living or business operations (e.g., tens of thousands of dollars), high-level nuisance. Business or residency may not remain viable. Long-term (e.g., weeks to one month) exclusion from operations. • Noticeable community unrest/tension. 	<ul style="list-style-type: none"> • Serious breach of law/regulation with investigation or report to authority and possible prosecution. • Performance Infringement Notice.

	Safety <i>(impact to GB Energy or contracting personnel)</i>	Impact on the environment <i>(impact to the physical and ecological environment and cultural heritage)</i>	Financial <i>(loss of revenue, business interruption, commodity trading, asset loss)</i>	Reputation and social <i>(services and community interruption)</i>	Regulation <i>(OHS, environment, industrial relations, trade practices, industry acts)</i>
		Repair/restoration may take months or years.			
2. Moderate	Reversible temporary injury/illness (e.g., lost time or hospitalisation or Alternate/Restricted Duties <1 month).	<ul style="list-style-type: none"> Moderately localised extent of effect (<10 square kilometres or hectares). Minor impact on a small to medium sized group of plants or animals. A small number of individuals of a threatened species is affected. Medium-term duration of impact (e.g., 5-10 years), reversible damage. Active rehabilitation may be required over weeks to months. Habitat or species is highly likely to recolonise. A medium-sized hydrocarbon spill (e.g., up to 1,000 litres) that requires clean up over several days. Repairable damage to item/place of state or national cultural heritage significance. Repair/restoration may take weeks or months. 	EBIT <ul style="list-style-type: none"> Impact or loss >\$30k but <\$300k. CASH FLOW <ul style="list-style-type: none"> Impact to project or business unit cash flow. 	<ul style="list-style-type: none"> Small number of people or small community affected (e.g., town of several hundred people, <20 fisheries licensees). Minor increased cost of living or business operations (e.g., thousands of dollars), medium-level nuisance. Short-term (up to several days) exclusion from normal operations. Some community unrest/tension, some locally-based complaints. 	<ul style="list-style-type: none"> Breach of law/regulation or non-compliance. Minor legal issues. Litigation possible.
1. Minor	Injury/illness not requiring Medical Treatment (no lost time, no Alternate/Restricted Duties). - First Aid - Report Only.	<ul style="list-style-type: none"> Localised effect (<1 square kilometre or hectare). Little or no effect on small number of plants or animals or habitat. No threatened species are affected. Short to medium-term duration of impact (e.g., several months to 5 years), reversible damage. No active 	EBIT <ul style="list-style-type: none"> Impact or loss >\$3k but <\$30k. CASH FLOW <ul style="list-style-type: none"> No significant impact. 	<ul style="list-style-type: none"> Up to several individuals affected (e.g., multiple landholders, <5 fishing licensees). Minor increased cost of living or business operations (e.g., hundreds of dollars), low-level nuisance, minimal or no 	<ul style="list-style-type: none"> Local investigation. Minor breach of regulation. On the spot fine or technical non-compliance. Prosecution unlikely.

Safety <i>(impact to GB Energy or contracting personnel)</i>	Impact on the environment <i>(impact to the physical and ecological environment and cultural heritage)</i>	Financial <i>(loss of revenue, business interruption, commodity trading, asset loss)</i>	Reputation and social <i>(services and community interruption)</i>	Regulation <i>(OHS, environment, industrial relations, trade practices, industry acts)</i>	
		rehabilitation likely. Habitat or species will recolonise. <ul style="list-style-type: none"> • A small hydrocarbon spill (e.g., less than 100 litres) that requires no active clean up. • No visible damage to item/place of local, state, national or international cultural heritage significance. 		exclusion from normal operations. <ul style="list-style-type: none"> • No community unrest. 	

5.2.3 Determining Risk Likelihood

GB Energy defines likelihood as:

The chance of occurrence (sometimes per unit in time).

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.

5.2.4 Risk Evaluation

Risks identified through an environmental risk assessment workshop conducted by GB Energy are evaluated by ‘multiplying’ their likelihood and consequence, as per Table 5.3.

Table 5.3. Qualitative risk analysis matrix

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

6 Environmental Impact and Risk Assessment

A summary of the impact and risk rating for each impact identified and assessed during the environmental risk assessment workshop, following appropriate control and mitigation measures, is summarised in Table 6.1 and 6.2.

Table 6.1. Environmental impact and risk rating summary

Known hazards (impacts)		Residual consequence
1	Generation of underwater sound – impacts to biological receptors	
	– plankton	Minor
	– fish (with swim bladders)	Minor
	– fish (without swim bladders)	Minor
	– cetaceans	Minor
	– pinnipeds	Minor
	– avifauna	Minor
	– crustaceans (e.g., southern rock lobster)	Minor
	– molluscs (e.g., commercial scallops)	Minor
	– turtles	Minor
2	Underwater sound – potential disruption to commercial fisheries	
	– southern rock lobster (Vic)	Minor
	– ocean access (Vic)	Minor
	– ocean purse seine (Vic)	Minor
	– SESS (Gillnet and shark hook) (Cth)	Minor
3	Seabed disturbance	Minor
4	Atmospheric emissions	Minor
5	Light emissions	Minor
6	Discharge of sewage and grey water	Minor
7	Discharge of cooling and brine water	Minor
8	Discharge of putrescible waste	Minor
9	Discharge of deck and bilge water	Minor
Potential hazards (risks)		Residual risk
10	Accidental overboard release of hazardous and non-hazardous waste	Low
11	Introduction of invasive marine species	Low
12	Displacement of or interference with third-party vessels – displacement	Low

	– interference	Low
13	Underwater sound interaction with swimmers and divers	Low
14	Vessel strike or entanglement with megafauna – individuals	Low
	– population	Low
15	Diesel spill	Low
Hydrocarbon spill response activities (risks)		Residual risk
16	Surveillance and tracking	Low
17	Protection and deflection – nearshore habitat	Low
	– shoreline habitat	Low
	– fauna disturbance	Low
18	Shoreline assessment and clean-up – shoreline habitat	Low
	– recreational users	Low
	– cultural heritage disturbance	Low
19	Oiled wildlife response – fauna injury	Low
	– fauna death	Low

Table 6.1. Environmental impact and risk assessment for the geophysical and geotechnical investigations

Hazard	Potential impacts & risks	Avoidance, management and mitigation measures (environmental performance standards)	Residual impact or risk
<i>Known hazards (impacts)</i>			Residual consequence rating
Generation of underwater sound from geophysical activities and vessels.	Temporary and localised physiological or pathological impacts to local populations of marine fauna, including plankton, fish, cetaceans, pinnipeds, avifauna, benthic invertebrates and turtles.	<ul style="list-style-type: none"> The EPBC Act Policy Statement 2.1 (Part A, Standard Management Procedures, Section A.3) will be implemented during the geophysical investigations whenever the geophysical equipment is active. This includes: <ul style="list-style-type: none"> Pre-start visual observations out to 3 km for 30 minutes. Soft-starts over a 30-minute period (only required if there is more than a single airgun for the shallow seismic investigation). Reducing power if cetaceans are observed within the 'low power zone' (within 2 km of the sound source). Shutting down the sound source if a cetacean is observed within the shutdown zone (within 500 m of the sound source). Having a trained and experienced Marine Mammal Observer (MMO) onboard the vessel undertaking geophysical investigations to implement the EPBC Act Policy Statement. The SBP and shallow seismic source will not be operated at night-time if there have been three or more shutdowns in the proceeding 24 hours. The MMO inducts key vessel crew into the EPBC Act Policy 2.1 requirements. Cetacean strategy is discussed in the vessel's daily operations meetings during geophysical investigations. Cetacean sightings are reported to the DoEE. Vessel engines and thrusters are well maintained. 	Minor
Potential disruption to fisheries from underwater sound (indirect impact).	Temporary and localised disruption to the sustainability of commercial and recreational fisheries.	<ul style="list-style-type: none"> The location and timing of the activity will be communicated to local marine users, through notifications via AMSA, the Australian Hydrographic Office and via direct communications from GB Energy. The vessels used for the activity will be readily identifiable to other vessels. The activity will not be undertaken concurrently with recreational fishing competitions. 	Minor
Seabed disturbance	Localised turbidity of the water column at the	<ul style="list-style-type: none"> Physical damage to reef habitat will be avoided by specifying that the vessels do not anchor (they will remain on station using dynamic positioning). 	Minor

<p>from geotechnical activities.</p>	<p>seabed, smothering of seabed habitat by borehole cuttings, seabed damage and displacement of a small area of seabed habitat.</p>	<ul style="list-style-type: none"> • Only vessels suitable for work in shallow waters will be contracted. • The vessel crew will adjust the depth of the towfish to keep towed equipment clear of the seabed. • Geotechnical sampling equipment will not be deployed over areas of mapped reef. • Only low toxicity, readily biodegradable and non-bioaccumulating water-based muds and additives will be used during the coring process. • Avoid the loss of towed equipment through using the contractors' quality control/assurance procedures. • Avoid objects being dropped overboard by securely fastening equipment to the vessel decks and ensuring that crane operators are trained and competent in the crane/A-frame handling and transfer procedure. 	
<p>Atmospheric emissions from the vessels.</p>	<p>Decrease in air quality due to gaseous emissions and particulates from diesel combustion and contribution to the incremental build-up of GHG in the atmosphere (influencing climate change).</p>	<ul style="list-style-type: none"> • Combustion systems operate in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) requirements. <ul style="list-style-type: none"> ○ Vessels >400 gross tonnes will have in place a current International Air Pollution Prevention (IAPP) certificate and Ship Energy Efficiency Management Plan (SEEMP). ○ Only marine-grade low sulphur (no greater than 3.5% m/m) diesel will be used. ○ Vessels >400 gross tonnes must ensure that firefighting and refrigeration systems are managed to minimise Ozone Depleting Substances (ODS). • Only a MARPOL VI-approved incinerator is used to incinerate solid combustible waste (e.g., non-putrescible food waste, timber, rags, etc). • All fuel-burning equipment will be maintained in accordance with planned maintenance systems. • Fuel use will be measured, recorded and reported for abnormal consumption so that corrective action can be taken in the event of abnormal (i.e., higher than required) fuel use. 	<p>Minor</p>
<p>Light glow from the vessels.</p>	<p>Attractant to fauna, temporary and localised increase in predation rates on fauna attracted to lights.</p>	<ul style="list-style-type: none"> • Light glow is minimised by managing external vessel lighting in accordance with: <ul style="list-style-type: none"> ○ AMSA Marine Orders Part 30 (Prevention of Collisions). ○ AMSA Marine Orders Part 59 (Offshore Support Vessel Operations). 	<p>Minor</p>

	Reduction in visual amenity for Golden Beach residents and visitors when the vessels are close to the beach.		
Discharge of treated sewage and grey water from the vessels.	Temporary and localised reduction in water quality (up to 50 m horizontally and 10 m vertically from the discharge point).	<ul style="list-style-type: none"> Treated sewage and grey water will only be discharged in Commonwealth waters (>3 nm from shore). Sewage and grey water will be treated in a MARPOL Annex IV-compliance sewage treatment plant prior to discharge. In the event of a sewage treatment plant malfunction, untreated sewage and grey water will only be discharged when > 12 nm from shore (in accordance with MARPOL Annex IV). 	Minor
Discharge of cooling water and reverse osmosis (brine) from the vessels.	Temporary and localised elevation in sea surface water temperature and salinity levels (up to 50 m horizontally and 10 m vertically from the discharge point).	<ul style="list-style-type: none"> Engines and associated equipment that require cooling by water will be maintained in accordance with the vessel maintenance system so that they are operating within accepted parameters. Only low-toxicity chemicals are used in the cooling and brine water systems. 	Minor
Discharge of putrescible waste from the vessels.	Temporary and localised increase in nutrient content of surface and near-surface water quality (up to 100 m horizontally and 10 m vertically from the discharge point). Temporary increase in scavenging behaviour of pelagic fish and seabirds.	<ul style="list-style-type: none"> Putrescible waste discharges will comply with MARPOL Annex V requirements: <ul style="list-style-type: none"> A Garbage Management Plan 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. Food waste will be macerated to <25 mm prior to discharge. Macerated putrescible waste will only be discharged in Commonwealth waters (>3 nm from shore). In the event of macerator malfunction, un-macerated putrescible waste will be discharged when >12 nm from shore. Non-putrescible galley waste will either be incinerated or returned to shore for disposal. 	Minor
Discharge of bilge water	Temporary and localised reduction in	<ul style="list-style-type: none"> Bilge water discharges comply with MARPOL Annex I requirements: <ul style="list-style-type: none"> Vessels >400 gross tonnes: 	Minor

and deck drainage from the vessels.	water quality (up to 100 m horizontally and 10 m vertically from the discharge point).	<ul style="list-style-type: none"> ▪ Will have in place a MARPOL Annex I-compliant oily water separator (OWS) set to limit oil-in-water content to <15 ppm prior to discharge. ▪ The OWS is maintained in accordance with the vessel planned maintenance system (PMS). ▪ The OWS is calibrated in accordance with the PMS to ensure the 15 ppm limit is met. ○ Vessels <400 tonnes: <ul style="list-style-type: none"> ○ All bilge water will be retained onboard for onshore disposal or is treated and discharged as per vessels >400 tonnes. • No whole residual bilge oil is discharged overboard (residual oil from the oily water separator is pumped to tanks and disposed of onshore). • Chemical storage areas will be bunded and drain to the bilge tank. • Portable bunds and/or drip trays are used to collect spills or leaks from equipment that is not contained within a permanently bunded area (non-process areas). • Deck cleaning detergents will be biodegradable. • The vessel crew is competent (i.e., trained) in spill response. • Spill response kits (fully stocked) and scupper plugs or equivalent drainage control measures are readily available to the deck crew and used in the event of a spill to deck to prevent or minimise discharge overboard. • Spills to deck will be cleaned immediately in accordance with the vessel-specific Shipboard Marine Pollution Emergency Plans (SMPEP). 			
<i>Potential hazards (risks)</i>			Residual risk assessment		
			C	L	RR
Accidental overboard release of hazardous and/or non-hazardous waste from the vessels.	Marine pollution (litter and a temporary and localised reduction in water quality). Injury and entanglement of individual animals (such as seabirds and seals) and smothering or	<ul style="list-style-type: none"> • Vessels >100 gross tonnes or certified to carry more than 15 people will have in place and implement a vessel-specific Garbage Management Plan, including measures such as: <ul style="list-style-type: none"> ○ Solid wastes will be bagged and sent ashore for disposal. ○ All waste bins will be secured and covered. ○ Waste streams will be sorted onboard to enable correct onshore disposal and recycling. 	Minor	Unlikely	Low

	pollution of benthic habitats.	<ul style="list-style-type: none"> • Vessel crew and visitors will be inducted into the waste management procedures. • A waste manifest will be maintained. • Solid waste that is accidentally discharged overboard is recovered if reasonably practicable. 			
Introduction of invasive marine species from the vessel hulls and/or ballast water.	<p>Reduction in native marine species diversity and abundance.</p> <p>Displacement of native marine species.</p> <p>Socio-economic impacts on commercial fisheries.</p> <p>Reduction of conservation values of protected areas.</p>	<ul style="list-style-type: none"> • A vessel contractor pre-qualification is undertaken to ensure vessel biofouling and ballast water controls meet these EP requirements. <p><u>Biofouling</u></p> <ul style="list-style-type: none"> • Vessels are managed in accordance with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry. This means: <ul style="list-style-type: none"> ○ 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. • Any vessel >400 gross tonnes carries a current International Anti-fouling System (IAFS) Certificates and is compliant with and Marine Order Part 98 (Anti-fouling Systems). • The Western Australian Department of Fisheries Biofouling Risk Assessment Tool will be completed to calculate a vessel risk status (in the absence of an equivalent [and as a proxy for] Commonwealth- or Victorian-waters risk assessment tool). Only vessels that are not of 'high risk' will be permitted to work on the activity. • Towed/submersible equipment will be cleaned (e.g., fouling is removed) prior to initial use in the activity area. <p><u>Ballast water</u></p> <ul style="list-style-type: none"> • Vessels will fulfil the requirements of the Australian Ballast Water Management Requirements. This includes requirements to: <ul style="list-style-type: none"> ○ Carry a valid Ballast Water Management Plan. ○ Submit a Ballast Water Report (BWR) through the Maritime Arrivals Reporting System (MARS). If intending to discharge internationally-sourced ballast water, submit BWR through MARS at least 12 hours prior to arrival. ○ If intending to discharge Australian-sourced ballast water, seek a low-risk exemption through MARS. 	Minor	Unlikely	Low

		<ul style="list-style-type: none"> ○ Hold a Ballast Water Management Certificate. ○ Ensure all ballast water exchange operations are recorded in a Ballast Water Record System. 			
Displacement of or interference with third-party vessels.	Presence of vessel/s (and towed equipment), damage to or loss of fishing equipment and loss of commercial fish catches.	<ul style="list-style-type: none"> ● GB Energy has undertaken thorough pre-activity consultation with fishing stakeholders to ensure that commercial fishers are aware of the activity operations, timing and safety exclusion zone requirements. ● The AHS will be notified of the activity no less than four weeks prior to the activity commencing to enable the promulgation of Notice to Mariners and AusCoast navigational warnings. ● The activity vessels are readily identifiable to third-party vessels. ● Visual and radar watch is maintained on the bridge of the vessels at all times. ● The Vessel Master and deck officers have a valid SCTW certificate in accordance with AMSA Marine Order 70 (seafarer certification) (or equivalent) to operate radio equipment to warn of potential third-party spatial conflicts. ● The Vessel Masters issue warnings (e.g., radio warning, flares, lights/horns) to third-party vessels approaching the safety exclusion zone in order to prevent a collision with the vessel/s or equipment. ● The tail buoys on the shallow seismic streamers will have flashing lights and radar reflectors so they are visible to other marine users. ● The vessels will display the appropriate lights and day shapes for a vessel with restricted ability to manoeuvre during operations when geophysical and geotechnical equipment is deployed. ● GB Energy will apply to NOPSEMA to enter and work within the Bass Strait ATBA if the vessels are >200 gross tonnes. ● In the event of a collision: <ul style="list-style-type: none"> ○ The Vessel Master will sound the general alarm, manoeuvre the vessel to minimise the effects of the collision and implement all other measures as outlined in the vessel or structure collision procedure (or equivalent). ○ Vessel collisions will be reported to AMSA if that collision has or is likely to affect the safety, operation or seaworthiness of the vessel or involves serious injury to personnel. 	<i>Displace</i> Minor	Unlikely	Low
			<i>Interfere</i> Moderate	Unlikely	Low

Underwater sound interaction with swimmers and divers.	Injury to swimmers/divers.	<ul style="list-style-type: none"> The activity will not take place during the peak tourism period (from Christmas Eve 2018 through to the end of January 2019) so as to minimise interactions with holiday makers. Continued consultation will occur with stakeholders in the lead up to the activity. Vessel Masters will monitor for 'diver below' flags (a white and blue flag, or red flag with white diagonal stripe) in the activity area and surrounds, and liaise with any commercial or recreational vessels in the area to advise them to leave the activity area. Upon visual confirmation of swimmers or 'diver-below' flags in the area where sound is predicted to be >155 dB, the shallow seismic source will be shut down. On notification or visual sighting of a swimmer or diver in acoustic-induced distress, the geophysical source will be shut down immediately. Swimmers or divers in acoustic-induced distress will be rescued and transported to shore for further medical assistance or clearance. 	Moderate	Unlikely	Low
Vessel strike or entanglement with megafauna (e.g., whales, dolphins, seals).	Injury or death of individual animals.	<ul style="list-style-type: none"> The Australian National Guidelines for Whale and Dolphin Watching (2017) will be implemented, which means: <ul style="list-style-type: none"> Caution zone (300 m either side of whales and 150 m either side of dolphins) – vessels must operate at no wake speed in this zone. No approach zone (100 m either side of whales and 50 m either side of dolphins) – vessels should not enter this zone and should not wait in front of the direction of travel or an animal or pod/group. 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. The MMO onboard the geophysical vessel will implement the above-listed guidelines (while crew will implement it on the geotechnical vessel). Vessel crew will complete an environmental induction covering the above-listed requirements for vessel and megafauna interactions. <p><i>Incident response:</i></p> <ul style="list-style-type: none"> Vessel strike causing injury to or death of a cetacean is reported via the online National Ship Strike Database within 72 hours of the incident. 	<i>Individual</i> Minor <i>Population</i> Moderate	Unlikely Remote	Low Low

		<ul style="list-style-type: none"> Entanglement of megafauna in survey streamers is reported to the Whale and Dolphin Emergency Hotline as soon as possible. No attempts to disentangle megafauna should be made by project personnel. 			
Diesel release due to a vessel-to-vessel collision or grounding.	<p>Temporary and localised reduction in water quality.</p> <p>Tainting of commercial fisheries species.</p> <p>Injury and death of species such as seabirds and turtles.</p> <p>Pathological effects on fish larvae and plankton.</p>	<ul style="list-style-type: none"> As per 'displacement of or interference with third-party vessels', plus: <p><i>Preparedness:</i></p> <ul style="list-style-type: none"> No refuelling will take place on location. Use of a shallow draft vessel in water depths <10 m. The vessels have an approved SMPEP (or equivalent appropriate to class) that is implemented in the event of a fuel tank rupture and spill. Vessel crew will be trained in spill response techniques in accordance with the SMPEP and vessel training matrix. Within 4 weeks prior to each vessel contractor commencing the activity, a desktop oil spill response exercise will be conducted to test interfaces between the SMPEP, OPEP, NatPlan and VicPlan. <p><i>Reporting:</i></p> <ul style="list-style-type: none"> GB Energy will report the spill to regulatory authorities within 2 hours of becoming aware of the spill. <p><i>Response:</i></p> <ul style="list-style-type: none"> 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. GB Energy will undertake operational and scientific monitoring in accordance with the OSMP. 	Moderate	Unlikely	Low
Hydrocarbon spill response activities (risks)					
Diesel spill response activities.	<p><u>Spill surveillance and tracking</u> – disturbance to marine and coastal fauna from increased vessel and aerial activity.</p>	<p><i>Preparedness:</i></p> <ul style="list-style-type: none"> Access to operational response capabilities is maintained through the Maritime Emergencies NSR Plan. GB Energy undertakes regular desktop drills to test response capability. 	Minor	Possible	Low

	<p><u>Protection and deflection booming</u> – disturbance to marine and coastal fauna and habitats and to coastal Aboriginal heritage.</p>	<ul style="list-style-type: none"> • GB Energy ensures that regular inspection and testing is undertaken for its oil spill response equipment. • An oil spill-tracking buoy is available and maintained in operational condition on each of the contracted vessels. 	Minor	Remote	Low
	<p><u>Shoreline assessment and clean-up</u> – disturbance to coastal fauna and habitats, Aboriginal cultural heritage, temporary exclusion of the public from beaches, secondary contamination.</p>	<p><i>Response:</i></p> <ul style="list-style-type: none"> • 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. • Visual observations from aircraft are initiated within 12 hours of request (subject to daylight hours). • 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). 	Minor	Unlikely	Low
	<p><u>Oiled wildlife response</u> – distress, injury or death of fauna through inappropriate.</p>	<ul style="list-style-type: none"> • An operational NEBA is prepared to determine the net benefits of each response strategy. • Personnel and equipment resources are deployed to site to undertake responses activities within timeframes outlined in the IAP. 	Minor	Remote	Low

7 Implementation Strategy

GB Energy retains full and ultimate responsibility as the Titleholder of the activity and is responsible for ensuring that the environmental performance standards in the EP are adequately implemented. This section briefly describes how this will be achieved.

7.1 GB HSE Policy

GB Energy is aware of its responsibility to conduct all activities with the goal of achieving best practice HSE performance, to ensure there is no harm to people and that any potential environmental impacts are managed to be as low as reasonably practicable. GB Energy's HSE Policy is provided in Box 7.1 over page.

7.2 Environmental Management Systems

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

The HSEMS 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. The elements of the EMS are briefly described in Table 7.1.

7.3 Training and Awareness

7.3.1 Recruitment and Training

During its contractor selection process, 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, with position descriptions (including a description of HSE responsibilities) for key personnel being readily available.

7.3.2 Environmental Induction

An activity-specific HSE induction for all personnel working on the vessels will be undertaken prior its commencement. The GB Energy Onboard Representative is responsible for ensuring personnel receive this induction prior to the commencement of the activity. The vessel contractors will conduct their own company and vessel-specific inductions independently of the activity-specific HSE induction.

7.3.3 Marine Mammal Observer

Only an appropriately qualified and experienced MMO will be hired. The MMO will provide an information session to the geophysical vessel crew at the start of the geophysical investigations regarding their MMO duties and the communication protocols required to ensure their duties are undertaken efficiently.



Our Health, Safety and Environment (HSE) policy

GB Energy is an independent Australian company focused on the safe and responsible development of domestic gas production and energy infrastructure.

Our aim is to avoid harm to people, society and the environment within which we operate.

At GB Energy we are committed to:

- ✓ Providing a safe and healthy workplace, free of occupational injuries and illness
- ✓ Creating a culture that puts HSE first through leadership and accountability
- ✓ Conducting our business in a way that protects, or enhances, community, safety, local infrastructure and the natural environment
- ✓ Utilising trained, skilled and knowledgeable people who are provided with adequate resources to achieve our HSE objectives
- ✓ Measuring and continually striving to improve our HSE performance
- ✓ As a minimum requirement, complying with all laws and regulations for the protection of our people, society and the environment.

Wherever we are working, GB Energy will strive to achieve its goals through:

- ✓ Identifying hazards associated with our activities and eliminate or, if not possible, manage risk as low as reasonably practicable
- ✓ Setting, monitoring and communicating meaningful performance measures to employees, contractors and stakeholders
- ✓ Actively identifying and implementing opportunities to improve HSE outcomes
- ✓ Providing relevant instruction and training in regards to GB Energy HSE systems
- ✓ Establishing and maintaining appropriate HSE management systems and plans
- ✓ Proactively participating in business, community and government programs to enhance community health and safety, and environmental sustainability
- ✓ Requiring contractors and project partners to manage HSE issues using systems, standards and procedures in accordance with this policy.

In developing and pursuing high standards in HSE performance we value:

- ✓ Recognition and reward of innovation in HSE
- ✓ Forums to communicate HSE processes, initiatives and issues to employees, contractors and the community
- ✓ Leadership and accountability at all levels in the organisation to focus on and promote HSE.

We believe we are all responsible for HSE performance and that all incidents are preventable.

In particular:

- ✓ No business objective will take priority over health, safety and the environment
- ✓ We are all individually accountable and empowered to ensure our actions protect ourselves, fellow workers, the public and the environment
- ✓ Management and supervision provide visible leadership, adequate resources, and ensure workplace standards are implemented and maintained.

As GB Energy's Chief Executive Officer, I am committed to working with our people to ensure that this policy is communicated, understood, accepted and implemented. It will be continually reviewed and updated in response to the company's growth.



Tim Baldwin
Chief Executive Officer
GB Energy

25 September 2018

Table 7.1. Summary of the GB Energy HSEMS

Element	Intent
1. Policies, leadership and accountabilities	GB Energy directors, managers, employees and contractors understand their respective responsibilities, and demonstrate leadership and commitment to the values of the HSE Policy and the performance requirements specified in the HSE Elements. The intent is supported by seven performance requirements.
2. Commitments, legal and other requirements	Relevant legal and other requirements including HSE commitments are identified, understood and applied to all aspects of the organisation's activities and operations. The intent is supported by four performance requirements.
3. Risk management	HSE hazards are identified and risk assessed, controlled and managed to as low as reasonably practicable. The intent is supported by eight performance requirements.
4. Goals and improvement plans	HSE considerations are integrated into the GB Energy business planning process and these plans drive continual improvement in HSE performance. The intent is supported by seven performance requirements.
5. Awareness, behaviour and competence	GB Energy personnel and visitors are appropriately skilled, trained, aware and competent to conduct activities in accordance with the behaviours expected in the HSE Policy and these HSE Elements. The intent is supported by eight performance requirements.
6. Change management	Changes whether planned or unplanned, permanent or temporary or as the result of incremental change are assessed for potential HSE risks and appropriate action is taken to ensure existing performance levels are not compromised. The intent is supported by seven performance requirements.
7. Communication and consultation	Open and consultative communication practices are established with personnel and external stakeholders on HSE matters and encourage participation in HSE performance improvement initiatives. The intent is supported by seven performance requirements.
8. Document control and records management	HSE management system documents and records are controlled, readily available, current and appropriate to ensure compliance with the HSE Policy and these HSE Elements. The intent is supported by four performance requirements.
9. Project design, construction and commissioning	HSE risks and opportunities are considered for all phases of projects including design, construction and commissioning. The intent is supported by six performance requirements.
10. Operations and maintenance	Procedures for the operation, maintenance, inspection, testing and calibration of facilities, equipment and instruments are established and maintained such that activities are carried out in a manner that minimises adverse HSE effects. The intent is supported by seven performance requirements.
11. Suppliers and contractors	Contracted services and purchase, hire or lease of equipment and materials are carried out to minimise adverse HSE consequences and to improve HSE performance. The intent is supported by seven performance requirements.
12. Non-conformances and Incident Investigation and Reporting	Non-conformances and incidents are identified, reported and investigated, with corrective and preventive actions implemented, and learnings shared. The intent is supported by six performance requirements.

Element	Intent
13. Crisis and emergency management	Procedures and resources are established for the identification, preparation and effective response to crisis and emergency situations. The intent is supported by five performance requirements.
14. Monitoring, audit and reviews	HSE performance is monitored, audited and reviewed to ensure the effectiveness of HSE management system towards meeting the requirements of the HSE Policy and these Elements, and to drive continual improvement in HSE performance. The intent is supported by seven performance requirements.

7.4 Environmental Emergencies and Preparedness

In the event of an emergency of any type, the Vessel Master will assume overall onsite command and act as the Emergency Response Coordinator (ERC). All persons aboard the vessels will be required to act under the ERC's directions.

7.4.1 Adverse Weather Protocol

It is the duty of the Vessel Master 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 safeguard his vessel, all personnel onboard and environment. During adverse weather, the Vessel Master is responsible for the following:

- Ensuring the safety of all personnel onboard;
- Monitor all available weather forecasts and predictions;
- Initiating the vessel safety management system, vessel HSE procedures and/or vessel ERP;
- Keeping the GB Energy Onboard Representative fully informed of the prevailing situation and intended action to be taken;
- Assessing and maintaining security, watertight integrity and stability of vessel; and
- Proceeding to identified shelter location(s) as appropriate.

Other appropriate responsibilities shall be taken into consideration as dictated by the situation.

7.4.2 Vessel Emergencies and Oil Spills

Activity-specific emergency response procedures will be included in the vessel contractors' Emergency Response Plan (ERP) (or equivalent). The ERP contains instructions for vessel emergency, medical emergency, search and rescue, reportable incidents, incident notification and emergency contact information.

The activity-specific Oil Pollution Emergency Plan (OPEP) will be implemented (and supplements the vessel-specific SMPEP) in the event of a large-scale hydrocarbon spill that requires response resources beyond those immediately available to the vessels. The activity-specific OPEP details the response actions aimed at minimising the impacts of an MDO spill on sensitive resources.

The Vessel Masters will ensure that all crew on board are fully aware of the vessel-specific requirements and that exercises for vessel-related incidents are conducted.

7.4.3 Emergency Response Training

The readiness and competency of GB Energy (and its oil spill response contractor ORCA) and the vessel contractors to respond to incidents and emergencies will be tested by conducting a desktop emergency response exercise within four (4) weeks prior to each vessel contractor commencing the activity.

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.

Any learnings, findings or recommendations identified as part of the testing exercise will be addressed and incorporated into the relevant emergency response plans and procedures to ensure they remain effective.

7.5 Routine and Incident Recording and Reporting

All breaches of the EP are considered non-compliances. Non-compliances may be identified during an audit, inspection, crew observation or as a consequence of an incident. Detailed routine and incident recording and reporting requirements are outlined in the full EP.

7.6 Monitoring

7.6.1 Field Environmental Monitoring

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

Table 7.2. Summary of the G&G investigations environmental monitoring requirements

Aspect	Monitoring requirement	Frequency
Impacts		
Underwater sound	MMO megafauna visual observations.	Continuous during geophysical operations.
Atmospheric emissions	Fuel consumption.	Tallied at end of activity from daily reports and/or bunker receipts.
Bilge water	Volume of bilge water discharged during the activity.	Noted in Oily Water Logbook.
Muds used for borehole sampling	Chemicals and volumes used in the mud system.	Tallied at end of activity from daily reports.
Risks		
Waste disposal	Weight/volume of wastes sent ashore (including oil sludge, solid/hazardous wastes).	Tallied at end of activity from the activity-specific waste manifest. Garbage Record Book updated during back-loading at port.
Displacement of or interaction with third-party vessels	Continuous bridge watch for (and communications with, as necessary), third-party vessels.	Continuous during activity.

Aspect	Monitoring requirement	Frequency
Underwater sound risks on swimmers and divers	Bridge watch for 'diver below' flags and swimmers	During the shallow seismic investigations.
	Beach patrols.	
Introduction of IMS	Volume and location of ballast water discharges.	As required, noted in the ballast water log.
Vessel strike or entanglement with cetaceans	MMO megafauna observations.	Continuous during geophysical investigations.
	Bridge watch during geotechnical investigations	Continuous during geotechnical investigations.
MDO spill (in the event of)	Operational monitoring in line with the OPEP.	As required.

7.6.2 Auditing, Assurance and Inspections

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

- Environmental performance objectives are being met;
- Potential non-compliances and opportunities for improvement are identified; and
- All environmental monitoring requirements have been met before completing the activity.

The following arrangements will be established to review environmental performance of the activity:

- HSE due diligence pre-activity audit – audit(s) of the vessels will be carried out prior to the activity (and after contract award) to ensure that procedures and equipment for managing routine discharges and emissions are in place to enable compliance with the EP.
- Internal operations inspections – the GB Energy Onboard Representative will continually supervise the activity, ensuring adherence to the environmental controls specified in this EP. Regular inspections using an environmental checklist issued by GB Energy will be completed by the GB Energy Onboard Representative.

7.6.3 Management of Non-compliance

Any non-compliance with the environmental performance standards outlined in this EP will be internally and externally reported and subject to investigation and follow-up action. 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 Vessel Masters and GB Energy Onboard Representative 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 the DJPR (ERR branch) after the completion of the activity.