ASSET ENERGY PTY LTD

BALEEN 2D HR SEISMIC SURVEY

ENVIRONMENT PLAN SUMMARY
Rev 2

Petroleum Exploration Permit 11 (PEP11)
Offshore Sydney Basin
January 2018

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GLOSSARY OF TERMS AND ABBREVIATIONS

AHO	Australian Hydrographic Office
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
AFZ	Australian Fishing Zone
AMFA	Australian Fisheries Management Authority
AMSA	Australian Maritime Safety Authority
Anthropogenic	Produced or caused by human activity
BHP	Break Horse Power
CTS	Commonwealth Trawl Sector
cu in	Cubic Inch
DAWR	Department of Agriculture and Water Resources
DGPS	Differential Global Positioning Service
DOtE	Department of the Environment
DSEWPaC	The Department of Sustainability, Environment, Water, Population and Communities
EAC	East Australia Current
EP	Environmental Plan
EPBC	Environment Protection and Biodiversity Conservation
EPBC ACT	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecologically Sustainable Development
ETBF	Eastern Tuna and Billfish Fishery
FAD	Fish Attraction Device
GMP	Garbage management plan
GRB	Garbage record book
HAZID	Hazard Identification
HP	Horse Power
IEEM	Institute of Ecology and Environmental Management
IMO	International Maritime Organisation
IMS	Integrated Management System
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973 and 1978
MGO	Marine Gas Oil
MV	Motor Vessel
NES	National Environmental Significance
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NM	Nautical Miles
NMP	Ningaloo Marine Park
NSW	New South Wales
OCS	Offshore Constitutional Settlement
OIC	Officer in charge
OIW	Oil in Water
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2009
OPRC	International Convention on Oil Pollution Preparedness, Response and Cooperation 1990
OTLF	Ocean Trap and Line Fishery
PEP	Petroleum Exploration Permit
PSI	Pounds Per Square Inch
PSU	Practical Salinity Units
QA	Quality Assurance
QC	Quality Control
RAM	Risk Analysis Matrix
SOPEP	Shipboard Oil Pollution Emergency Plan
SESSF	South East Shark and Scalefish Fishery
SETFIA	South East Trawl Fishing Association
SST	Sea Surface Temperature
SWL	Safe Working Load
TACC	Total Allowable Commercial Catch
WGS84	World Geodetic System 1984

1 INTRODUCTION

1.1 Background

Asset Energy Pty Ltd, as the Titleholder, proposes to undertake a high resolution two-dimensional (2D) seismic survey located in PEP -11 offshore Commonwealth waters, New South Wales (NSW). The survey will be predominantly undertaken within an area of 12.25 square kilometres (km^2) plus a single 2D tie line, to the surface location of the exploration well: New Seaclem-1, of ~50km length. The duration of the survey is between 3 to 4 days and will be undertaken using a purpose-built survey vessel equipped with the necessary hardware to conduct a seismic acquisition survey. For the purposes of this Environment Plan, it is assumed that the survey vessel will be the *Pacific Conquest* (IMO 8600741).

Seismic and drilling operations have previously been undertaken by Asset Energy in PEP-11 in the vicinity of the proposed survey area, the most recent offshore drilling campaign was in 2010. The purpose of this 2018 campaign is to further the understanding of the shallow sub-surface geology and the potential drilling hazards over a prospect in the area of interest through the acquisition of high resolution geophysical data (high-resolution 2D seismic survey).

1.2 EP Nominated Liaison Person

Asset Energy's contact details and nominated contact person (with respect to this EP Summary) are as follows:

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2 ACTIVITY DESCRIPTION

2.1 Location

The seismic survey will be located entirely within Permit Area PEP-11 – offshore Sydney Basin (Figure 2.1), NSW. The larger permit area PEP-11 covers approximately 4,568 km^2 and extends approximately 120 km from Sydney to Newcastle with an average width of 50 km (Australia, 2014). Water depths in the area of interest are expected to range between 125 and 145 m.

2.2 Operational Area

Approximate coordinates and location for the operational area of the 2D seismic site survey can be found in Table 2-1 and Figure 2-1, respectively. The operational area covers approximately 460km^2. The high resolution survey area (Figure 2-2) lies within this operational area and predominantly occurs within a grid of 12.25 km^2 (see Section 2.4).

Table 2-1 Coordinates of the Proposed Survey Operational Area (Degrees, Minutes, Seconds GDA94)

Survey Area	Easting	Northing	Latitude (Approximate)	Longitude (Approximate)
North Point	398720	6331244	33° 09’ 10.22” S	151°54’50.28” E
East Point	401048	6328632	33° 10’ 35.80” S	151°56’19.11” E
South Point	398436	6326305	33°11’50.51” S	151° 54’37.33” E
West Point	396107	6328916	33°10’24.92” S	151°53’08.50” E
New Seaclem-1	441441	6356247	32°55’49.70” S	152°22’ 25.08” E

Coordinate system: GDA1994 UTM Grid Zone 56 Southern Hemisphere

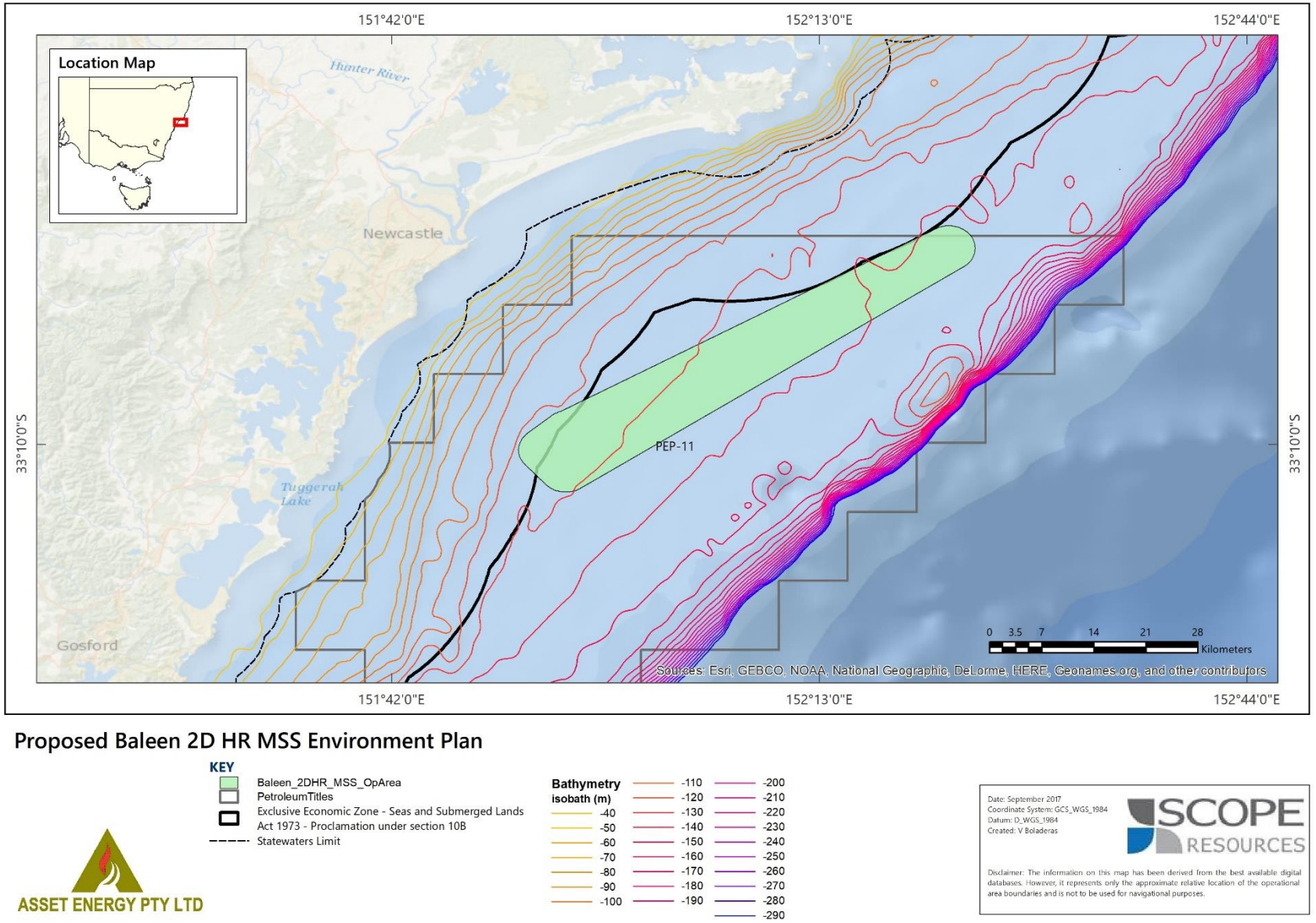


Figure 2-1 Two-dimensional marine seismic survey operational area for Baleen EP

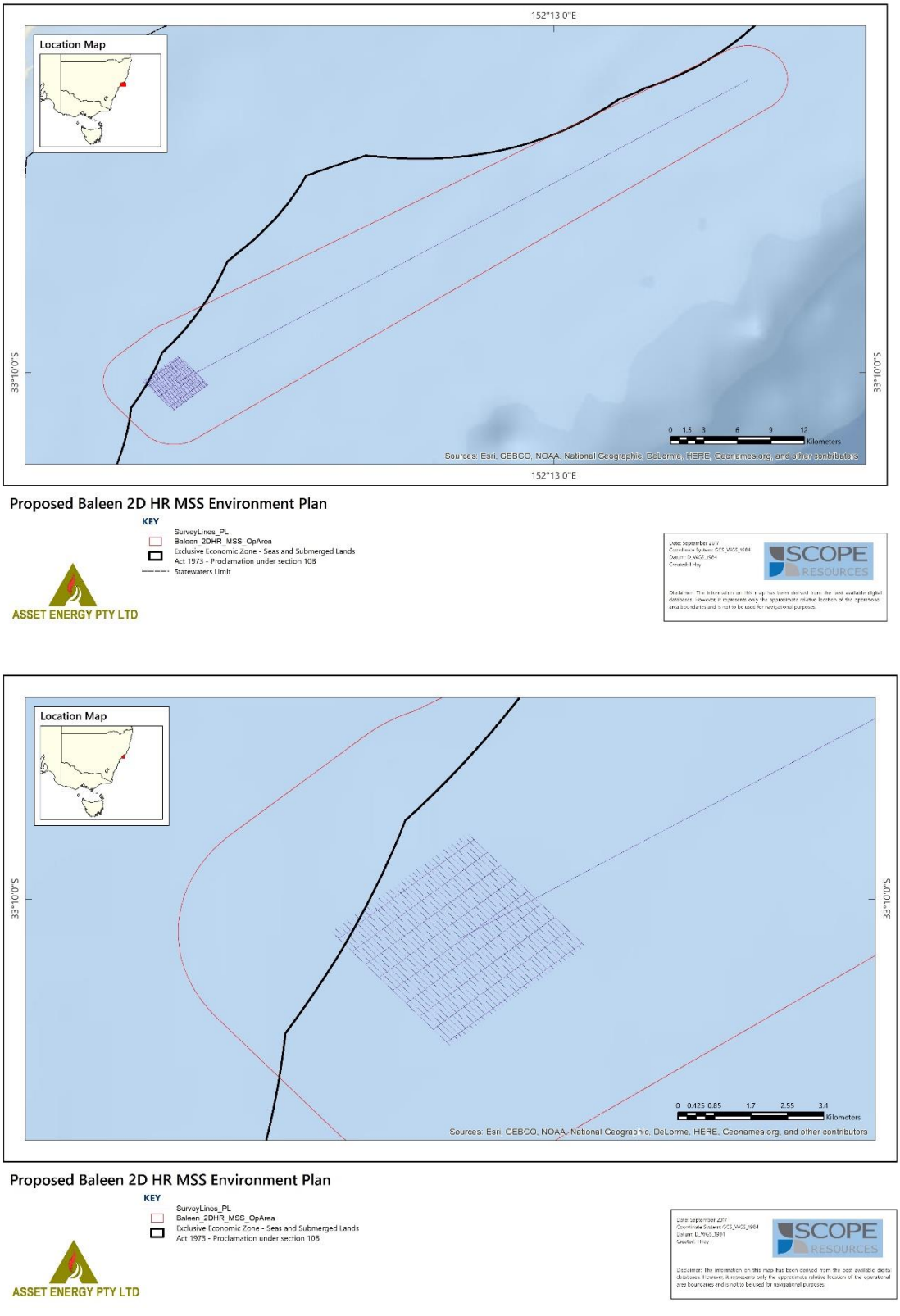


Figure 2-2 Survey Area and Proposed Line Plan

2.3 Schedule

The seismic survey will operate on a 24-hour basis for three to four days and will be undertaken between 15 March and 31 May 2018, excluding the period 23 March to 8 April surrounding Easter.

2.4 Description of Activity

The seismic survey will consist of a series of survey lines designed in a grid to be surveyed following conventional geophysical techniques. One seismic cable (streamer) containing a series of hydrophones will be towed behind the vessel together with only a single sound source (one airgun).

The survey is a total of 208 km acquired on a grid comprised of:

- 36 survey lines orientated in a north-west / south-east direction, with a line spacing of 100m,
- 9 survey lines oriented in a north-east / south-west direction, with a line spacing of 400m, and
- 1 survey line oriented in a north-east / south-west direction to tie the high resolution survey area to the New Seaclem-1 (2010) well location.

The high resolution survey area predominantly occurs within a grid of 12.25 km^2. A single acoustic source will be used, firing every 6.25 m and will not be fired during the line turns, but will be kept at pressure ready to conduct the required soft start at the commencement of each line. When running lines, the vessel will sail at a speed of 3–4 knots. It is estimated that each survey line will take approximately 1 hour to complete (including line turns). Source configuration (Figure 2-3) will comprise the following:

- 1 x 90 cubic inch acoustic source
- 1 x Streamer containing hydrophones (900m in length, detailed below)
- 1 x Tailbuoy

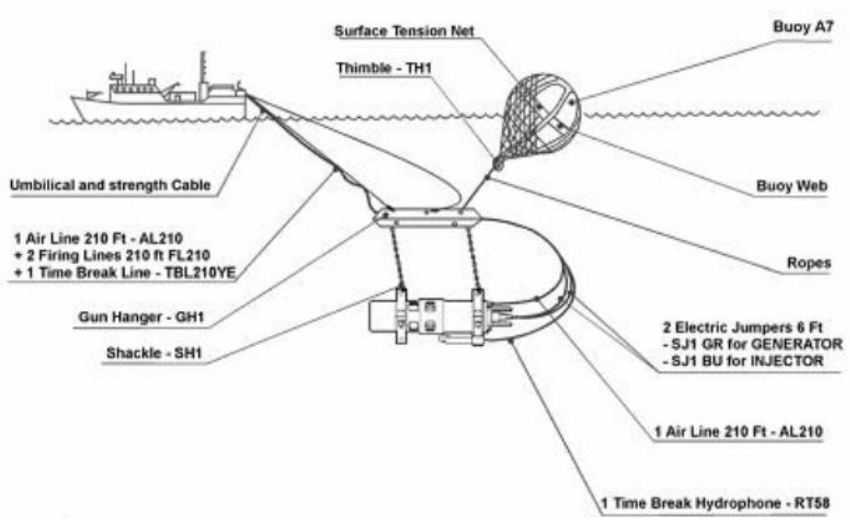


Figure 2-3 2D Source Configuration, *Pacific Conquest*

The vessel will mobilise and demobilise all survey personnel, equipment and stores in port (Newcastle), including refuelling. No refuelling or transfer of personnel or stores will take place at sea.

2.4.1 *Airgun*

The single airgun is towed by an umbilical line which is usually around 30m in length from the stern of the vessel. The gun is attached to a gun hanger by chains of a fixed length and the hanger is attached by ropes to a buoy. 2D data will be acquired using a single source / streamer configuration due to the requirements of acquiring high resolution, shallow information below the seabed in the area of interest. The configuration of the proposed survey is described below:

- 1 x 90 cubic inch acoustic source
- High pressure air fed to the airguns is expected to be at a pressure of 2000psi.
- The firing interval will be every three to four seconds, which translates to shots being repeated approximately every 6.25 m along pre-selected traverses.

2.4.2 *Seismic Streamer (Hydrophones)*

The depth that the streamer operates at is 3 m. The depth of the streamer is controlled by units called ‘birds’, to an accuracy of +/- 1m (OGP, 2011)(OGP, 2011). One streamer of 900 m in length with a group spacing of 6.25 m and shot point of 6.25 m will be towed from the survey vessel.

2.4.3 *Tailbuoy*

The tailbuoy is located at the rear of a streamer and will have a white flashing light.

2.4.4 *Vessel Information*

The survey will be undertaken by the survey vessel *Pacific Conquest*. *Pacific Conquest* is owned by East Coast Maritime.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 Regional Setting

The Baleen Operational Area overlaps sections of the Temperate East Marine Region, which includes all Commonwealth waters from the eastern side of Cape York to just north of the NSW–Victoria border. It runs parallel to the coast and includes an elongate area of continental shelf ranging in width from 10–60 km. The deepest point in the provincial bioregion is 240 m (DSEWPaC, 2012):

The Operational Area is located within the Commonwealth waters of the Central Eastern Shelf Province and overlaps sections of the Temperate East Marine Region. The area to be surveyed lies approximately 20 km off the coast, ~70 km north-east of Sydney, and ~30 km south-east of Newcastle, offshore of the central coast region of NSW. A series of small terraces run parallel to the shoreline at the shelf edge and covers over 15% of the Central Eastern Shelf Province area, which is further characterised by the following biophysical features:

- The East Australian Current (EAC) is the dominant oceanographic influence on ecosystems in the Region. The East Australian Current's movement along and away from the shelf causes upwelling of nutrient-rich, cool water onto the shelf, resulting in phytoplankton growth and increased primary production.
- There is a tropical/temperate transition in the marine invertebrates found in the Region that is most evident on the continental shelf and becomes less distinct in deeper waters off the shelf.
- Geomorphology and sediment types are the primary determinates of the distribution of benthic organisms. Pelagic (ocean-going) species distribution is more closely linked with variations in water masses.
- The presence of internationally significant migratory routes, resident populations, breeding and feeding grounds for a number of EPBC Act listed threatened and migratory species; including humpback whales (*Balaenoptera musculus*), marine turtles, seabirds and migratory shorebirds.

3.2 Key Ecological Features

The Operational Area does not overlap Key Ecological Features (KEF), which are elements of the Commonwealth marine environment with regional importance for either the region's biodiversity or ecosystem function and integrity (DSEWPaC, 2012). However, of the eight KEFs identified in the Temperate East Marine Region, the closest KEFs to the Baleen operational area include (Figure 3-1; Table 3-1):

1. Shelf rocky reefs (>30 km away)
2. Canyons on the eastern continental slope (>34 km away)
3. Tasman Front and eddy field (>40 km away).

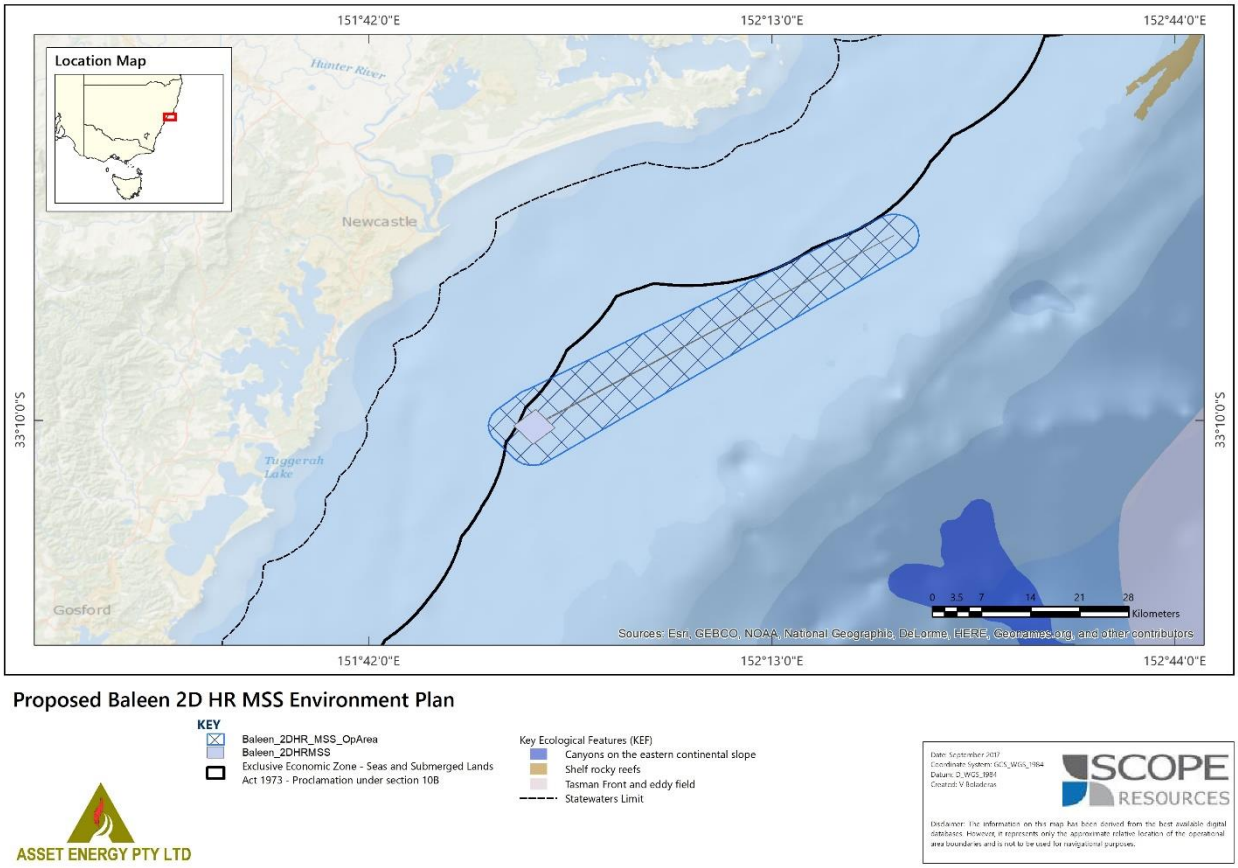


Figure 3-1 KEFs in the vicinity of the Baleen 2D HR Seismic Survey operational area

Table 3-1 Summary of KEFs in the vicinity of the Baleen 2D HR Seismic Survey operational area

KEF	Distance from Operational Area	Values	Description	Environmental Concerns
Shelf rocky reefs	>30 km away	Unique sea-floor feature with ecological properties of regional significance	Along the continental shelf south of the Great Barrier Reef, communities associated with the shift from algae-dominated sea-floor communities to those dominated by attached invertebrates (including large sponges, moss animals and soft corals). This shift generally occurs at a depth of 45 m. These invertebrates create a complex habitat that supports a multitude of animals including crabs, snails, worms and starfish. The habitats also contain a diverse assemblage of bottom-dwelling fishes that show distinct patterns of association with shelf-reef habitats.	• Potential concerns include bycatch and extraction of living resources, physical habitat modification, climate change and marine debris. • Noise impacts were not identified as an environmental concern.
Canyons on the eastern continental slope	>34 km away	Unique sea‑floor feature with ecological properties of regional significance	Canyon systems have a marked influence on the diversity and abundance of species, driven by the combined effects of steep and rugged topography, ocean currents, sea-floor types and nutrient availability. They significantly contribute to the overall habitat diversity of the sea floor, by providing hard surfaces in depth zones where soft sediment habitats prevail. Large benthic animals such as sponges and feather stars are abundant, with particularly high diversity found in the upper slope regions (150–700 m). Canyons also create localised changes in productivity in the water column above them, providing feeding opportunities for a range of species, many of which are commercially important or threatened.	• Potential concerns include bycatch and extraction of living resources, physical habitat modification, climate change, marine debris and oil and chemical pollution/contaminants (shipping). • Noise impacts were not identified as an environmental concern.
Tasman Front and eddy field	>40 km away	High productivity; aggregations of marine life; biodiversity and endemism	The Tasman Front is a region of intermediate productivity that separates the warm, nutrient-poor waters of the Coral Sea from the cold, nutrient-rich waters of the Tasman Sea. The front is located between 27º S and 33º S, moving north during winter and south in summer. It is associated with warm-core eddies, a number of which are semi-permanent features.	• Potential concerns include bycatch and extraction of living resources, climate change, marine debris and shipping-related oil and chemical pollution/contaminants. • Noise impacts were not identified as an environmental concern.

*Source: DSEWPaC, 2012

3.3 Physical Environment

3.3.1 *Climate, Meteorology and Oceanographic Currents*

The region has a temperate climate with air temperatures ranging from 17-25°C in summer and 9-17°C in winter. The dominant wind direction varies with season; moderate westerlies (7-10 knots) predominant in the winter months, with moderate easterlies (8-12 knots) over the summer.

The oceanic currents of the study area are dominated by the influence of the East Australian Current (EAC), the main western boundary current in the south-west Pacific and the largest ocean current close to the coast of Australia.

The EAC starts off Queensland and forms a distinctive core boundary current off NSW (Hayes, 2005). Within the central part of the core EAC region (~25-30°S), the current at the surface averages ~ 1ms^{-1}.

The current strength weakens with depth, but its effects extend down several thousand metres. The EAC generates a series of meandering eddies, resulting in shelf-edge effects and advection of nutrient-rich water onto the continental shelf and associated reef systems (Longhurst, 2007).

The current is strongest in summer, peaking in February, and weakest (by as much as half the flow) in winter (Hayes, 2005). Surface current velocity and direction at the operational area is variable, and is affected by prevailing winds, ranging from 0.5 – 1ms^{-1} on average.

Average sea surface temperature (SST) ranges from 18-23°C depending on season. Near seabed temperatures average 16-17°C at 150m (CSIRO, 1996).

3.3.2 *Bathymetry and seabed features*

The survey area is located on the NSW Continental Shelf region. Surveys of the south-eastern shelf have characterised the region as dominated by sediment flats, with isolated areas of reef, bedrock and consolidated sediments (Bax, 2001).

The sediment flats comprise mainly relict sandy sediments - terrigenous in origin close to the coast and becoming carbonate in origin as depth increases below 60m. Muds are uncommon (Poore, 1995)(Poore, 1995).

Bathymetric data shows no significant sea features in the area, with the sea floor sloping gently from ~70 m to ~150 m west to east across PEP11. There are no known reefs within the area of the proposed survey.

3.4 Biological Environment

3.4.1 *Protected Matters Under the EPBC Act 1999*

A search of the EPBC Act Protected Matters Database was undertaken to identify the likelihood of occurrence of listed fauna within and around the Operational Area. The search resulted in the following areas/species identified (Table 3-2):

- 36 listed threatened species (22 likely to occur in the survey area);
- 42 migratory species (23 considered likely to occur in the survey area and 23 also listed as threatened);

- 32 whales and other cetaceans;
- No World Heritage Properties nor National or Commonwealth Heritage Places;
- No Wetlands of International Importance;
- No Threatened Ecological Communities;
- No Critical Habitats;
- No Australian Marine Parks; and
- No KEFs.

Table 3-2 Protected species list for the survey area

Common Name	Scientific Name	Migratory	Threatened Status	Type of Presence
Birds				
Southern Royal Albatross	*Diomedea epomophora*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Northern Royal Albatross	*Diomedea epomophora sanfordi*		Endangered	Foraging, feeding or related behaviour likely to occur within area
Antipodean Albatross	*Diomedea exulans antipodensis*		Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Gibson's Albatross	*Diomedea exulans gibsoni*		Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Wandering Albatross	*Diomedea exulans (sensu lato)*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Antipodean Albatross	*Diomedea antiposensis*		Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Lesser Frigatebird, Least Frigatebird	*Fregata ariel*	✓		Species or species habitat likely to occur within area
Great Frigatebird, Greater Frigatebird	*Fregata minor*	✓		Species or species habitat likely to occur within area
White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)	*Fregetta grallaria*		Vulnerable	Species or species habitat likely to occur within area
Southern Giant-Petrel	*Macronectes giganteus*	✓	Endangered	Species or species habitat may occur within area
Northern Giant-Petrel	*Macronectes halli*	✓	Vulnerable	Species or species habitat may occur within area
Gould's Petrel	*Pterodroma leucoptera*		Endangered	Species or species habitat may occur within area
Kermadec Petrel (western)	*Pterodroma neglecta*		Vulnerable	Foraging, feeding or related behaviour may occur within area
Buller's Albatross, Pacific Albatross	*Thalassarche bulleri*	✓	Vulnerable	Species or species habitat may occur within area
Shy Albatross, Tasmanian Shy Albatross	*Thalassarche cauta*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Salvin's Albatross	*Thalassarche cauta salvini*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Common Noddy	*Anonus stolidus*	✓		Species or species habitat may occur within area
Streaked Shearwater	*Calonectris leucomelas*	✓		Species or species habitat may occur within area
Great Skua	*Catharacta skua*			Species or species habitat may occur within area
Osprey	*Pandion haliaetus*			Species or species habitat may occur within area
Flesh-footed Shearwater	*Puffinus carneipes*	✓		Species or species habitat likely to occur within area
Chatham Albatross	*Thalassarche eremita*		Endangered	Foraging, feeding or related behaviour likely to occur within area
Campbell Albatross, Campbell Black-browed Albatross	*Thalassarche impavida*		Vulnerable	Species or species habitat may occur within area
Common Sandpiper	*Actitis hypoleucos*	✓		Species or species habitat may occur within area
Sharp-tailed Sandpiper	*Calidris acuminate*	✓		Species or species habitat may occur within area
Red Knot, Knot	*Calidris canulus*	✓	Endangered	Species or species habitat may occur within area
Curlew Sandpiper	*Calidris ferruginea*	✓	Critically endangered	Species or species habitat may occur within area
Pectoral Sandpiper	*Calidris melanotos*	✓		Species or species habitat may occur within area
Black-browed Albatross	*Thalassarche melanophris*	✓	Vulnerable	Species or species habitat may occur within area
White-capped Albatross	*Thalassarche cauta steadi*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Eastern Curlew, Far Eastern Curlew	*Numenius madagascariensis*	✓	Critically Endangered	Species or species habitat may occur within area
Fairy Prion (southern)	*Pachyptila turtur subantartica*		Vulnerable	Species or species habitat may occur within area
Sooty Albatross	*Phoebetria fusca*		Vulnerable	Species or species habitat may occur within area
Australian Fairy Tern	*Sternula nereis*		Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Northern Buller's Albatross, Pacific Albatross	*Thalassarche bulleri platei*		Vulnerable	Species or species habitat may occur within area
Campbell Albatross	*Thalassarche melanophris impavida*		Vulnerable	Species or species habitat may occur within area
Fish				
Shortpouch Pygmy Pipehorse	*Acentronura tentaculata*			Species or species habitat may occur within area
Girdled Pipefish	*Festucalex cinctus*			Species or species habitat may occur within area
Tiger Pipefish	*Filicampus tigris*			Species or species habitat may occur within area
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish	*Heraldia nocturna*			Species or species habitat may occur within area
Beady Pipefish, Steep-nosed Pipefish	*Hippichthys penicillus*			Species or species habitat may occur within area
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse	*Hippocampus abdominalis*			Species or species habitat may occur within area
White's Seahorse, Crowned Seahorse, Sydney Seahorse	*Hippocampus whitei*			Species or species habitat may occur within area
Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish	*Histiogamphelus briggsii*			Species or species habitat may occur within area
Javelin Pipefish	*Lissocampus runa*			Species or species habitat may occur within area
Sawtooth Pipefish	*Maroubra perserrata*			Species or species habitat may occur within area
Red Pipefish	*Notiocampus ruber*			Species or species habitat may occur within area
Common Seadragon, Weedy Seadragon	*Phyllopteryx taeniolatus*			Species or species habitat may occur within area
Robust Ghost pipefish, Blue-finned Ghost Pipefish,	*Solenostomus cyanopterus*			Species or species habitat may occur within area
Spiny Pipehorse, Australian Spiny Pipehorse	*Solegnathus spinosissimus*			Species or species habitat may occur within area
Rough-snout Ghost Pipefish	*Solenostomus paegnius*			Species or species habitat may occur within area
Ornate Ghost pipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish	*Solenostomus paradoxus*			Species or species habitat may occur within area
Spotted Pipefish, Gulf Pipefish	*Stigmatopora argus*			Species or species habitat may occur within area
Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish	*Stigmatopora nigra*			Species or species habitat may occur within area
Pipefish	*Stigmatopora olivacea*			Species or species habitat may occur within area
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish	*Syngnathoides biaculeatus*			Species or species habitat may occur within area
Bentstick Pipefish, Bend Stick Pipefish, Shorttailed Pipefish	*Trachyrhamphus bicoarctatus*			Species or species habitat may occur within area
Hairy Pipefish	*Urocampus carinirostris*			Species or species habitat may occur within area
Mother-of-pearl Pipefish	*Vanacampus margaritifer*			Species or species habitat may occur within area
Mammals				
Blue Whale	*Balaenoptera musculus*	✓	Endangered	Species or species habitat may occur within area
Southern Right Whale	*Eubalaena australis (Balaena glacialis australis)*	✓	Endangered	Species or species habitat likely to occur within area
Humpback Whale	*Megaptera novaeangliae*	✓	Vulnerable	Species or species habitat known to occur within area
Sei Whale	*Balaenoptera borealis*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Fin Whale	*Balaenoptera physalus*	✓	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Minke Whale	*Balaenoptera acutorostrata*			Species or species habitat may occur within area
Bryde's Whale	*Balaenoptera edeni*	✓		Species or species habitat may occur within area
Pygmy Right Whale	*Caperea marginata*	✓		Foraging, feeding or related behaviour likely to occur within area
Pygmy Killer Whale	*Feresa attenuata*			Species or species habitat may occur within area
Short-finned Pilot Whale	*Globicephala macrorhynchus*			Species or species habitat may occur within area
Long-finned Pilot Whale	*Globicephala melas*			Species or species habitat may occur within area
Risso's Dolphin, Grampus	*Grampus griseus*			Species or species habitat may occur within area
Dusky Dolphin	*Lagenorhynchus obscurus*	✓		Species or species habitat may occur within area
Southern Right Whale Dolphin	*Lissodelphis peronei*			Species or species habitat may occur within area
Pygmy Sperm Whale	*Kogia breviceps*			Species or species habitat may occur within area
Dwarf Sperm Whale	*Kogia simus*			Species or species habitat may occur within area
Andrew's Beaked Whale	*Mesoplodon bowdoini*			Species or species habitat may occur within area
Blainville's Beaked Whale, Dense-beaked Whale	*Mesoplodon densirostris*			Species or species habitat may occur within area
Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale	*Mesoplodon layardii*			Species or species habitat may occur within area
True's Beaked Whale	*Mesoplodon mirus*			Species or species habitat may occur within area
Killer Whale, Orca	*Orcinus orca*	✓		Species or species habitat may occur within area
Spotted Dolphin, Pantropical Spotted Dolphin	*Stenella attenuata*			Species or species habitat may occur within area
Striped Dolphin, Euphrosyne Dolphin	*Stenella coeruleoalba*			Species or species habitat may occur within area
Long-snouted Spinner Dolphin	*Stenella longirostris*			Species or species habitat may occur within area
Rough-toothed Dolphin	*Steno brenadensis*			Species or species habitat may occur within area
Sperm Whale	*Physeter macrocephalus*	✓		Species or species habitat may occur within area
Common Dolphin, Short-beaked Common Dolphin	*Delphinus delphis*			Species or species habitat may occur within area
Melon-headed Whale	*Peponocephala electra*			Species or species habitat may occur within area
False Killer Whale	*Pseudorca crassidens*			Species or species habitat may occur within area
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	*Tursiops aduncus*			Species or species habitat likely to occur within area
Bottlenose Dolphin	*Tursiops truncatus s. str.*			Species or species habitat may occur within area
Cuvier's Beaked Whale	*Ziphius cavirostris*			Species or species habitat may occur within area
Long-nosed Fur-seal, New Zealand Fur-seal	*Arctocephalus forsteri*			Species or species habitat may occur within area
Australian Fur-seal, Australo-African Fur-seal	*Arctocephalus pusillus*			Species or species habitat may occur within area
Reptiles				
Loggerhead Turtle	*Caretta*	✓	Endangered	Species or species habitat known to occur within area
Green Turtle	*Chelonia mydas*	✓	Vulnerable	Species or species habitat known to occur within area
Leatherback Turtle, Leathery Turtle	*Dermochelys coriacea*	✓	Endangered	Species or species habitat known to occur within area
Hawksbill Turtle	*Eretmochelys imbricata*	✓	Vulnerable	Species or species habitat known to occur within area
Flatback Turtle	*Natator depressus*	✓	Vulnerable	Species or species habitat known to occur within area
Yellow-bellied Seasnake	*Pelamis platurus*			Species or species habitat may occur within area
Sharks and Rays				

Shortfin Mako, Mako Shark	*Isurus oxyrinchus*	✓		Species or species habitat likely to occur within area
Longfin Mako	*Isurus paucus*	✓		Species or species habitat likely to occur within area
White Shark, Great White Shark	*Carcharodon carcharias*	✓	Vulnerable	Breeding known to occur within area
Whale Shark	*Rhincodon typus*	✓	Vulnerable	Species or species habitat may occur within area
Grey Nurse Shark	*Carcharias taurus (east coast population)*		Critically Endangered	Species or species habitat likely to occur within area
Porbeagle, Mackerel Shark	*Lamna nasus*	✓		Species or species habitat likely to occur within area
Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray	*Manta alfredi*	✓		Species or species habitat likely to occur within area
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray	*Manta birostris*	✓		Species or species habitat may occur within area

3.4.2 *Benthic Communities*

Habitat studies in southern NSW and Victoria have shown that the composition of benthic communities to be related to sediment composition (Bax, 2001; Jordan Davies, 2010), with the majority of the survey area composed of medium grained sand.

The majority of animals associated with the sediment type found in the survey area occur as infauna, with low densities of larger sessile epifauna, such as sponges, ascidians, bryozoans gorgonians and sea whips (Jordan Davies, 2010) along with intermittent high density congregations of crinoids (Zann, 2000). The benthic habitat may also support the presence of bentho-pelagic fish and cephalopods in low densities.

Crustaceans, including *Paneaus plebejus* (king prawn), *Metapenaeus macleayi* (school prawn) *Haliporoides sibogae* (royal red prawn) and *M. bennettae* (greasy back prawns) may occur in the area, and are potentially targets of the NSW Ocean trawl fishery. The eastern rock lobster (*Jasus vereauxi*) is also known to occur in the region and is targeted by state fisheries.

3.4.3 *Reptiles*

Five marine turtle species were identified on the EPBC protected matters search as species that are migratory and 'known to occur' in the proposed survey area. There are resident groups of hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*) and green turtles (*Chelonia mydas*) in the waters of northern NSW (EA, 2003). Under the EPBC Act, leatherback (*Dermochelys coriacea*) and loggerhead turtles are listed as Endangered, while green, hawksbill and flatback (*Natador depressus*) turtles are listed as Vulnerable (DOE, 2014a). However, the survey area does not overlap with any known biologically important areas (BIA) for marine turtles, the closest of which is the loggerhead turtle BIA at >400 km away.

3.4.3.1 Green Turtles

Green turtles (*C. mydas*) are mostly associated with inshore areas of algae and seagrass, as their generalised diet is primarily herbivorous, although pelagic juveniles feed on algae, pelagic crustaceans and molluscs (DOEE, 2017; Limpus, 2008b). Given the location and depth of the proposed survey area, it is unlikely to provide a suitable feeding habitat for green turtles. While the species distribution range overlaps with the survey area, the survey area does not overlap with foraging, nesting or internesting BIAs for green turtles (DOEE, 2017). Of the nine genetically-distinct stocks in Australia, the Southern Great Barrier Reef stock has the closest nesting sites to the survey area, which is >840 km away.

3.4.3.2 Loggerhead Turtles

Loggerhead turtles are found in the waters of coral and rocky reefs, seagrass beds and muddy bays throughout eastern, northern and western Australia (DOE, 2014b; DOtE, 2014c). While nesting on the east coast of Australia is concentrated in southern Queensland, foraging areas are more widely distributed and may extend into NSW (Limpus, 2008a). Loggerhead turtles are thought to feed in near shore habitat to 50-60m in depth. Given the location and depth of the proposed survey area it is unlikely to provide a suitable feeding habitat for loggerhead turtles.

3.4.3.3 Hawksbill Turtles

Juvenile hawksbill turtles (*E. imbricata*) spend their first five to ten years drifting on ocean currents (DOE, 2014b; DOtE, 2014c). Adult turtles settle and forage primarily in tropical tidal and sub-tidal coral and rocky reef habitat, and occasionally seagrass meadows, where they feed on sponges and algae (Limpus, 2009a). Given the location and depth of the proposed survey area it is unlikely to provide a suitable feeding habitat for adult hawksbill turtles. Hawksbill turtles have been observed in temperate regions including the deeper habitats of trawl fisheries as far south as northern NSW (Limpus, 2009a) and are known to cover large distances between breeding and feeding grounds, and so may occur in the area.

3.4.3.4 Leatherback Turtles

Leatherback turtles (*D. coriacea*) are pelagic and are found in all regions of the Australian coast including NSW. This species may traverse and forage in the waters at and surrounding the proposed site, however they are thought to concentrate feeding activity in areas of upwelling or convergence associated with steeply sloping bathymetry (DOE, 2014a; Limpus, 2009b). Nesting occurs in eastern Australia in summer between December and January (Limpus, 2009b), however there are no significant rookeries in Australia (DOE, 2014a; DOE, 2014). Scattered nesting has been reported along the south Queensland coast from Bundaberg to Round Hill Head and along the coast of Arnhem Land from Coburg Peninsula to Maningrida, including Crocker Island. Some nesting in the past has occurred in northern NSW near Ballina, approximately 400 km north of the proposed survey area (DOE, 2014a).

3.4.3.5 Flatback Turtles

Flatback turtles (*N. depressus*) are endemic to Australia, and are concentrated in the northern regions of Australia (DOE, 2014a; Limpus, 2007). On the East coast, no significant nesting areas are located south of the Queensland region (DOE, 2014b); DOtE, 2014c). Flatback turtles feed primarily in shallow soft bottom inshore habitats. Given the location and depth of the proposed survey area it is unlikely to provide a suitable feeding habitat for flatback turtles.

3.4.3.6 Seasnake

The yellow bellied seasnake (*Pelamus platurus*) may occur in the area of operation. It is listed under the EPBC ACT, however is not threatened. It is a pelagic feeder, and is often found associated with areas of calm water and marine debris (Kropach, 1971).

3.4.4 *Fish Populations*

A search of the EPBC Act Protected Matters Database listed 23 fish species and 3 species of sharks of national environmental significance that may occur in, or may relate to the survey area (Table 3-2).

A number of bony fish groups occur along the coast of NSW ranging from shallow demersal territorial species, such as gobies (Gobiidae), damselfishes (Pomacentridae) and pipefish (Syngnathidae) to oceanic piscivorous fish such as striped marlin (*Tetrapturus audax*), yellowfin tuna (*Thunnus albacares*) and swordfish (*Xiphias gladius*) (CSIRO, 2009). Table 3-3 represents an example of bony fish groups and the most dominant species which are likely to occur within the vicinity of the survey area.

Table 3-3 Bony fish groups and their associated functional groups that may occur in the vicinity of the survey area

Functional Group[1]	Dominant Fish Species
Shallow pelagic small planktivorous	Anchovy (*Engraulis australis*), pilchard (*Sardinops neopilchardus*) and whitebait (*Hyperlophus vittatus, Spratelloides robustus*)
Shallow pelagic large planktivorous	Mackerel species (*Scomber australiasicus*, *Scomberomorus* spp.) and yellowtail kingfish (*Seriola lalandi*)
Shallow pelagic piscivorous	Australian salmon (east) (*Arripus trutta*), barracouta (*Thyrsites atun*), tailor (*Pomatomus saltatrix*), snook/barracuda (*Sphyraena novaehollandiae)*, dolphinfish (*mahi mahi*), yellowtail kingfish (*Seriola lalandi*), mulloway (*Argyrosomus hololepidotus*), teraglin (*Atractoscion aequidens*), mackerel (Spanish & spotted) (*Scomberomorus commerson, Scomberomorus munroi*), mackerel tuna (*Euthynnus affinis*), bonito (*Sarda australis*)
Deep demersal	Mirror dory (*Zenopsis nebulosus*), hapuku (*Polyprion oxygeneios*), painted gurnard (*Pterygotrigla andertoni*), long-finned gemfish (*Rexea antefurcata*), silverside (*Argentina australiae*), whiptails (family Macrouridae, various sp), cardinalfish (family Berycidae,various sp), spiny flathead (*Hoplichthys haswelli)*
Oceanic piscivorous	Leadenall (frigate mackerel or tuna) (*Auxis thazard*), skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), Southern bluefin tuna (*Thunnus maccoyii*), striped marlin (*Tetrapturus audax*), blue marlin (*Makaira mazara*), swordfish (*Xiphias gladius*).

Source; Ecological sustainable development of the regional marine and estuarine resources of NSW: Modelling of the NSW continental shelf ecosystem. CSIRO, March 2009.

[1] Functionally grouped according to habitat, predators and prey, growth characteristics and movement patterns (CSIRO, 2009)
* Key secondary species.

A number of fish species are targeted by both state and commonwealth fisheries including 'Ocean Trap and Line' (OTLF), Trawl fisheries (including the commonwealth trawl sector of the South East Shark and Scalefish) and the Eastern Tuna and Billfish Fishery (AFMA, 2014). Several species of shark are also targeted, either as a primary or secondary species by the NSW trawl fisheries.

Six species of shark and one species of manta ray protected under the EPBC Act may occur within the vicinity of the survey area (Table 3-4). Two of these species are listed as Vulnerable [great white (*Carcharodon carcharias*) (refer Figure 3-2 for BIA) and the whale shark (*Rhincodon typus*)], with six species listed as Migratory, including the giant manta ray (*Manta birostris*) (Table 3.3). The grey nurse shark (*Carcharias Taurus*) east coast population is listed as being Critically Endangered.

Table 3-4 Shark and Ray species listed under the EPBC Act

Common Name	Scientific Name	Migratory	Threatened Status	Type of Presence
Shortfin mako shark	*Isurus oxyrinchus*	✓		Species or species habitat likely to occur within area
Great white shark	*Carcharodon carcharias*	✓	Vulnerable	Breeding known to occur within area
Longfin Mako	*Isurus paucus*	✓		Species or species habitat likely occur within area
Whale shark	*Rhincodon typus*	✓	Vulnerable	Species or species habitat may occur within area
Grey nurse shark	*Carcharias taurus* (east coast population)		Critically Endangered	Species or species habitat likely to occur within area
Porbeagle, mackerel shark	*Lamna nasus*	✓		Species or species habitat likely to occur within area
Giant manta ray, Chevron/Pacific/pelagic /oceanic manta ray	*Manta birostris*	✓		Species or species habitat likely to occur within area
Reef manta ray. Coastal/Inshore/ Prince Alfred's/Resident manta ray	*Manta alfredi*	✓		Species or species habitat likely to occur with area

3.4.4.1 Great white sharks (Carcharodon carcharias)

Distribution includes coastal waters of NSW (refer Figure 3-2), with evidence suggesting that juveniles appear to aggregate seasonally in the coastal region between Newcastle and Forster (DSEWPaC, 2013c). Satellite telemetry suggests that juvenile white sharks were resident in the Port Stephens region of central NSW from late winter to spring and the Corner Inlet region of eastern Victoria from summer to autumn (B.D. Bruce, 2008) corresponding with historical catches from shark control programs in NSW (1950-1993) suggesting a peak from September to November (DSEWPaC, 2013c).

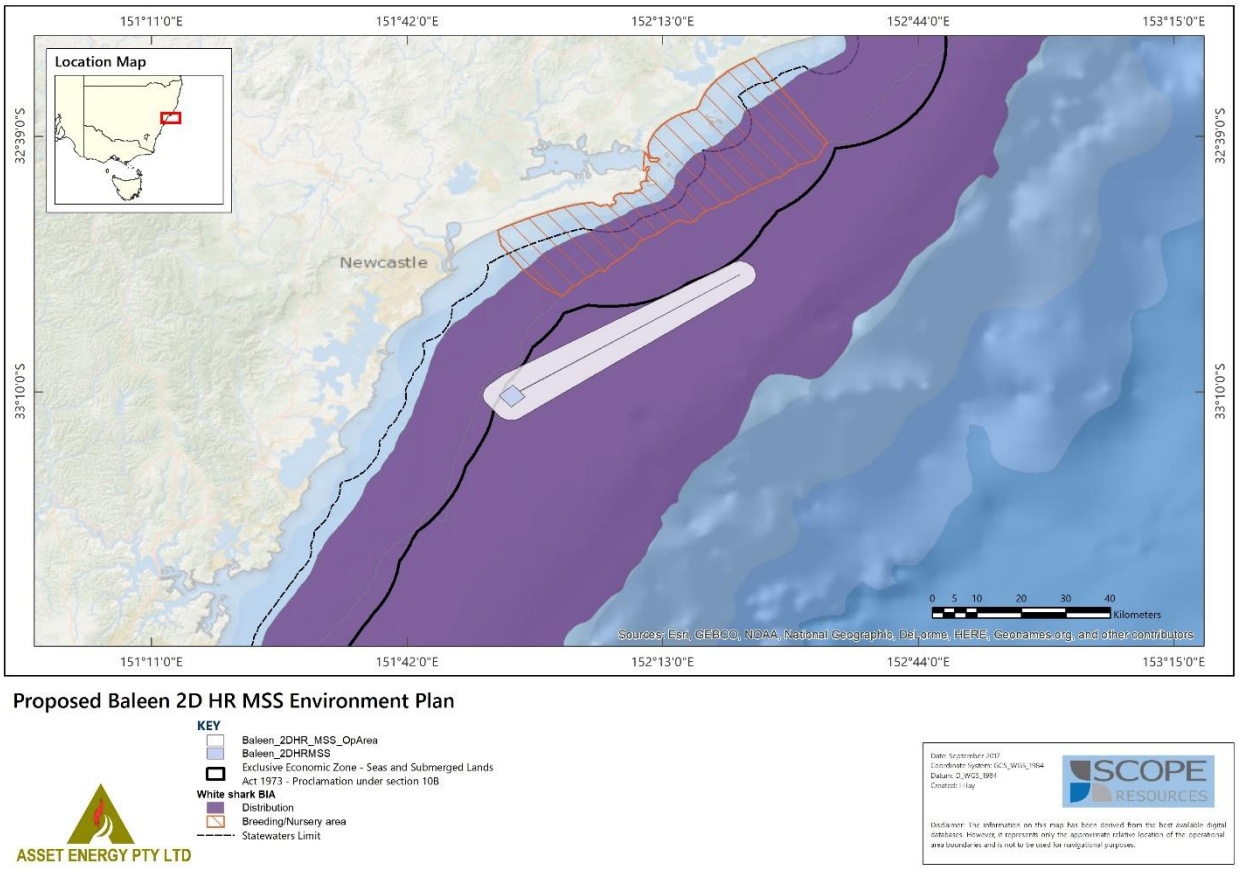


Figure 3-2 Great white shark BIA overlap with Operational Area

3.4.4.2 *Shortfin mako (Isurus oxyrinchus)*

The shortfin mako (*Isurus oxyrinchus*) are widespread in Australian waters (DSEWPaC, 2012c) including the entire NSW coast and occur in surface waters to depths of at least 650 m (NSW, 2008/09). Shortfin mako are recorded as giving birth off NSW around November (NSW, 2008/09).

3.4.4.3 *Longfin mako (Isurus paucuss)*

The longfin mako (*Isurus paucus*) is an epipelagic species with a usual depth range between 120 and 240 metres. Longfin mako sharks were only confirmed from Australian waters in 1995, with north-eastern waters considered a locally important region (DSEWPaC, 2012c). Within the region, it is known to occur south to at least Port Stephens in New South Wales.

3.4.4.4 *Porbeagle sharks (Lamna nasus)*

Porbeagle sharks (*Lamna nasus*) are wide-ranging, inhabiting subtropical and temperate waters of the North Atlantic and Southern hemisphere (DSEWPaC, 2012c). They are typically found in oceanic waters on the continental shelf and occasionally in coastal waters. Little data exist for southern hemisphere populations; however, some studies suggest that in Australian and New Zealand waters, birthing peaks June-July (winter), which contrasts with studies from the North Atlantic which suggest that porbeagles give birth in spring-summer (Francis & Stevens, 1999).

3.4.4.5 *Whale sharks (Rhincodon typus)*

Whale sharks are listed as migratory and vulnerable under the EPBC Act. There are no identified BIAs for the whale shark in the vicinity of the survey area. Given the lack of associated reef systems and upwelling particular to the area of proposed operation, it is unlikely that whale sharks will be encountered.

3.4.4.6 *Giant Manta Ray (Manta birostris)*

The giant manta ray (*Manta birostris*) is listed as a migratory species and protected under the EPBC Act. It is classified as vulnerable on the IUCN Red List of threatened species and has been identified as potentially occurring within the survey area. Little is known about this ray except that it is elusive and potentially migratory. In Australia they have been recorded from south-west, Western Australia around the tropical north of the country to the southern coast of NSW (IUCN, 2014) and sometimes migrate into temperate waters (Williams & Williams, 2014). It is reasonable to surmise that they may be present within the survey area. However, their presence would not be expected in significant numbers and would most likely occur while transiting to preferred habitats or feeding grounds.

3.4.4.7 Grey Nurse Shark (Carcharias taurus) Eastern population.

Under the EPBC Act, the grey nurse shark was listed as two separate populations: the east coast population and the west coast population. The status of the east coast population was upgraded to '*Critically endangered'* by the NSW Government in 2008 (NSW, 2011). The grey nurse shark has been sighted along the coast of NSW (DSEWPaC, 2013a). They are known to occur on, and occasionally off, the continental shelf to depths in excess of 200m (DSEWPaC, 2013a; NSW, 2013b) but appear to spend the majority of their time in depths below 40m around inshore rocky reefs or islands (NSW, 2000, 2013b; Otway, Burke, Morrision, & Parker, 2003).

There are currently twelve confirmed key aggregation sites located in NSW, with two sites in Commonwealth waters (DoE, 2014). The closest aggregation site to the survey area is Little Broughton Island near Port Stephens, which is ~60 km away from the northern most edge of the survey area. The survey area overlaps the grey nurse shark distribution and breeding BIAs (Figure 3-3). Timing for mating and pupping in Australia is unknown, although evidence from South Africa supported breeding during late October and early November and pupping in early spring, after pregnant females migrated south in July and August.

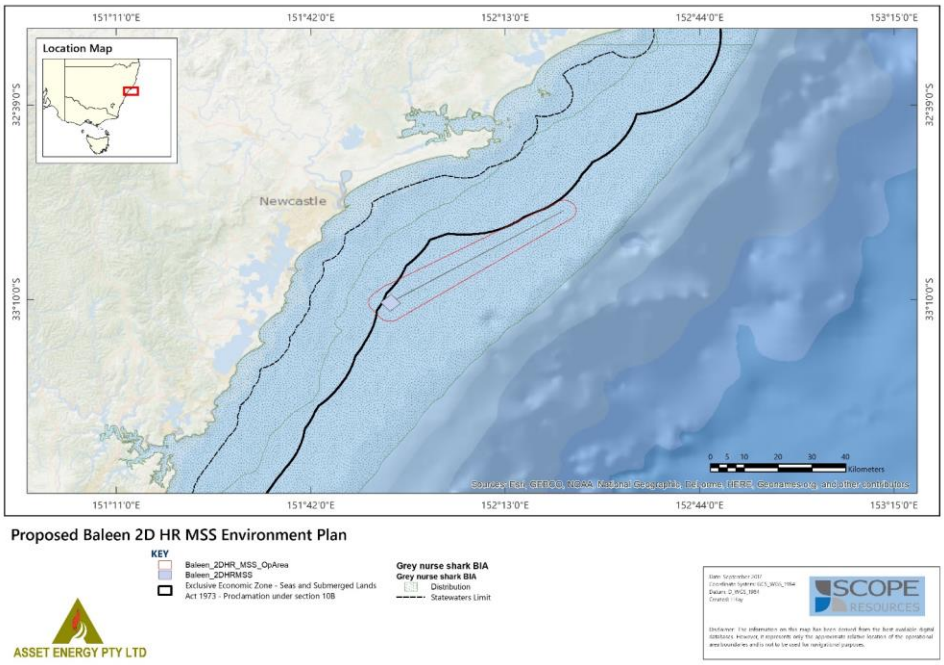


Figure 3-3 Grey nurse shark BIA overlap with Operational Area

3.4.5 *Marine Mammals*

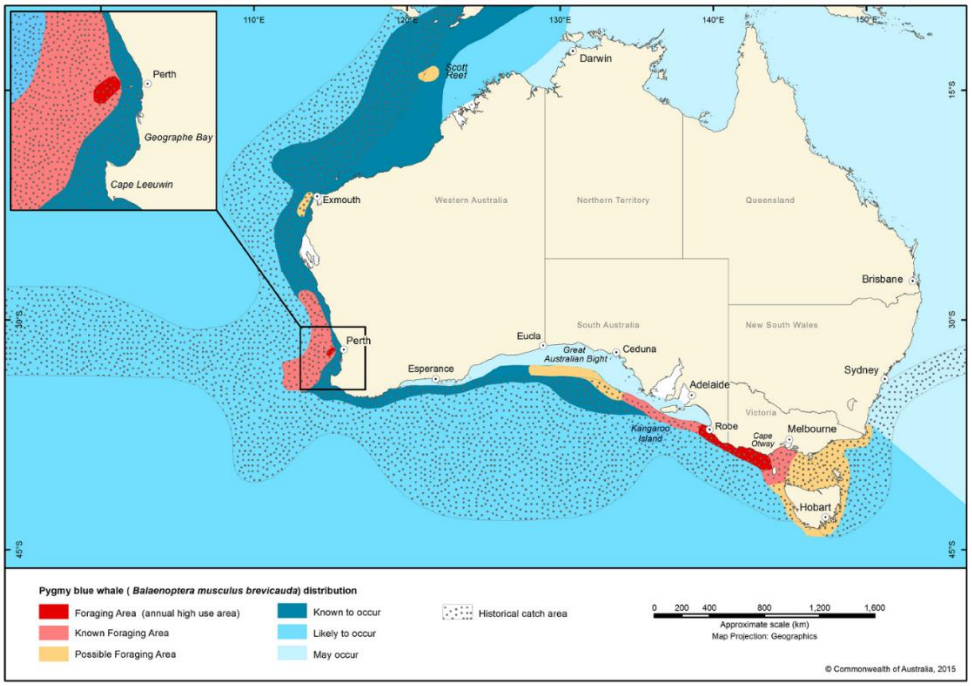
Thirty-two species of marine mammal were identified on the EPBC protected matters search as being found off the coast of NSW during the year, of which five species of whale listed as Threatened.

3.4.5.1 Blue Whale

Blue whales (*Balaenoptera musculus*) migrate annually from polar to tropical waters. In Australia, areas of feeding significance for blue whales include areas in Western Australia, South Australia and Victoria's western waters

(Figure 3-4 and Figure 3-5; DoE, 2015; DEH, 2005). The blue whale is rarely present in large numbers outside recognised aggregation areas. Blue whales follow deep oceanic routes associated with food sources during migration (Branch et al., 2007).

The Operational Area does not overlap any known migration, foraging or breeding BIAs for the blue whale, the closest of which is >1,000 km away from the survey area (NCVA, 2017).



Foraging Area (Annual high use area)	Blue whales are regularly observed feeding on a seasonal basis
Known Foraging Area	Known foraging occurs in these areas but is highly variable both between and within seasons
Possible Foraging Area	Evidence for feeding is based on limited direct observations or through indirect evidence, such as occurrence of krill in close proximity of whales, or satellite tagged whales showing circling tracks. Blue whales travel through on a seasonal basis, possibly as part of their migratory route

Known to occur	Blue whales are known to occur based on direct observations, satellite tagged whales or based on acoustic detections
Likely to occur	Blue whales are likely to occur based on occasional observations in the area and nearby areas
May occur	Evidence for the presence of blue whales through strandings or rare observations
Historical catch area	Blue whales were caught during the whaling period based on whaling data

Figure 3-4 Pygmy blue whale distribution around Australia (Source DoE, 2015)

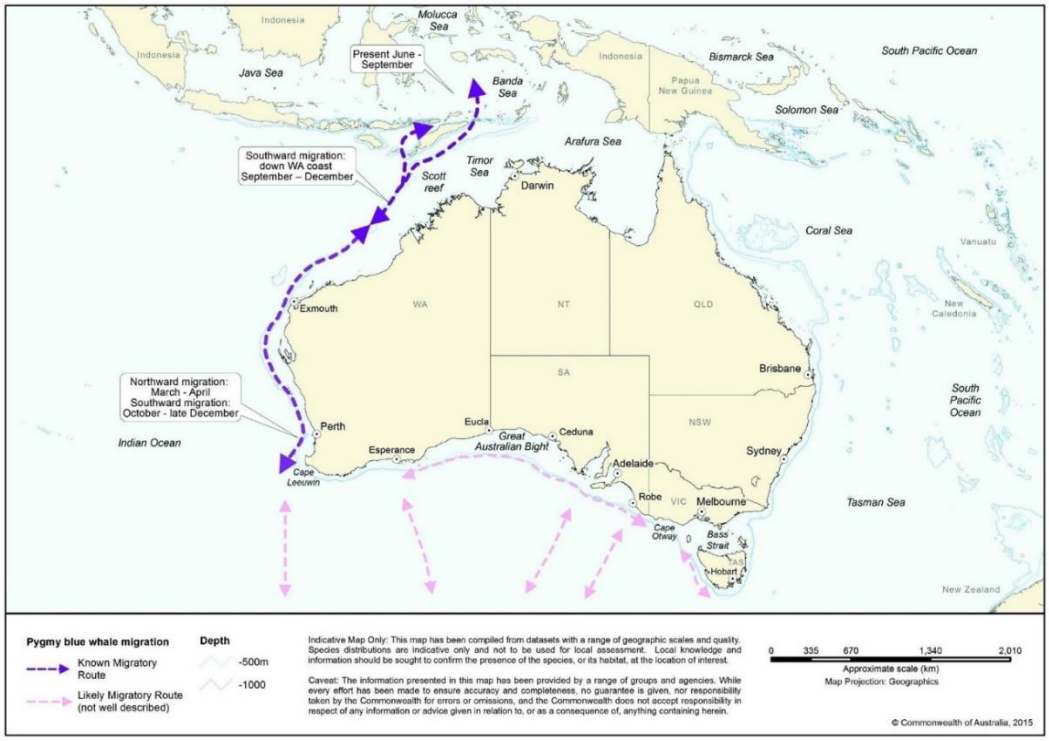


Figure 3-5 Pygmy blue whale migration routes (Source: DoE, 2015)

3.4.5.2 Humpback Whale

The humpback whale (*Megaptera novaeangliae*) is listed as a cetacean, and as a threatened and migratory species under the EPBC Act. Peak humpback whale northern migration along Australia's eastern coastline is June –July), and the southward migration to Antarctic waters is around August–September (DSEWPaC, 2010; DEH, 2005a). During the northern migration humpbacks travel close to the coast (within 0–9 km), while the southern migratory paths are more widespread and show significant variation (Advent/RPS EP Reference, 2010). The survey area overlaps the humpback whale migration BIA only, and there are no known breeding, feeding or resting BIAs within or adjacent to the survey area (TSSC, 2015; Figure 3-6, Figure 3-7, and Figure 3-8).

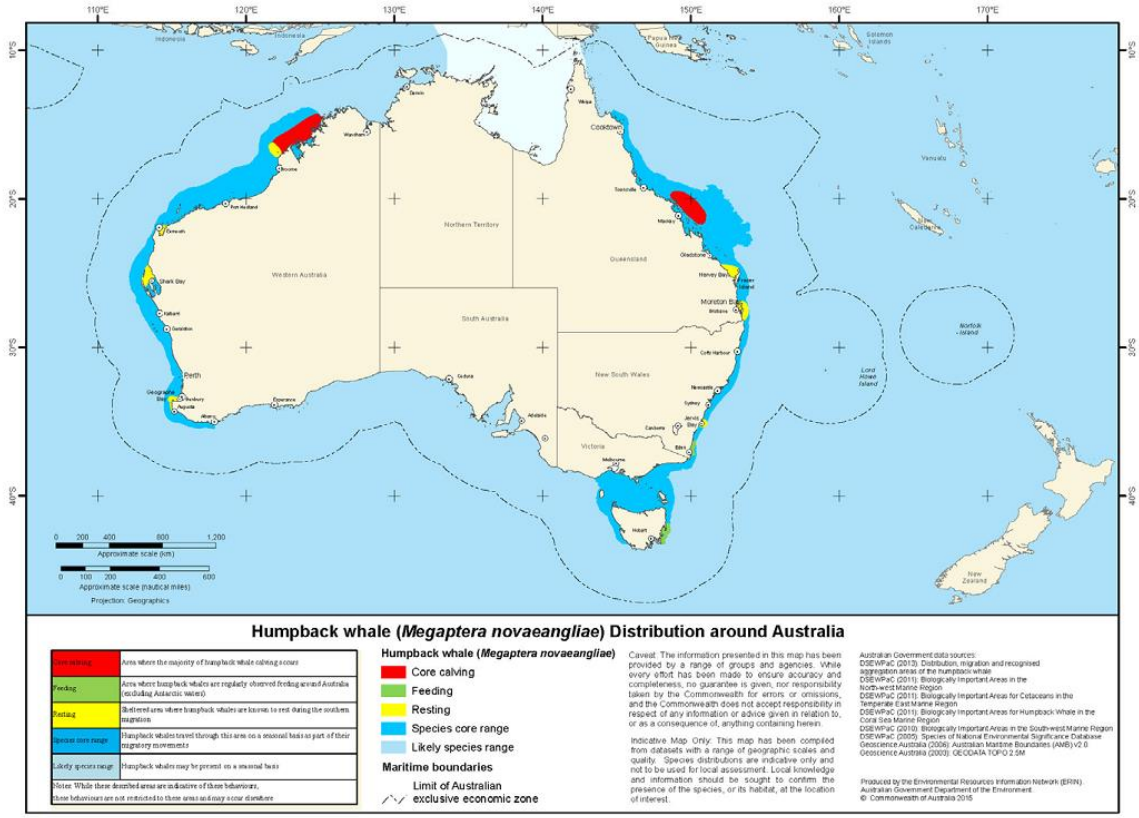


Figure 3-6 Humpback whale distribution around Australia (Source: TSSC, 2015)

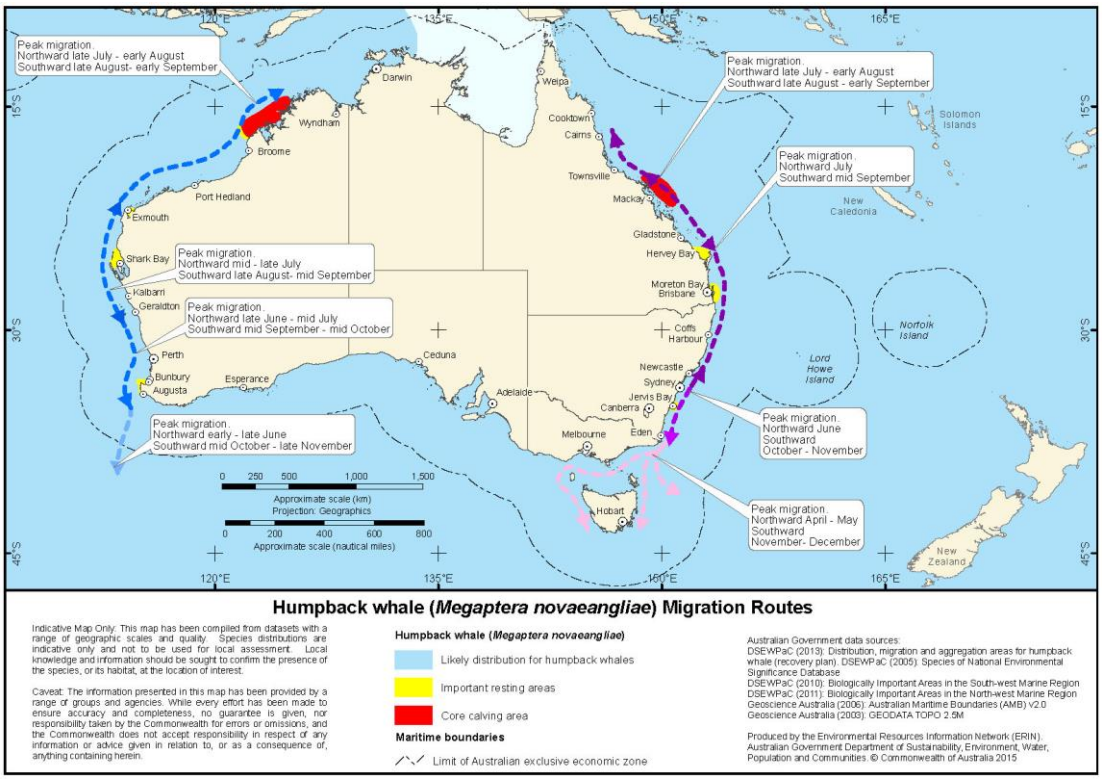


Figure 3-7 Humpback whale migration routes (Source: TSSC, 2015)

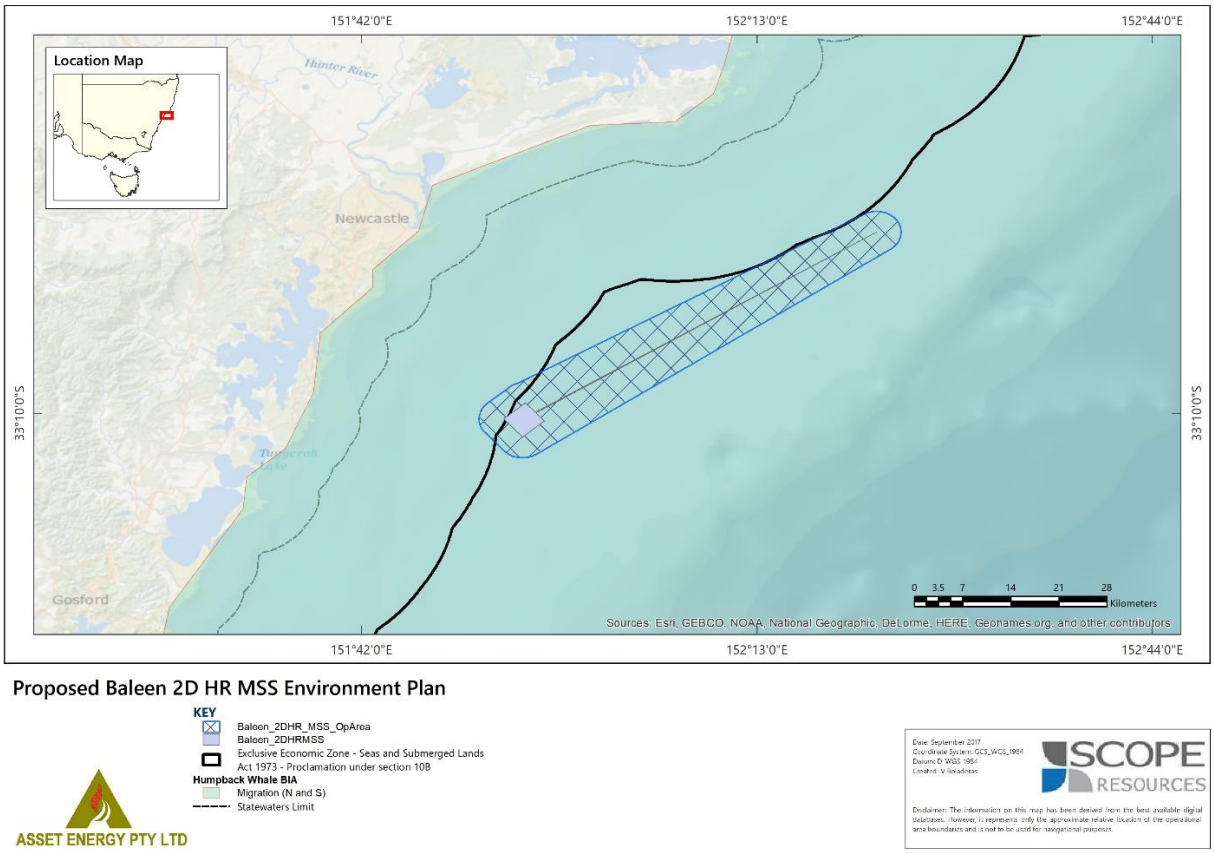


Figure 3-8 Humpback whale BIA overlap with Operational Area

3.4.5.3 Other Cetaceans

Bryde's Whale

The Bryde's whale (*Balaenoptera edeni*) is known to migrate seasonally and is generally found in temperate to tropical waters in depths ranging from 200m to 1000m. The species is most commonly limited to the 200m depth isobar (DSEWPaC, 2012). Bryde's whales have been recorded in all areas of Australia however no specific breeding or feeding grounds have been found within Australia (DSEWPaC, 2012). Due to the depth range of the Operational Area, and absence of any known aggregation areas, it is unlikely Bryde's whales would be present in significant numbers, though isolated individuals may transit the area.

Minke Whale

The dwarf minke whale (*Balaenoptera acutorostrata*) and the subspecies Antarctic minke whale (*Balaenoptera bonaerensis*) have been recorded in all state waters (except the Northern Territory) and in Commonwealth waters up to north Queensland (DSEWPaC, 2009). They are listed as Migratory under the EPBC Act. While Minke Whales may be present in the survey area, they will likely be only one or two individuals transiting the area.

Southern Right Whale

In Australia, southern right whales have been recorded in the coastal waters of all States (with the exception of the NT). Sydney is thought to mark the northern extent of the Southern right whale migration path, though sightings have been made as far north as Cape Byron (Bannister et al., 2001). The closest known calving area is Eden, approximately 400 km south of the survey area (DEH, 2005).

Pygmy Right Whale

The pygmy right whale is found throughout the southern hemisphere temperate and sub-Antarctic waters. Few or no records are available for NSW (DOtE, 2013a), but pygmy right whales have primarily been recorded in areas associated with upwelling and with high zooplankton abundance (Kemper, 2002). There are no known reproductive behaviours that may make pygmy right whales specifically vulnerable to threatening processes.

Pygmy right whales are found all year round in temperate Australian waters and there are no known areas of significance for this species in the region.

Killer Whales

Killer whales (*Orcinus orca*) prefer deep, cold waters (Bannister et al., 1996) and have been recorded along continental slopes (DSEWPaC, 2012). The species is found throughout the world's oceans and recorded in all areas of Australia. They appear to travel seasonally according to prey availability, and it is likely they will be found in close proximity to populations of pinnipeds (Bannister et al., 2001). Given the distance from the nearest significant seal breeding area or haul-out site, the presence of Killer whales in the survey area is considered unlikely.

Dusky Dolphin

Dusky dolphins (*Lagenorhynchus obscurus*) occur mostly in temperate and sub-Antarctic zones. They occupy primarily inshore habitats, but may be found in pelagic waters at times. There are no key localities known in Australian waters (Bannister et al., 2001).

Other Dolphins

Other marine mammal species that have widespread or temperate deepwater distributions may also occur in the area in small numbers. These include:

- Spotted Dolphin (*Stenella attenuata*);
- Risso's Dolphin (*Grampus griseus*);
- Common Dolphin (*Delphinus delphis*);
- Striped Dolphin (S*tenella coeruleoalba*);
- Long-snouted Spinner Dolphin (*Stenella longirostris*);
- Rough-toothed Dolphin (*Stenella bredanensis*);
- Indo-Pacific Humpback Dolphin (*Sousa chinensis*);
- Bottlenose Dolphin (*Tursiops truncatus s. str.*); and
- Indian Ocean Bottlenose Dolphin (*Tursiops aduncus*).

Bottlenose dolphins are common and are found around the Australian coastline, from estuaries to the open ocean (Figure 3-9). Common dolphins are found in offshore waters. While they have been recorded in waters off all Australian states and territories, they appear to occur in two main southern locations, with one cluster in the south-eastern Indian Ocean and another in the Tasman Sea (DEWHA, 2008). The area of Australian occupancy of Risso's dolphins, spotted dolphins and dusky dolphins cannot be accurately determined due to the scarcity of sighting records for large proportions of their expected ranges (DEWHA, 2008). They are, however, likely to be rare species that are infrequently encountered, if ever, within the survey area.

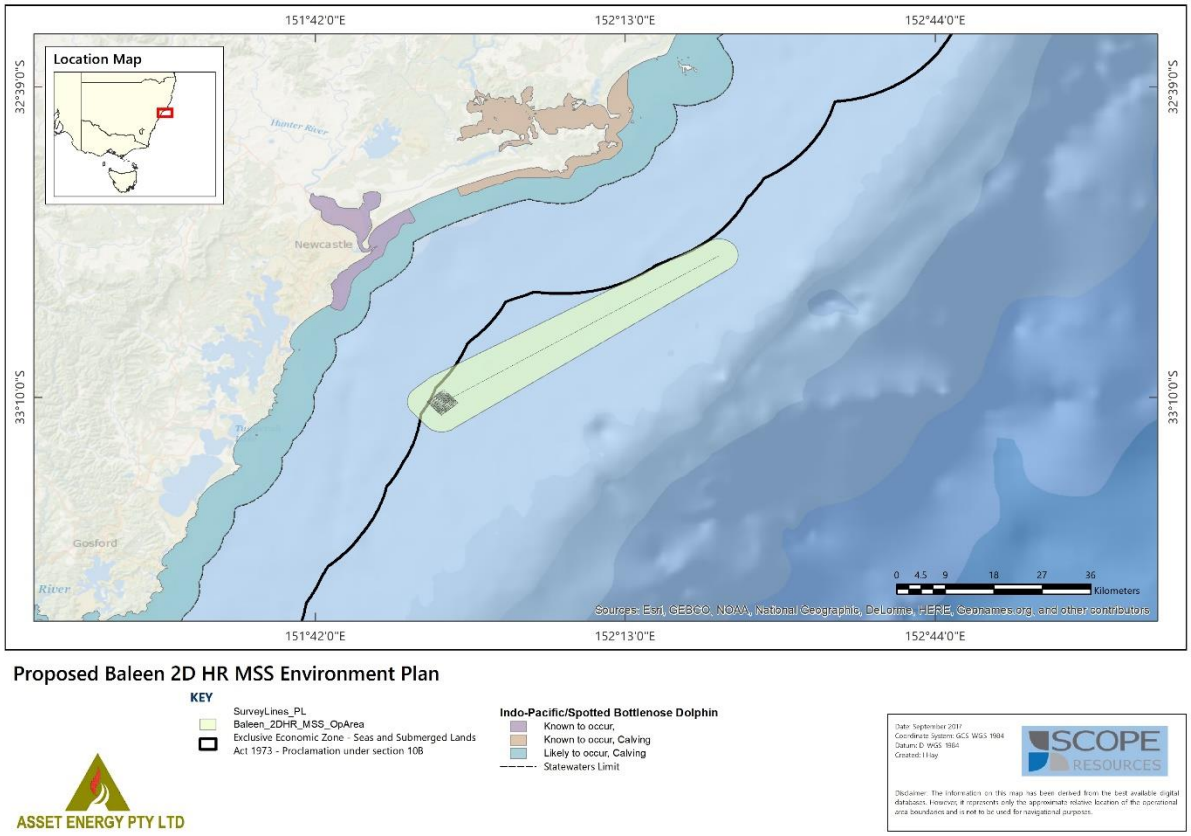


Figure 3-9 Indian Ocean Bottlenose Dolphin BIA overlap with Operational Area

Source: National Conservation Values Atlas

Seals

There are no known breeding colonies of either the Australian fur seal (*Arctocephalus pusillus doriferus*) or the New Zealand fur seal (*Arctocephalus forsteri*) in the East Marine Region (DEWHA, 2009). Montague Island is the major haul-out site along the coast of NSW for both species (Shaughnessy, 1999). Montague Island is located more than 300 km south of the survey area.

3.4.6 *Seabirds and shorebirds*

The EPBC Act Protected Matters Search found 35 avifauna species, of which 24 are listed as Vulnerable or Endangered, and 2 as Critically Endangered (Table 3-2). The nearest known breeding ground for any of the birds listed is located 60 km north of the proposed survey area. However, the survey area overlaps a small section of the large foraging BIAs for five avifauna species (Figure 3-10, Figure 3-11 and Figure 3-12):

- Antipodean albatross (Vulnerable);
- Black petrel (Marine);
- Flesh-footed shearwater (Migratory;)
- Short-tailed shearwater (Marine); and
- Sooty shearwater (Marine).

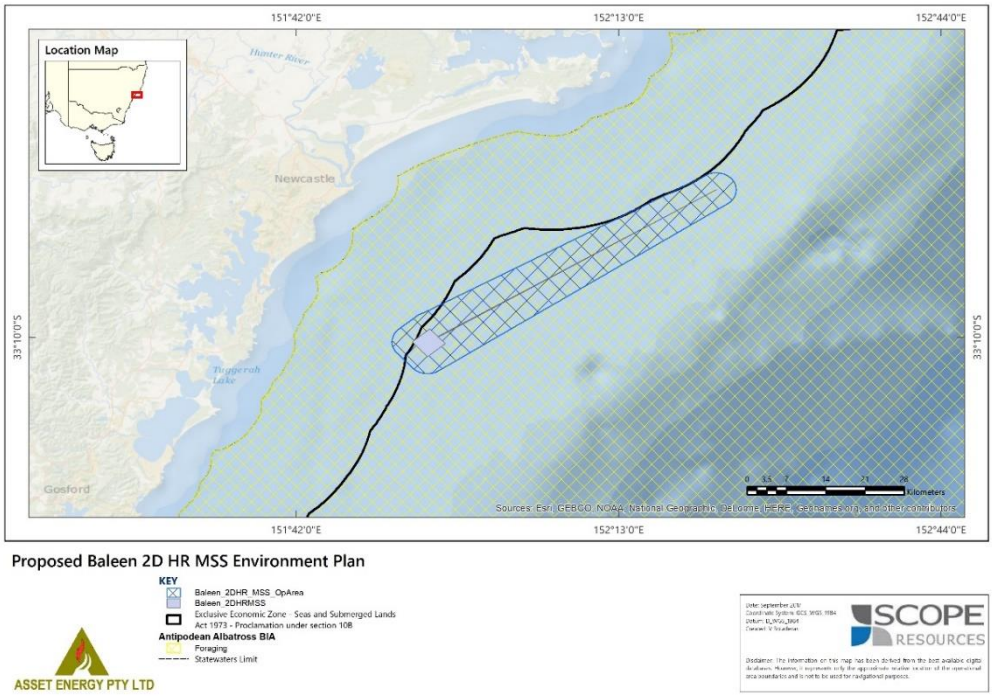


Figure 3-10 Antipodean albatross BIA overlap with Operational Area

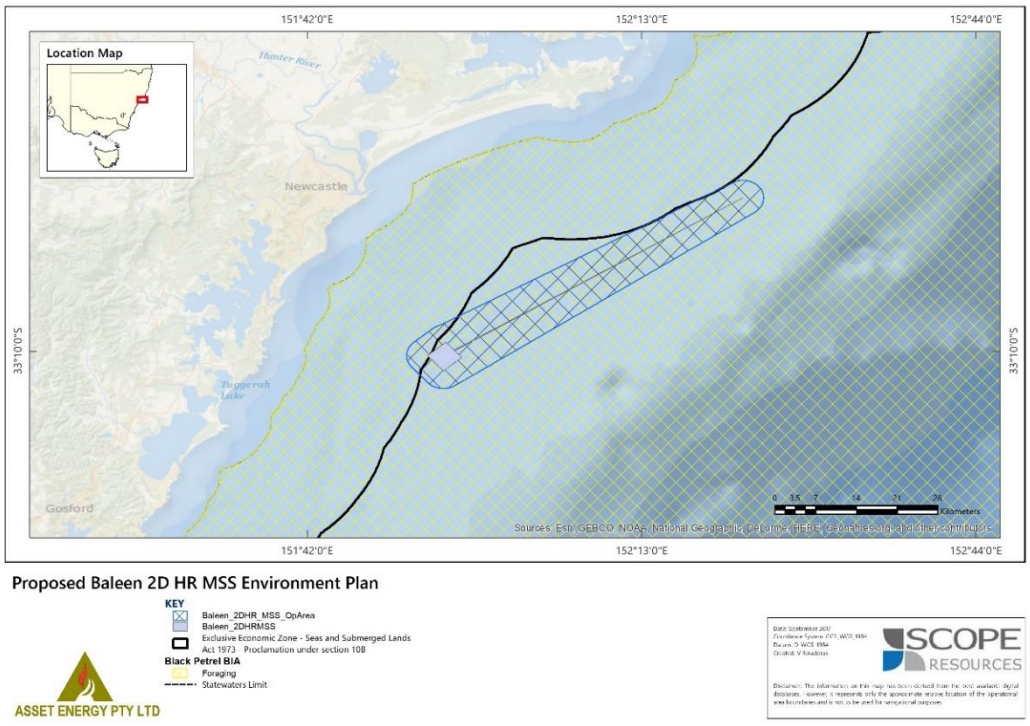


Figure 3-11 Black petrel BIA overlap with Operational Area

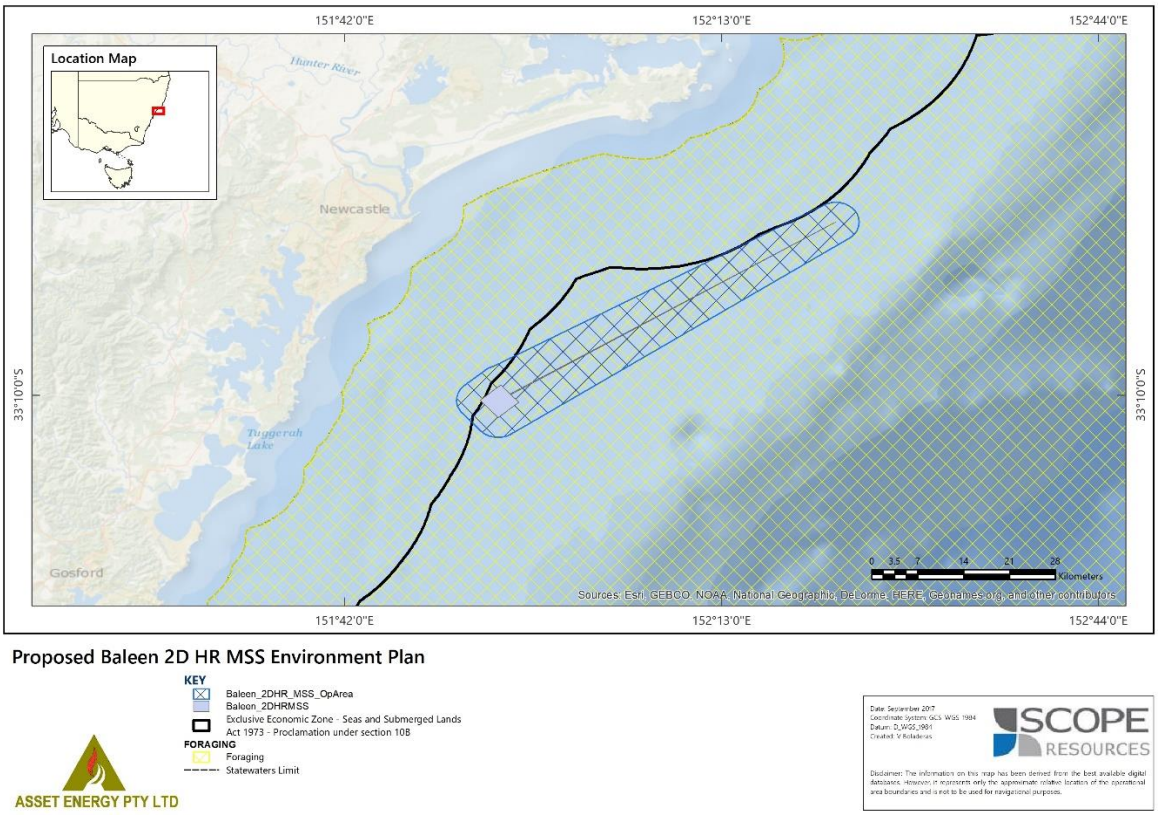


Figure 3-12 Flesh footed shearwater BIA overlap with Operational Area

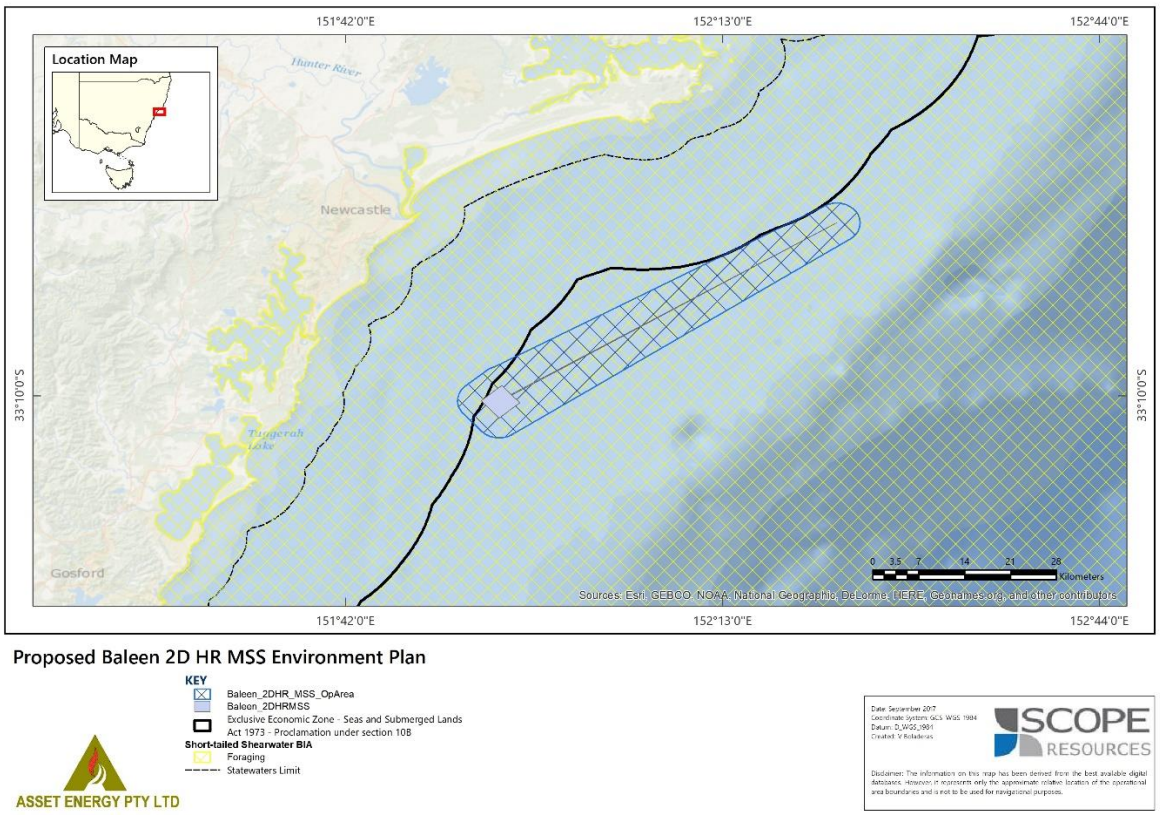


Figure 3.12 A Short-tailed shearwater BIA overlap with Operational Area

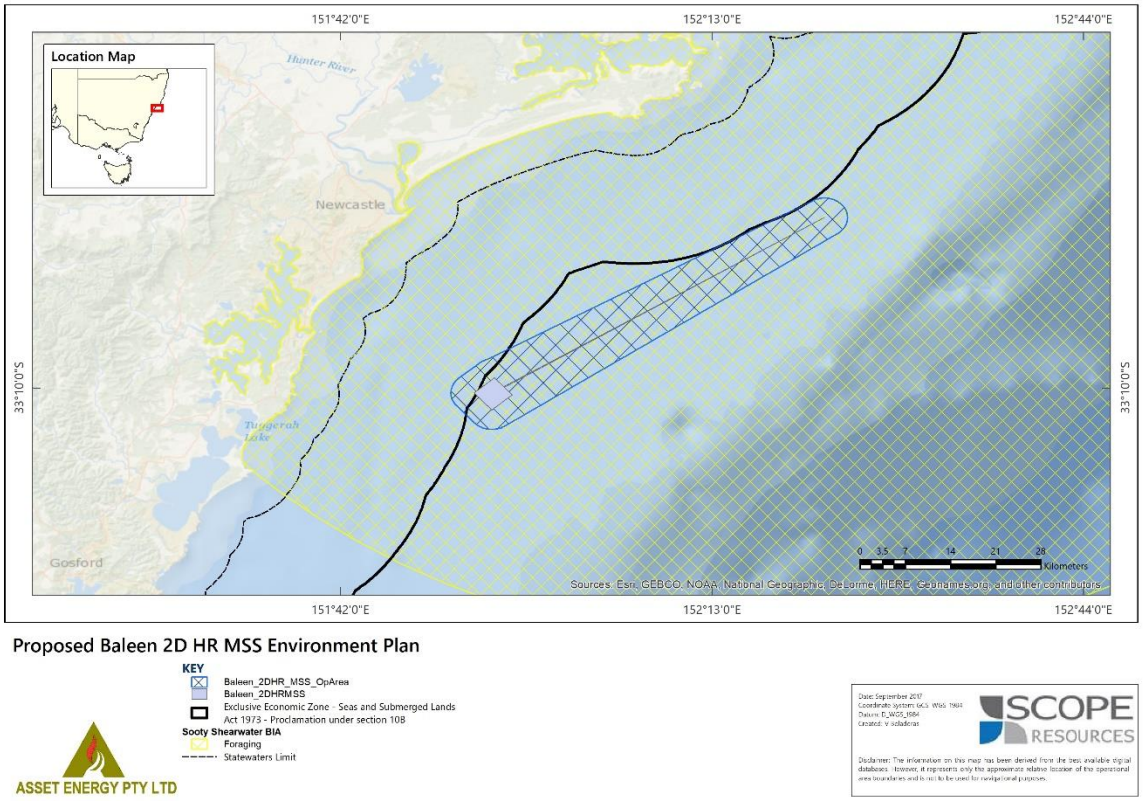


Figure 3.12 B Sooty shearwater BIA overlap with Operational Area

3.5 Socio-Economic Environment

The nearest major population centre to the area of operation is Newcastle, approximately 28 km inshore from the main part of the survey area and Sydney (~80 km) to the south.

3.5.1 *Commercial Fisheries*

Waters off the coast of NSW in the vicinity of the survey area are managed by both Commonwealth and State fisheries.

3.5.1.1 Commonwealth Fisheries

The Australian Fisheries Management Authority (AFMA) is responsible for the efficient management and sustainable use of Australia's Commonwealth fisheries resources (AFMA, 2014a)(AFMA, 2014a).

A search undertaken by AFMA have listed two fisheries as being active within the survey area;

- Commonwealth Trawl Sector of the South East Shark and Scalefish Fishery (SESSF); and
- Eastern Tuna and Billfish Fishery (ETBF).

The Commonwealth trawl sector (CTS) of SESSF covers the area of the Australian Fishing Zone (AFZ) extending southward from Barranjoey Point (north of Sydney) around the NSW, Victorian and Tasmania coastlines to Cape Jervis in South Australia (AMFA, 2014a). It is therefore unlikely that fishers from this industry would occur within the vicinity of the survey area. The Eastern Tuna and Billfish Fishery extends from Cape York, Queensland to the South Australian / Victorian Border. Fishing occurs in both the Australian Fishing Zone (AFZ) and the adjacent high seas (AFMA, 2014a).

3.5.1.2 State Fisheries

Significant commercial fishing activity occurs in the proposed survey area (DPI, 2016), including line fishing (rod/handline and setline), trapping (lobster and fish), and trawling (fish and prawn).

The proposed survey activities may overlap with the following fisheries and share classes:

- Ocean Trap and Line Fishery
  - Demersal fish trapping
  - Line fishing western zone (<180 m depth)
  - Line fishing eastern zone (<180 m depth)
- Ocean Trawl Fishery:
  - Offshore prawn trawl
  - Deepwater prawn trawl
  - Fish trawl northern zone
- Lobster Fishery (lobster trapping).

Asset Energy recognises the economic importance of catches in the periods leading up to peak seafood consumption periods including Christmas and Easter each year, and has scheduled the survey to avoid these times.

Asset Energy has identified that the Operational Area overlaps a highly-profitable and viable fishing region, which was colloquially named “the Farm” (Figure 3-13). However, stakeholders informed Asset Energy that adverse impacts were not and would not be recorded on Logbook Return Records, as fishers move fishing efforts elsewhere.

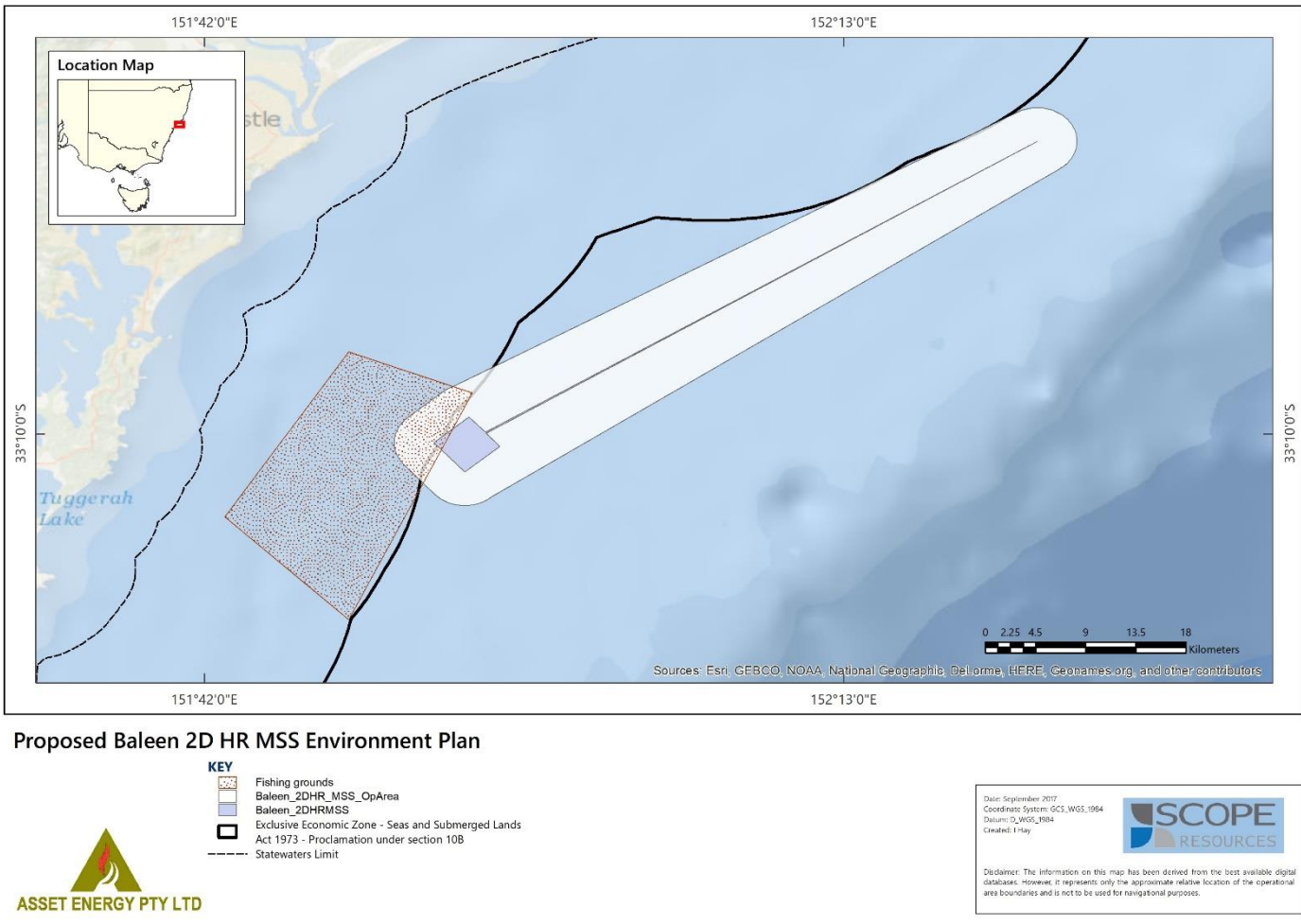


Figure 3-13 Operational Area overlap with an important fishing region (“the Farm”)

3.5.2 *Commercial Shipping*

Newcastle and Sydney Harbour, along with Botany Port comprise the major ports in the region of the greater

permit area. Approximately 10% of the total shipping traffic entering the Port of Newcastle arrives from the south, therefore it is expected that ships pass through the survey area on transit to and from the Port of Newcastle. It is also likely that the survey area falls within potential shipping approaches to the Port of Newcastle given the volume of shipping traffic in and out of the port.

3.5.2.1 Port of Newcastle

The Port of Newcastle receives approximately 5,000 vessel movements annually and is one of the largest coal ports in the world. There are no designated anchor points within the approaches to the port (*pers.com Port of Newcastle, Wayne Mabbott, Paul Thomas, NSW Port Authority*). It is very unlikely that vessels at anchor will be located within the area of operation due to the distance offshore and depth (i.e. >12 nm (22.2 km)) the depth becomes too deep to anchor. However, it is possible that vessels on standby may drift into the vicinity of the survey location.

3.5.3 *Cultural and National Heritage*

Under the EPBC Act protected matters report, no world heritage properties or national heritage places are listed as occurring within the vicinity of the survey area.

3.5.4 *Tourism and Recreational Fishing*

Advice from the NSW DPI (2017) stated that recreational fishing (e.g. stationary, drifting and trolling line fishing) occurs regularly within the Operational Area. The fishing includes both private recreational and commercial charter fishing. There are estimated to be 150,000 recreational fishers in the Hunter region, and the most popular time for fishing is mid-December through to mid-April (peak from January–March), with more activity over the Christmas and Easter holidays. Peak game fishing activity is usually from February–March, with slightly less activity in both January and April. An important area for game fishing is the 'carpark', which encompasses a relatively large area (from GPS coordinates 33.02 S and 152.24 E), which is ~10 km south of the New Seaclem-1 location. NSW DPI (2017) confirmed that the carpark area can move around 10 nm in either direction. The following fishing tournaments are scheduled for 2018 within/around the 'carpark' area (DPI 2017):

- Bigfish Bonanza - Lake Macquarie 9-11 Feb
- The Billfish Shootout - Port Stephens 16-18 Feb
- Port Stephens Interclub 23-26 Feb
- East Coast Classic - Newcastle 10-11 March.

Recreational fishers in the vicinity of the proposed survey area operate from both Newcastle and Port Stephens on a year-round basis (Davis, 2014). Within the vicinity of the area of operation there are currently 10 fish charter businesses currently licenced to operate. Seasonal peaks are likely to occur during the summer months due to improved weather conditions and increased visitor numbers to the region, especially during holiday periods, i.e. Christmas and Easter. Fish attraction devices (FAD) are utilised in NSW. Two FADs are anchored to the sea floor via a floating buoy beyond the boundary of the Operational Area (Figure 3-13). The Newcastle FAD is >15 km away, while the Swansea FAD is ~3.5 km away from the Operational Area boundary and ~5.5 km from the closest survey line. These FADs are usually deployed between 1st November and 30th June (DPI, 2014), so would be in place during the period of the survey.

Given the lack of significant seabed features in the area of operation, the distance from shore and the extent to which recreational fishers can utilise the ocean, high levels of recreational fishing are not expected to occur within the vicinity of the survey area.

Port Stephens has a year-round dolphin watching industry, which conducts approximately four tours a day during winter and six during the summer months when the number of visitors to the region increase and weather conditions improve. These tours operate within the bay and do not extend into offshore waters (Davis, 2014). Further to this whale watching tours also operate in the region between May to November, with an average of three to four tours a day depending upon visitor numbers and weather conditions. The duration of these tours (~

2.5 – 3.5 hours) will most likely act to limit the distance travelled offshore (visitnewcastle, 2014). While there is the possibility that some whale tours may venture into the region of operation, it is unlikely that significant numbers will be encountered, especially considering that the survey will not occur during peak whale migration season.

Other marine related activities including recreational diving, kayak tours and surf lessons, both of these latter two activities are beach / nearshore activities (visitnewcastle, 2014). No recreational diving is expected to occur in the vicinity of the survey area due to the lack of significant seabed features and that the water depth far exceeds the limitations applied to recreational divers to reach the seabed.

3.6 Values and Sensitivities

3.6.1 *Marine Protected Areas*

There are no marine protected areas or Australian Marine Parks within the proposed survey location. The closest Australian Marine Park is the Hunter Marine Reserve, which is ~24 km away from the Operational Area. The closest marine protected area is the Port Stephens – Great Lakes Marine Park, which is located approximately 30 km from the northern most point of the Operational Area.

3.6.2 *Wetlands of International Importance (Ramsar Wetlands)*

Ramsar Wetland sites and a Marine Reserve are located in the region of the survey area (the Hunter Estuary Wetlands and Myall Lakes to the north and Towra Point Nature Reserve to the south (DOtE, 2010)). However, the nearest site is > 25 km from the northern most point of the Operational Area and is not affected by the survey.

3.6.3 *Particular Issues or Sensitivities (Other Marine Values)*

The Operational Area overlaps with migratory routes for humpback whales; however, the survey will occur outside the peak migratory season. Further to this, there are no bathymetric features that could obstruct or enclose transiting individuals and there are no areas of particular significance (feeding, calving or resting) for humpback whales in the vicinity of the Operational Area.

Both state and commercial fishers utilise the region, including lobster fishers. Effort in lobster catch (and potentially prawn) may peak prior to the Christmas period and again prior to Easter (i.e. during the latter days of March).

Table 3-5 Summary of activity windows for ecological and socio-economic sensitivities (indicating spatial overlap)

Receptor	J	F	M	A	M	J	J	A	S	O	N	D	Spatially Applicable
Ecological													
Leatherback Turtles (nesting)													N
Great white shark													P
Shortfin mako (reproducing)													N
Whale shark													N
Grey nurse shark (reproducing)													N
Humpback Whale (northern migration)													N
Humpback Whale (southern migration)													Y
Southern right whale (migration)													Y
Socio-economic													
Commercial Fisheries (Commonwealth)													Y
Commercial Fishers (State)	LS							LS	LS	LS	LS	LS	Y
Commercial Shipping													Y
Tourism - whale													N

watching tours													
Tourism - Recreational Fishing													**U**

Code	
U	Unlikely to occur within the survey area
P	Possibility of spatial overlap (individuals may be encountered within the survey area).
Y	Yes - spatial overlap occurs – effects controlled through mitigation controls
Seasonality legend (months are indicative only)	
	Species likely to be present with year to year variability / activity occurs year-round. LS – Lobster Spawning (October / November represent peak spawning)
	Seasonal Peaks (presence of animals reliable and predictable each year / peak in activity i.e. peak catch rates)

4 ENVIRONMENTAL IMPACTS AND RISK EVALUATION METHODOLGY

4.1 Risk Assessment Methodology

The methodology used to evaluate the potential environmental effects arising from the proposed survey has been derived in accordance with the principles laid down in international standards (AS/NZS ISO 31000 and ISO 14001) and guidelines for ecological impact assessment, such as those designed for the marine and coastal environment of Britain and Ireland (UK Institute of Ecology and Environmental Management – IEEM).

The risk assessment process consisted of the following steps:

- Environmental Hazard Identification –establishing a comprehensive list, definition and description of hazards association with the activity;
- Risk Analysis – assessment of potential environmental impact(s) on each receptor (values and sensitivities) identified;
- Consequence Ranking – ranking the level of inherent consequence of each hazard prior to the introduction of any control measures.
- Impact Management – development of environmental performance outcomes, performance standards, and measurement criteria to reduce (or eliminate) the level of risk to acceptable, ALARP levels.
- Demonstration of ALARP and Acceptability – presentation of supporting information to demonstrate that environmental consequences following the implementation of control measures, will be of an acceptable level and that further control measures would not substantially reduce the impact without being grossly disproportionate.
- Post-Control Ranking – ranks the level of environmental consequence of each hazard with management controls in place (referred to as the residual risk).
- Risk Monitoring, Review and Reporting – process in which control measures are implemented reviewed and reported to ensure control measures are adequate to maintain an acceptable level (ALARP).

Running in parallel with the above procedure is a consultation process in which targeted individuals, organisations or groups who may either have useful contributions to the technical assessment / existing environment or who may have views on the project or its potential impact on the marine environment (including social and economic), were included.

4.2 Quantification of the Level or Risk

A Risk Analysis Matrix (RAM) in line with international standards is used by Asset Energy. The RAM standardises qualitative risk assessment and facilitates the categorisation the environmental risk associated with this seismic survey activity. Information from the consultation process is incorporated.

4.2.1 *Allocation of Consequence*

Table 4-1 Consequence Definitions

Score	Guidance
0	No effect - no behavioural response or injury to any animal or measurable effect on habitats
1	Slight (negligible) effect – Possible avoidance responses by individuals with no other behavioural changes (e.g. feeding). No injury to individuals. Spills confined to premises / ship contained and cleaned in minutes
2	Minor (short term) effect - Possible short term (e.g. hours) behavioural responses by individuals with no lasting avoidance of the survey area. No injury to individuals. Spills confined to premises / ship contained and cleaned within 24 hrs.
3	Moderate effect – (e.g. days) behavioural responses by individuals that may lead to avoidance of the survey area (or part of). Temporary injury to individuals. Spills spread to local area / adjacent property – drains / scuppers. Contained and cleaned up within 24 hrs.
4	Major effect (Medium term) – (e.g. months) behavioural responses by individuals that may lead to avoidance of the survey area, reduction in fecundity, potential permanent injury to individuals. Spills spread to local area / adjacent property. Clean up longer than 24 hrs with involvement of specialist cleaning contractors.
5	Massive effect – long term / permanent damage to environmental receptors (e.g. seasonal or yearly behavioural response to avoid area / permanent injury to individuals or long-term oiling of habitats). Use of emergency services.

4.2.2 *Allocation of Probability*

Table 4-2 Guide for Assessing Likelihood

Score	Guidance
A	No substantive evidence for a consequence to occur for this activity (i.e. no industry precedence) – *Very Improbable.*
B	Highly infrequent or very intermittent evidence of a similar consequence occurring (i.e. Heard of in industry) – *Slight Possibility*
C	Has occurred in our organisation or during a similar operation – *Distinct Possibility.*
D	Happens several times per year in our organisation or during a similar operation – *Reasonable Probability.*
E	Happens several times per year at the location or routinely during similar operations – *Near Certainty.*

4.2.3 *Risk Assessment Matrix (RAM)*

The consequence and the likelihood are combined to determine the level of risk attributable to the resulting ranking using a qualitative RAM (Figure 4-1).

Figure 4-1 Risk Assessment Matrix

			Likelihood				
			VERY IMPROBABLE	SLIGHT POSSIBILITY	DISTINCT POSSIBILITY	REASONABLE PROBABILITY	NEAR CERTAINTY
			A	B	C	D	E
Consequence	No Effect	0					
	Slight Effect	1					
	Minor Effect	2					
	Moderate Effect	3					
	Major Effect	4					
	Massive Effect	5					
TASK CAN CONTINUE - RECORD DETAILS AND FILE							
RISK ASSESSMENT REQUIRED TO ENSURE - ALARP – AUTHORISATION AND ADDITIONAL ASSESSMENT REQUIRED IF CANNOT CONTROL INTO BLUE							
TASK CANNOT CONTINUE - RISK ASSESSMENT REQUIRED TO ENSURE - ALARP							

4.3 Control Measures and Residual Ranking

Risk mitigation plans are developed using a hierarchy of risk control (Table 4-3). They form part of Asset Energy's risk management framework. The mitigation control measures are taken into account and the risk is then reassessed in the RAM to ensure they are ALARP.

Once the control measures have been identified to reduce the risk rating to ALARP, the process of risk assessment must be undertaken again to evaluate the effectiveness of the controls resulting in a 'residual risk rating'. Any hazard (activity / task) that cannot be moved from the red risk area after the implementation of controls to yellow or blue risk (*i.e.,* from high to moderate / low risk) should not proceed as planned. With reference to the risk assessment of the hazards identified as part of this EP, control measures have resulted in all hazards having a moderate to low risk.

4.4 Demonstration of ALARP and Acceptability

4.4.1 *Demonstration of Acceptability*

The following criteria are used to determine whether impacts and risks were acceptable:

- The level of risk is determined to be low or medium (refer Figure 4-2);
- The activities, the identified impact and risk and/or the identified control measures are compliant with applicable legislation;
- The activities, the identified impact and risk and/or the identified control measures are consistent with Conservation Advice, Recovery Plans, Marine Reserve Management Prescriptions and/or other industry guidelines and standards and corporate policies, standards and procedures;
- The activities, the identified impact and risk and/or the identified control measures are consistent with the following principles of Ecologically Sustainable Development, as set out in section 3A of the EPBC Act, and the precautionary principle where relevant;
- Relevant stakeholder objections, claims, concerns or information have been considered during the assessment of impacts and risks and selection of control measures, where they are considered to have merit.

Acceptable levels are evaluated independently of ALARP and the acceptability criteria are considered when selecting the environmental performance outcomes that apply to managing a particular impact or risk

4.4.2 *Demonstration of ALARP*

For all risks, risk mitigation plans are developed and implemented using the Hierarchy of Risk Control. The mitigation control measures are taken into account and the risk is then reassessed in the RAM to ensure they are ALARP.

The following hierarchy of control is used to develop the necessary control measures when reducing risks to ALARP.

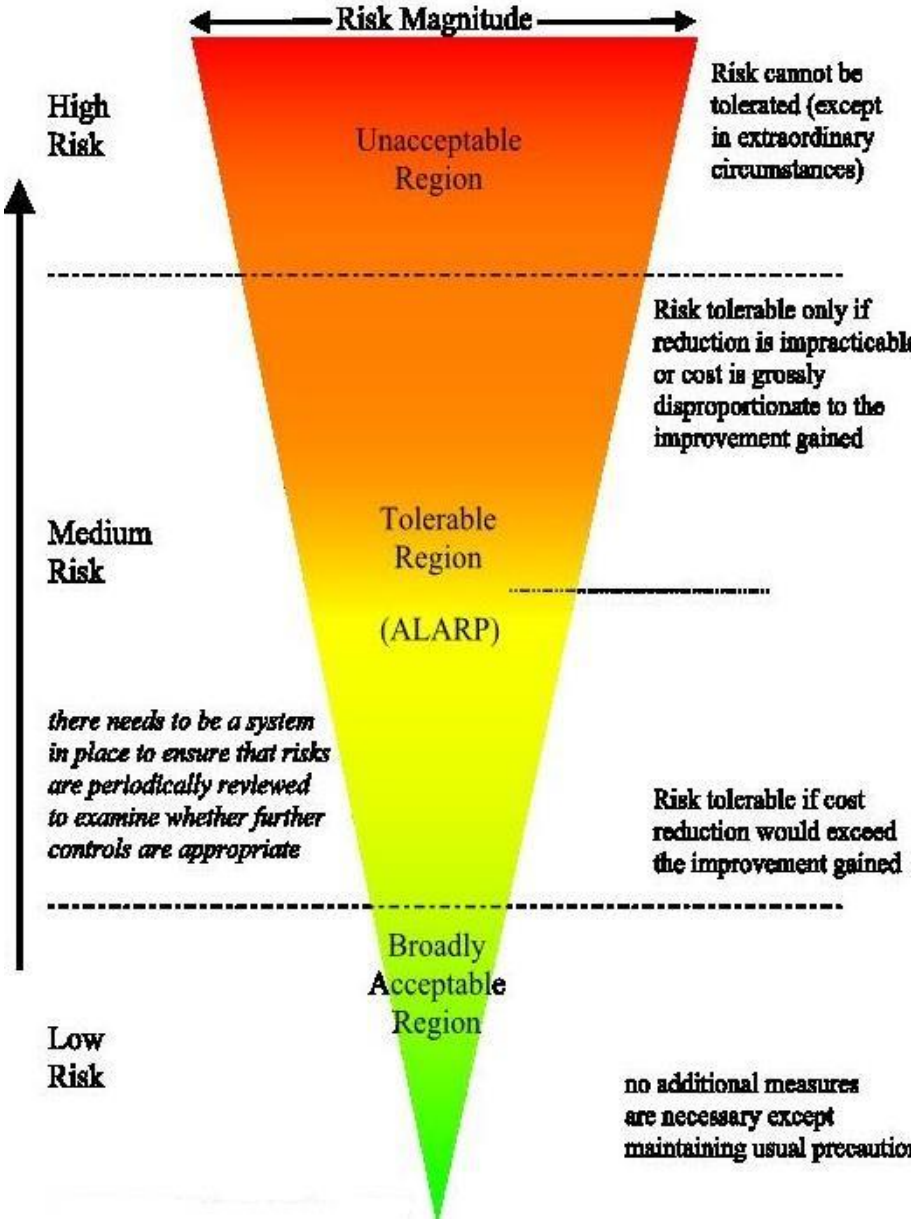
Table 4-3 Hierarchy of Risk Control

Hierarchy of Risk Control	
1	Elimination of hazard or task
2	Substitution of hazard or task
3	Changing work methods or patterns
4	Reduced or limited time exposure
5	Engineering controls (e.g. isolation, insulation and ventilation)
6	Good housekeeping
7	Safe systems of work
8	Training and information
9	Personal Protective Equipment and Clothing
10	Welfare

The following criteria were used to determine whether impacts and risks were ALARP:

- No reasonably practicable alternatives/substitutes to the activity are available that could eliminate, isolate or provide a net reduction in the risk to environmental values or sensitivities;
- No reasonably practicable additional controls (e.g. engineering, administrative or procedural controls) are available that could provide a net reduction in the risk to environmental values or sensitivities; and
- No reasonably practicable improvements are available that could increase the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility.

In making this determination, consideration was given to trade-offs of implementing the alternatives or additional controls in terms of cost, technical, environmental, safety and logistical implications.



Source: Image is based on concepts presented by NOPSEMA in N-04300-GN0166 Rev 5 June 2014

Figure 4-2 The ALARP Triangle

5 ENVIRONMENTAL RISKS AND MANAGEMENT – PLANNED ACTIVITIES

This section provides details of the hazards, impacts and risks, and Environmental Performance Standards (control measures) associated with the following aspects are described and discussed in the subsections below:

- Underwater noise;
- Interference with other users of the sea
- Artificial lighting;
- Routine discharges (sewage and grey water);
- Routine discharges (putrescible waste); and
- Atmospheric emissions.

5.1 Underwater Noise

The project centres around the ability to acquire geophysical information through the use of instruments designed to emit noise into the marine environment at varying frequencies and intensities. Any anthropogenic activity that occurs in vicinity to the sea can potentially result in an increase of the underwater noise levels and as a result the potential to disturb the marine fauna through physical, behavioural, perceptual, chronic and indirect effects (Richardson, Greene, Malme, & Thomson, 1995; Southall et al., 2007).

In line with this, responses received as part of the Stakeholder Consultation process has highlighted a concern regarding the potential effects of underwater noise on marine fauna, specifically commercially targeted fish species and crustacea (specifically lobster *Jasus vereauxi*). As a result, a higher level of detail has been included within this subsection with respect to the propagation of underwater noise and its effect on marine fauna. Details of acoustic modelling are described below (Sections 5.1.1). The overall noise risk assessment is shown in Table 5-2 and individual risk assessments to specific receptors are summarised in Sections 5.1.2 to 5.1.5.

5.1.1 *Underwater Noise Modelling*

An independent third party was engaged to undertake sound transmission loss modelling for the survey to predict the received sound exposure levels (SELs) (both SELs from a single shot and cumulative SELs within a 24-hour period), peak sound pressure levels (Peak SPLs), peak-to-peak sound pressure levels (Peak-Peak SPLs) and root-mean-square sound pressure levels (RMS SPLs) from the survey within the most immediate adjacent receiving areas.

The modelling included the following components:

- Airgun source modelling, i.e. modelling the sound energy emissions from the proposed GI Gun unit, including its far-field signature and power spectral density;
- Short range modelling, i.e. prediction of the received SELs (both cumulative SELs and SELs from a single shot), Peak SPLs, Peak-Peak SPLs and RMS SPLs over a range of 4 km from the source location.
- Accumulated modelling – using the survey parameters for number of lines (45), length of line (3.5 km), shot-point interval (6.25 m) and survey duration (48 hours without downtime), the cumulative SEL was estimated for the near-field SEL values adjacent to the survey area for the first 24 hours. It should be noted this is the utmost worst-case scenario for the sound field with close proximity to the survey area, assuming that every shot has the equal contribution (i.e. source SEL) to the sound field to be assessed. In reality, the received SEL values are expected to be much lower than the estimated values, as the contributions from those gun shots that are not in the source location would be significantly lower than the source SEL value.

Peak SPLs, Peak-Peak SPLs, RMS SPLs and cumulative SELs are derived from modelled SELs for single shot scenario applied with relevant correction factors, based on relevant worst-case assumptions.

The modelling was based on the following environmental parameters:

1. Water depths within the survey area vary from 125–145 m. Based on a conservative consideration, the shallowest water depth of 125 m was selected for this modelling study.
2. The most significant seasonal differences in speed profiles occur within the mixed layer near the sea surface. Typically, spring and summer seasons have downwardly refracting near-surface profiles, with the summer profile having the stronger downwardly refracting feature. Both the autumn and winter seasons exhibit a mixed surface layer surface duct, with the profile in the winter season having a stronger and deeper surface duct than that in the autumn season. Due to the stronger surface duct within the profile, it is expected that the winter season will mostly favour the propagation of sound from a near-surface acoustic source among four seasons. In a descending order, the autumn, spring and summer seasons are expected to have relatively weaker sound propagation for a near-surface acoustic source. As survey acquisition is planned during summer or autumn season in 2018, the autumn seasonal profile was selected for the modelling study, based on a conservative consideration of the sound speed profile in autumn and its greater influence on propagation of sound compared to summer. As summer sound speed profiles are expected to result in the weakest sound propagation of all four seasons, the precautionary approach supports the use of autumn as the worst-case scenario.
3. From dropcore results from 2010, the sandy seabed is generally more reflective than silt-clay seabed. Therefore, based on a conservative consideration, a half-space seafloor geoacoustic model with fine sand seafloor material is used for this modelling study.

The noise modelling results are shown in Table 5-1.

Table 5-1: Predicted maximum SELs (single shot and cumulative with a 24-hour period), Peak SPLs, Peak-Peak SPLs and RMS SPLs across water column at various ranges from the source location.

Predicted Parameter	Maximum levels across the water column at various ranges from the source location, dB re 1µPa^2·S or dB re 1µPa							
	10 m	50 m	100 m	200 m	1.0 km	1.5 km	2.0 km	4.0 km
SEL – single shot	178.2	164.3	158.4	152.6	143.0	140.0	137.2	129.5
SEL – cumulative	219.5	205.6	199.7	193.9	184.3	181.3	178.5	170.8
Peak SPL	205.8	191.9	186.0	180.2	170.6	167.6	164.8	157.1
Peak-Peak SPL	211.0	197.1	191.2	185.4	175.8	172.8	170.0	162.3
RMS SPL	199.0	185.1	179.2	173.4	163.8	160.8	158.0	150.3

Table 5-2 Summary of Underwater Noise Assessment

NOISE		
Hazard	Noise generated from the vessel, *Pacific Conquest* (i.e. engine and propellers) during transit to and from the area of operation and while conducting the survey.	
	Release of acoustic energy from the vessel will generate multiple pulses of high intensity noise which may impact on noise sensitive marine fauna, especially cetaceans that use sound for navigation and communication.	
Extent	Localised, until a few kilometres from the vessel, depending on noise propagation loss.	
Duration	Duration of the survey (~3–4 days).	
Risk Ranking with no controls	**Consequence**	**Likelihood**
	Moderate Effect (e.g. days), localised with no lasting avoidance or impacts	Reasonable probability – will probably occur in most circumstances
Inherent Risk	ALARP	

5.1.2 *Cetaceans*

Hazard
Noise generated from the vessel (i.e. engine and propellers) during transit to and from the area of operation and while conducting the survey.
Release of acoustic energy from the vessel will generate multiple pulses of high intensity noise.
Extent
Localised, until a few kilometres from the vessel, depending on noise propagation loss.
Duration
Duration of the survey (~3–4 days).
Impact

Without adequate controls in place, sound emitted from the seismic or vessel sound source has the potential to impact cetaceans in the following ways:
• Physiological:
  o non-auditory – damage to body tissues and induction of gas and fat embolism and auditory (sound induced hearing loss);
  o damage to the auditory system, permanent hearing threshold shift (PTS) and temporary hearing threshold shift (TTS); and
  o mortality.
• Perceptual: masking of communication with con-specifics, masking of other biologically important sounds used for navigation, finding prey, etc.
• Behavioural: interruption of normal behaviours such as feeding, breeding and nursing, behaviour modification, adaptive shifting of vocalisation intensity/frequency, and displacement from area (short or long term).

Receptors
EPBC listed cetacean species, including: • Pygmy blue whales – the pygmy blue whale migration, foraging or breeding BIAs are located >1 000 km from the Operational Area; • Indian Ocean Bottlenose Dolphin – Operational Area overlaps the foraging BIA; • Humpback whales – the Operational Area overlaps the migratory route, but does not overlap any resting or calving areas; and • Other transient cetacean species, such as occasional pygmy right whale and dolphins.
Environmental Performance Standards
Seismic acquisition will not take place outside accepted (agreed) time period for the survey.
Adherence to EPBC Policy Guidelines 2.1 (Part A), as appropriate for the activity (Nov – May); Part A of EPBC Policy Statement 2.1 will be applied in full to mitigate potential impacts to cetaceans, including: • Observation zone: 3+ km horizontal radius from the seismic source; • Low Power Zone: 2 km horizontal radius from the seismic source; • Shut-down zone: 500 m horizontal radius from the seismic source; • Pre-Start-up Visual Observations (> 30 mins before soft start); • Soft-start Procedures; • Start-up Delay Procedures; • Operational Shut-down and Low-power Procedures; • Night-time and Low Visibility Procedures; and • Sighting Reports. Aspects of Part B of EPBC Policy Statement 2.1 will be applied to mitigate potential impacts to cetaceans as follows: • Marine Mammal Observers (B.1); and • Increased low power zone: 2 km horizontal radius from the seismic source (B.4).
Vessel propulsion system(s) (engines and thrusters) maintained in good working order in accordance with manufacturers specification via the Planned Maintenance System (PMS) to ensure efficient operation.
Seismic source will be adequate for the project objectives (i.e. not overcharged), water depths and underlying geology.
Use of MFO to observe for marine fauna and Soft Start Policy.
Use of thrusters to maintain vessel's position only as required.

Spatial separation from cetaceans maintained at all times in compliance with Part 8 of the EPBC Regulations (Interactions with cetaceans and whale watching).
The survey will not be undertaken during peak humpback whale migrations (northern and southern migrations); 01 June – 31 July or 01 October – 30 November respectively.
MFO will maintain vigilant observation for marine cetaceans within precaution zones and vessel planned path throughout duration of seismic survey.
Seismic array will be shut down if cetacean (or whale shark) enters shut-down zone.
When observations cannot extend to 3 km (i.e. during night time or times of low visibility) operations may proceed provided there have not been 3 or more whales instigated power-down or shut-down situations during the preceding 24 hours.
Seismic gun will not be fired if cetaceans (or whale sharks) are within low power or shut-down zone within intended passage of vessel – alternative line plan to be selected as required.
The single airgun is initiated at increasing pressure from a lowest pressure of 800 psi to the maximum 2,000 psi.
Vessel and survey crew to attend environmental induction containing basic information and legal requirements on procedures to manage interactions between survey vessel, survey equipment and marine fauna (including, EPBC Act Policy Statement 2.1 Part A and Part B requirements, soft start, start-up delay, operations and stop work procedures, night time and low visibility procedures).
Details of Residual Impacts and Risks
Based on acoustic modelling and with the proposed controls in place, impacts to marine mammals such as cetaceans and dolphins, are primarily expected to be localised behavioural avoidance impacts with no long term ecological implications. PTS and TTS impacts are unlikely given that the received sound levels at the low power (2 km) and observation zones (3 km) control measures are well below the PTS and TTS impact thresholds, and the fact that there are no aggregation, feeding, breeding or calving areas within or adjacent to the Operational Area. The likelihood for any serious physiological impact (i.e. mortality or serious injury) during the seismic survey is considered Very Improbable, particularly after implementation of mitigation measures. Based on the site-specific acoustic modelling results, sound levels at 2 km away (i.e. Low-power zone) are below sound levels that are likely to cause mortality or serious injury to marine mammals. At 3 km there is a slight possibility of avoidance behaviour by whales. This avoidance behaviour represents only a minor effect on either the individual or the species unless avoidance results in displacement of whales from nursery, resting or feeding areas, at an important period for the species. Cetaceans may experience masking to a small degree, but this would be temporary and only at close proximity to the sound source. The introduction of low frequency acoustic noise into the marine environment has the potential to cause significant impacts to marine fauna. These potential impacts can be reduced through implementing control measures. Conducting the survey outside peak migration periods has a substantial mitigating effect. Strict adherence to the EPBC Policy Statement 2.1 (Part A and aspects of Part B) will be the primary control point in preventing impacts to marine fauna. The addition of two MFOs to the vessel's crew ensure that mitigation controls are followed and that continuous observations are kept when/if a whale is sighted and monitoring of performance standards are kept (as they will operate as back-to-backs). The continuous movement of the vessel will lessen the time that any one area of seabed is exposed to the airguns, providing an additional mitigation factor and the slow speed of the vessel (~3-4 knots) as it traverses each survey line will support the ability of fauna to move away from the source. Given the timing and short duration of the survey, the absence of critical habitats (feeding, breeding, calving, resting), relatively low numbers of marine mammals expected to be encountered in the Operational Area and the control measures proposed, the residual impacts and risks, with the control measures in place, have therefore been assessed as ALARP.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Moderate Effect (e.g. days), localised with no lasting avoidance or impacts	Reasonable probability- will probably occur in most circumstances	ALARP - Medium
Residual Risk	Minor - Short term effect, localised with no lasting avoidance	Reasonable probability- will probably occur in most circumstances	ALARP - Medium

5.1.3 *Fish*

Hazard
Noise generated from the vessel, *Pacific Conquest* (i.e. engine and propellers) during transit to and from the area of operation and while conducting the survey.
Release of acoustic energy from the vessel will generate multiple pulses of high intensity noise.
Extent
Localised, until a few kilometres from the vessel, depending on noise propagation loss.
Duration
Duration of the survey (~3–4 days).
Impact
Without adequate controls in place, sound emitted from the seismic or vessel sound source has the potential to impact fish in the following ways: • Mortal injury or recoverable injury to fish at very close range to the seismic source; • Temporary changes in hearing (temporary threshold shift; TTS) experienced by fish exposed to high sound levels for prolonged periods; and • Behavioural impacts resulting from disturbance, or masking or interfering with biologically important sounds.
Receptors
EPBC listed fish species, including: • Whale sharks – there are no known BIAs in the Operational Area and it is unlikely that whale sharks will be encountered; • Grey nurse shark – the Operational Area does not overlap any known aggregation sites. It does overlap a breeding BIA but the survey will not be undertaken in the possible mating or pupping periods; • Great white sharks – the survey area overlaps the BIA; and • Other transient fish such as occasional mako (shortfin and longfin), giant manta ray and porbeagle sharks.
Environmental Performance Standards
Seismic acquisition will not take place outside accepted (agreed) time period for the survey.
The survey will not be undertaken during grey nurse shark breeding; 01 June - 31 July.
Adherence to EPBC Policy Guidelines 2.1 (Part A), as appropriate for the activity (Nov – May); Part A of EPBC Policy Statement 2.1 will be applied in full to mitigate potential impacts to marine fauna, including: • Observation zone: 3+ km horizontal radius from the seismic source; • Low Power Zone: 2 km horizontal radius from the seismic source; • Shut-down zone: 500 m horizontal radius from the seismic source; • Pre-Start-up Visual Observations (> 30 mins before soft start); • Soft-start Procedures; • Start-up Delay Procedures; • Operational Shut-down and Low-power Procedures; • Night-time and Low Visibility Procedures; and • Sighting Reports. Aspects of Part B of EPBC Policy Statement 2.1 will be applied to mitigate potential impacts to cetaceans as follows: • Marine Mammal Observers (B.1); and • Increased low power zone: 2 km horizontal radius from the seismic source (B.4).
Vessel propulsion system(s) (engines and thrusters) maintained in good working order in accordance with manufacturers specification via the Planned Maintenance System (PMS) to ensure efficient operation.
No overcharging of the airgun.
Use of thrusters to maintain vessel's position only as required.
Seismic source will be adequate for the project objectives (i.e. not overcharged), water depths and underlying geology.

MFO will maintain vigilant observation for marine fauna within precaution zones and vessel planned path throughout duration of seismic survey.
Seismic gun will not be fired if cetaceans (or whale sharks) are within low power or shut-down zone within intended passage of vessel – alternative line plan to be selected as required.
Seismic array will be shut down if cetacean (or whale shark) enters shut-down zone.
The single airgun is initiated at increasing pressure from a lowest pressure of 800 psi to the maximum 2,000 psi.
Vessel and survey crew to attend environmental induction containing basic information and legal requirements on procedures to manage interactions between survey vessel, survey equipment and marine fauna (including, EPBC Act Policy Statement 2.1 Part A and Part B requirements, soft start, start-up delay, operations and stop work procedures, night time and low visibility procedures).
Details of Residual Impacts and Risks
The introduction of low frequency acoustic noise into the marine environment has the potential to cause significant impacts to marine fauna. These potential impacts can be reduced through implementing control measures. The knowledge of fish hearing capabilities and how they respond to acoustic signals and increased ambient sounds is still very limited. No studies to date have demonstrated direct mortality of adult fish in response to vessel noise or seismic airgun emissions, even when fired at close proximity (within 1–7 m; DFO 2004; Boeger et al. 2006 as cited in NSW DPI 2014; Popper et al. 2014). Carroll et al (2017; Table 3.16) concluded that "for fish, there are few data on the physical effects of seismic airguns (e.g. mortality, barotrauma), and of these none have shown mortality." For fish that are able to move away from seismic sources as they approach, the potential for lethal physical damage from airgun emissions is even further nullified. Reef-associated fish may show greater site attachment and may be less inclined to flee from a seismic sound source and experience greater effects as a consequence. While there are no identified habitats within the Operational Area for site-attached fish to occur, there are two FADs installed by the NSW DPI within the region. The Newcastle FAD is >15 km away from the Operational Area boundary, and received sound levels are not likely to cause acoustic disturbance to fish species aggregated there. The Swansea FAD is 3.5 km away from the Operational Area boundary but is ~5.5 km from the closest seismic source (survey line). At these distances from the sound source, the cumulative SEL is predicted to be at a level which available scientific evidence supports that no mortality or permanent injury will occur to fish species aggregated at the FADs. Based on the site-specific modelling and short duration of survey, the likelihood of permanent hearing loss/recoverable injury beyond 10 m from the acoustic source is very improbable, while the likelihood for TTS beyond 1 km is very improbable. Within 1 km, the risk from temporary and recoverable hearing loss to individual and populations of fish is moderate and beyond 1 km, is slight and negligible, which are acceptable levels. Current literature suggests that the risk of masking from seismic air guns is low and there has been no reported mortality of fish caused by air gun pulses. The approach of the survey vessel as with other vessels in the region (commercial shipping, fishing, recreational / tour boats) will most likely instigate an avoidance behaviour from some pelagic fish species, however the temporary nature of the vessel's movement and the comparative influence of the survey vessel compared to the region as a whole is considered minimal. The risk of behavioural impact from the seismic survey, associated with airgun pulses and vessel movement can be considered major closer to the source. There may be a high risk of behavioural impacts in fish species within near and intermediate ranges from the source. The survey operational area does overlap with areas that contain bony fish and those that use swim bladders for hearing (e.g. the Farm). Short term avoidance of the area may occur with a return within 24 hours, there are no cumulative impacts as the source is moving; therefore, there are not multiple impacts on the same fish. However. mitigation measures, predominantly the soft start procedure (and power down/shut down zones regarding approaching cetaceans) reduce this impact to acceptable. Strict adherence to the EPBC Policy Statement 2.1 (Part A and aspects of Part B) will be an additional control point in preventing the severity of any impacts to any visible marine fauna, not just cetaceans. Any residual impacts are expected to be minor and are not expected to result in any lasting population level impacts or longer ecological implications for the fish. The residual impacts and risks, with the control measures in place, have therefore been assessed as ALARP.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Moderate Effect (e.g. days), localised with no lasting avoidance or impacts	Reasonable probability- will probably occur in most circumstances	ALARP - Medium
Residual Risk	Minor - Short term effect, localised with no lasting avoidance	Reasonable probability- will probably occur in most circumstances	ALARP - Medium

5.1.4 *Crustacea (Lobster spp)*

Hazard
Noise generated from the vessel, *Pacific Conquest* (i.e. engine and propellers) during transit to and from the area of operation and while conducting the survey.
Release of acoustic energy from the vessel will generate multiple pulses of high intensity noise.
Extent
Localised, until a few kilometres from the vessel, depending on noise propagation loss.
Duration
Duration of the survey (~3–4 days).
Impact
Without adequate controls in place, sound emitted from the seismic or vessel sound source has the potential to impact Lobsters in the following ways: • Mortal injury or recoverable injury at very close range to the seismic source; • Behavioural impacts; • Larvae; and • Population reductions.
Receptors
Lobsters.
Environmental Performance Standards
Seismic acquisition will not take place outside accepted (agreed) time period for the survey.
The survey will not be undertaken between 01 June and 31 January to avoid spawning of eastern lobsters.
Vessel propulsion system(s) (engines and thrusters) maintained in good working order in accordance with manufacturers specification via the Planned Maintenance System (PMS) to ensure efficient operation.
No overcharging of the airgun.
Use of thrusters to maintain vessel's position only as required.
Seismic source will be adequate for the project objectives (i.e. not overcharged), water depths and underlying geology.
The single airgun is initiated at increasing pressure from a lowest pressure of 800 psi to the maximum 2,000 psi.
Vessel and survey crew to attend environmental induction containing basic information and legal requirements on procedures to manage interactions between survey vessel, survey equipment and marine fauna (including, EPBC Act Policy Statement 2.1 Part A and Part B requirements, soft start, start-up delay, operations and stop work procedures, night time and low visibility procedures).
Details of Residual Impacts and Risks
No exposure threshold criteria exist to enable an evaluation of mortality/mortal injury in crustaceans. However, based on the research findings to date these effects are likely to be confined to extremely close ranges (i.e. <10 m) from the source. Day et al. (2016) contained no evidence of lobster mortality for any experiment, as well as no evidence of impact to lobster embryos, which were described as resilient to the acoustic exposure, it is reasonable to conclude that the predicted sound levels generated by the Baleen 2D HR seismic survey acoustic source will likewise not cause mortality or serious injury to lobsters or crustaceans directly at the seabed. Therefore, lobster mortality in direct response to seismic airgun exposure is unlikely to occur, and the risk to the population is negligible, which is an acceptable level. Day *et al.* (2016) concluded that overall there were no differences in the quantity or quality of hatched larvae, indicating that the condition and development of spiny lobster embryos were not adversely affected by air gun exposure. The results also suggested that early life stage crustaceans may be more resilient to seismic air gun exposure than other marine organisms and highlight the caution necessary in extrapolating results from the laboratory to real world scenarios or across life history stages. Therefore, based on these larvae results, long-term, adverse impacts from acoustic exposure are unlikely to occur at the early embryonic developmental stage, and the risk to individual development and the greater population is negligible, which is an acceptable level. Sub-lethal, short-term behavioural impacts may occur to individual lobsters and other crustaceans. However, long-term, adverse impacts at the population level (and thus associated commercial fisheries) are unlikely to occur, based on the experimental research, the site-specific acoustic modelling results for the Baleen survey and the short duration of the activity. As such the risk to the catch rates are minor, which is an acceptable level.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Moderate Effect (e.g. days), localised with no lasting avoidance or impacts	Reasonable probability- will probably occur in most circumstances	ALARP - Medium
Residual Risk	Minor - Short term effect, localised with no lasting avoidance	Reasonable probability- will probably occur in most circumstances	ALARP - Medium

5.1.5 *Zooplankton*

Hazard
Noise generated from the vessel, *Pacific Conquest* (i.e. engine and propellers) during transit to and from the area of operation and while conducting the survey.
Release of acoustic energy from the vessel will generate multiple pulses of high intensity noise.
Extent
Localised, until a few kilometres from the vessel, depending on noise propagation loss.
Duration
Duration of the survey (~3–4 days).
Impact
Without adequate controls in place, sound emitted from the seismic or vessel sound source has the potential to impact Zooplankton in the following ways: • Mortal injury or recoverable injury at very close range to the seismic source; and • Behavioural impacts.
Receptors
Zooplankton communities (including copepods, cladocerans and krill larvae).
Environmental Performance Standards
Seismic acquisition will not take place outside accepted (agreed) time period for the survey.
Vessel propulsion system(s) (engines and thrusters) maintained in good working order in accordance with manufacturers specification via the Planned Maintenance System (PMS) to ensure efficient operation.
Use of thrusters to maintain vessel's position only as required.
Seismic source will be adequate for the project objectives (i.e. not overcharged), water depths and underlying geology.
The single airgun is initiated at increasing pressure from a lowest pressure of 800 psi to the maximum 2,000 psi.
Vessel and survey crew to attend environmental induction containing basic information and legal requirements on procedures to manage interactions between survey vessel, survey equipment and marine fauna (including, EPBC Act Policy Statement 2.1 Part A and Part B requirements, soft start, start-up delay, operations and stop work procedures, night time and low visibility procedures).
Details of Residual Impacts and Risks

The range of pathological effect on zooplankton is likely to be restricted to < 2-5 m. Calculations based on the site-specific modelling indicated that less than 0.02% of plankton in an area would be affected. The percentage of plankton affected is considered very minor, and the effects from the seismic discharge is insignificant compared with the size of the planktonic population in a survey area or natural mortality rates for planktonic organisms.

Sætre and Ona (1996) calculated that under the 'worst case' scenario, the number of larvae killed during a typical seismic survey was 0.45% of the total population. There may be substantial impact from seismic activity on zooplankton populations on a local scale within or close to the survey area. However, on a regional scale, the impacts are expected to be minimal and not discernible at a regional level. Zooplankton biomass is known to recover to pre-seismic levels only three days following the completion of seismic surveys.

Acoustic impacts are not significant when compared to rates of natural mortality in planktonic populations (10–50% per day), and population-level impacts are not expected to occur, particularly as recovery has been documented within three days of exposure.

There is a moderate relative risk of impairment (i.e. recoverable injury and TTS) effects to fish eggs and larvae < 10 m of the acoustic source. The relative risk of impairment to zooplankton >10 m from the acoustic source is low and negligible, which is an acceptable level.

There is a moderate relative risk of behavioural effects to fish eggs and larvae < 10 m of the acoustic source, and a low relative risk >10 m from the source. It is not clear what these behavioural impacts could be, but it is possible that zooplankton (including free-swimming larvae) could move either vertically or horizontally within the water column in response to a stimulus such as underwater noise. These impacts are not likely to be significant, especially as they will be restricted to a range of a <10 m from the acoustic source. Therefore, the relative risk of behavioural impacts to zooplankton >10 m from the acoustic source is low and negligible, which is an acceptable level.

The Operational Area does not overlap known foraging BIA for any marine fauna species, and thus the sound levels generated by the acoustic source is not likely to cause higher ecosystem-level impacts, and the risk for higher trophic levels is negligible, which is an acceptable level.

Given the limited size of the survey area and the short duration of the sound exposure, it is expected that long-term impacts on the zooplankton communities in the survey area will be minimal and acceptable. After a mass die-off following a seismic survey, previous research found that the zooplankton biomass recovers three days after completion of the survey (Richardson et al., 2017). As such, the overall risk to zooplankton is negligible, which is an acceptable level.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Moderate Effect (e.g. days), localised with no lasting avoidance or impacts	Reasonable probability- will probably occur in most circumstances	ALARP - Medium
Residual Risk	Minor - Short term effect, localised with no lasting avoidance	Reasonable probability- will probably occur in most circumstances	ALARP - Medium

5.1.6 *Tourism*

Refer to Other Interference with Other Users of the Sea Section 5.2

5.2 Interference with Other Users of the Sea

Hazard
The presence of *Pacific Conquest* within the survey area may potentially interfere with other users (i.e. commercial fishers, recreational fishers, commercial shipping (including whale watching vessels)) of the sea.
Extent
Operational Area only.
Duration
Duration of the survey (~3–4 days).
Impact
• Restricting or prohibiting access to the survey location and adjacent areas along with increasing the chance of collision and risk to these operators; • Increased risk of loss / damage to fishing equipment resulting in loss of catch; and • Loss of income or increased costs associated with other uses.
Receptors
• Commercial and recreational fishers; and • Tourism businesses based around marine activities e.g. whale watching.
Environmental Performance Standards
Seismic acquisition will not take place outside accepted (agreed) time period for the survey
Adherence to EPBC Policy Guidelines 2.1 (Part A), as appropriate for the activity (Nov – May); Part A of EPBC Policy Statement 2.1 will be applied in full to mitigate potential impacts to cetaceans, including: • Observation zone: 3+ km horizontal radius from the seismic source; • Low Power Zone: 2 km horizontal radius from the seismic source; • Shut-down zone: 500 m horizontal radius from the seismic source; • Pre-Start-up Visual Observations (> 30 mins before soft start); • Soft-start Procedures; • Start-up Delay Procedures; • Operational Shut-down and Low-power Procedures; • Night-time and Low Visibility Procedures; and • Sighting Reports. Aspects of Part B of EPBC Policy Statement 2.1 will be applied to mitigate potential impacts to cetaceans as follows: • Marine Mammal Observers (B.1); and • Increased low power zone: 2 km horizontal radius from the seismic source (B.4).
Vessel propulsion system(s) (engines and thrusters) maintained in good working order in accordance with manufacturers specification via the Planned Maintenance System (PMS) to ensure efficient operation.
No overcharging of the airgun.
Use of thrusters to maintain vessel's position only as required.
Relevant stakeholders identified and notified of proposed activity, including location and schedule
Consultation with appropriate regulators / stakeholders prior to commencement of survey (with notification of location and survey duration and schedule).
Location and timing of the survey forwarded to AMSA and Australian Hydrographic Office >2 weeks prior to mobilisation (for issue of NTM) and warnings broadcast to shipping in region.
Direct communications with fishers and careful management with respect to access of the survey area will be implemented throughout operations to minimise the level of disturbance.
Direct communication through NSW DPI communication channels (e.g. Newscast, Charter Chatter and NSW DPI Facebook).
The survey will not be undertaken between 01 June - 31 January to avoid spawning of eastern lobsters.
The single airgun is initiated at increasing pressure from a lowest pressure of 800 psi to the maximum 2,000 psi.
Vessel and survey crew to attend environmental induction containing basic information and legal requirements on procedures to manage interactions between survey vessel, survey equipment and marine fauna (including, EPBC Act Policy Statement 2.1 Part A and Part B requirements, soft start, start-up delay, operations and stop work procedures, night time and low visibility procedures).
Compliance with EPBC Act Policy Statement 2.1.
Vessel to be equipped with necessary navigation aids (i.e. radar, vessel GPS tracking).
Maintain appropriate lighting, communication and navigation equipment (including operational maintenance) as required to satisfy navigation / marine safety legislation (i.e. *International Regulations for the Prevention of Collisions at Sea 1972 (as amended), International Convention of the Safety of Life at Sea (SOLAS), 1974 and Navigation Act 2012).*
Tail buoy markers maintained and visible.
Enforcement of 2 nm exclusion zone around the vessel to avoid entanglement and collision.
Look-out duties maintained 24 hours per day by competent and trained crew, with additional watch officer / rating for night time activities as required through international legislation (i.e. SOLAS) and internal vessel procedures.

Regular updates with relevant stakeholder / regulators (local fisheries, AMSA (AMSA Rescue Coordination Centre-RCC)) on vessel movements and intended movements (line plan).
Vessel management systems adhered to.
The survey will not to be undertaken during key recreational fishing period and during the planned game fishing tournaments defined as in s3.6.5 being from 9 February to 11 March, plus 23 to 25 March.
The survey will not overlap the temporal or spatial boundaries of the 'carpark' area at the times of known game fishing tournaments, defined as being from 9 February to 11 March and 23-25 March.
The survey will not be undertaken between 23 March and 8 April, being the week lead up to and after Easter – 1 April 2018 (due to overlap with peak commercial and recreational fishing activities).
Details of Residual Impacts and Risks
There are no designated shipping routes or anchor points located in the survey area. Commercial shipping has the ability to navigate to avoid the survey area with little disruption to their main course and will be required to do so through notices administered by AMSA / Hydrographic Office. Adherence to ship safety protocols to ensure that the survey vessel is visible to other users and open communications will provide control measures to reduce the risk of collision. The potential effects on commercial shipping are considered negligible and acceptable. The socioeconomic impact of the temporary exclusion of fishers from potential fishing grounds has the potential to cause disruptions (i.e. possible loss of catch, amendments to fishing practices). However, due to the ability of fishers to utilise other locations, the short duration of the survey and the inability to determine the movement of fish specifically in the survey location (and therefore the consequence of excluding fishers from this area) this is considered an acceptable risk. The survey will not be undertaken during key recreational fishing periods, planned game fishing tournaments or weeks surrounding Easter, and will not overlap spatially or temporally with the 'carpark' area at the times of known game fishing tournaments. The nearest FAD, the Swansea FAD, is 3.5 km away from the Operational Area but is 5.5 km away from the closest survey line which is the seismic source. Temporary behavioural impact has been found to be at a distance of 2 km (Pena et al 2013), and based on the site-specific modelling the Swansea FAD is well outside the impact risk area. In addition, Popper et al (2014) found that there was only a low behavioural risk to fish at the (F) far distance - thousands of meters. The consequences of conducting the survey will not cause serious long-term damage to regional fishers, any exclusion from fishing grounds will be temporary in nature (~three to four days) and will be restricted to the vicinity of the survey vessel (i.e. 2 nm exclusion zone), which will move on a daily basis. Therefore, with the control measures implemented, adverse impacts to other maritime users would be moderate, localised and temporary (3–4 days), causing no lasting avoidance or impacts, which is considered an acceptable level.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Moderate Effect (e.g. days), localised with no lasting avoidance or impacts	Reasonable probability- will probably occur in most circumstances	ALARP - Medium
Residual Risk	Minor - Short term effect, localised with no lasting avoidance	Reasonable probability- will probably occur in most circumstances	ALARP - Medium

5.3 Artificial Lighting

Hazard
Pacific Conquest will maintain lighting for navigation and onboard safety requirements (i.e. during deck operations) at all times throughout the duration of the survey
Extent
Artificial surface lighting will be limited to the area directly adjacent to the vessel and would not directly spill outside the area of operation. Vessel lighting (particularly at night-time) will be visible at distances of at least 10 km, depending upon weather conditions, with intensity attenuating with distance.
Duration
Duration of the survey (~3–4 days).
Impact
Light emissions can affect fauna in the following ways: • Behaviour; and • Orientation.
Receptors
• Turtles; • Seabirds; and • Marine mammals and organisms.
Environmental Performance Standards
Seismic acquisition will not take place outside accepted (agreed) time period for the survey.
Minimum lighting used as required, to satisfy navigation / marine safety (*International Regulations for the Prevention of Collisions at Sea 1972 (as amended).*
Minimum lighting used for safe (deck) operations with lights orientated to work surfaces to reduce 'marine light pollution (The Australian Offshore Support Vessel Code of Safe Working Practice (Section 9.1.4 Deck lighting – AMSA, version 3, 2002).
Awareness training for all crew to minimise unnecessary lighting, with continuous reminders throughout duration of the activity.
Compliance with EPBC Act Policy Statement 2.1.
Details of Residual Impacts and Risks
It is unlikely that lights from the vessel will have a significant impact on seabirds. The nearest known bird breeding site is ~60 km north of the survey and the closest point of the Operational Area to land is ~20 km. Due to the small size of the Operational Area the environmental risk associated with collision from seabirds attracted to the light is considered to be low, with no specific, additional mitigation required. Artificial lighting may result in localised short-term aggregation of fish activity. However, as the vessel is moving this occurrence is likely to be minimal, if at all, and will be temporary with any long-term changes to fish species composition or abundance highly unlikely. The consequence is determined to be slight with a distinct possibility of the effect occurring leading to no requirement for additional mitigation to be incorporated in relation to lighting. There are no known turtle rookeries within the region of the survey area and the likelihood of encountering adult turtles is determined as being slight. The vessel will be operating at least 20 km from the coast at its closest point. The survey vessel will be continuously moving, albeit at a slow speed, and consequently the effects of artificial lighting are likely to be less than for a stationary source such as an offshore facility or coastal developments. The consequence of any impact is deemed to be moderate leading to no additional mitigation being required. Marine fauna that encounter the vessel may display short term behavioural changes. Reports (BHP Billiton, 2005, Stybarrow Development, northwest Australia and Husky Oil Operations, White Rose Oilfield, 2001, Newfoundland, Canada) have concluded that there was no evidence to suggest an impact on the feeding or breeding behaviours of cetaceans. The survey is going to be undertaken outside peak Humpback whale migration periods but may encounter occasional early migrators, however, the risk with the controls in place (adherence to EPBC Act Policy Statement 2.1) is acceptable. Given the temporary nature of the project (~3-4 days) and the control measures in place, including directional lighting, the adverse impacts on the receiving environment are considered to be of an acceptable level.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Slight – possible avoidance responses	Slight possibility – could occur but not expect to	ALARP - Low
Residual Risk	Slight (Negligible) Effect	Slight possibility (could occur but not expected)	ALARP - Low

5.4 Routine Discharges (Sewage and Grey Water Discharges)

Hazard			
During normal vessel operations a number of routine discharges (sewage, greywater, deck drainage and bilge water) to the marine environment will be required.			
Extent			
Small volumes of discharged material are likely to be localised to the survey vessel and surface waters.			
Duration			
Intermittently throughout duration of the survey (~3–4 days).			
Impact			
Routine discharges may reduce the water quality of the marine environment as follows: • disease introduction; • oxygen depletion; and • nutrient enrichment.			
• **Receptors**			
Marine fauna.			
Environmental Performance Standards			
Waste management in accordance with Vessel Shipboard Garbage Management Plan (including the treatment of sewage and grey water discharges via an approved sewage treatment plant).			
Vessel's sewage treatment plant is maintained in accordance with PMS.			
Grey water (from showers, laundry, dishwasher) may be discharged at sea as per Annex IV.			
Discharge to comply with Protection of the Sea (Prevention of Pollution by Ships) Act 1983 and sewage will be treated in accordance with MARPOL (Annex IV) / AMSA Marine Orders 96, including: • Discharge of sewage is permitted in Operational Area (i.e. >3 nm from nearest shoreline if comminuted and disinfected using an approved system and/or >12 from nearest shoreline if not comminuted and disinfected using an approved system).			
Quantity, time and location of disposal are recorded.			
Tools and resources available to clean up spills consistent with SOPEP.			
Crew inductions will include details for correct waste disposal, spill response and good housekeeping practices (including minimising the level of waste (i.e. water use minimisation, shower duration, launder clothing as necessary).			
Discharges of bilge water in accordance with MARPOL Annex 1, (Regulation 6, 14 and 7).			
Bilge water discharged via oil water separators (as per MARPOL Annex I which specifies <15ppm oil content).			
Oil filtering system of an adequate and approved design maintained in accordance with vessel PMS.			
Correct storage of chemicals and hydrocarbons in accordance with Hazardous Goods Procedure.			
Tools and resources available to clean up spills consistent with SOPEP.			
Scupper plugs or equivalent deck drainage control measures (bunding) where chemicals and hydrocarbons are stored and frequently handled to prevent run off.			
Crew inductions will include details for correct waste disposal, spill response and good housekeeping practices.			
Details of Residual Impacts and Risks			
Routine discharges will be generated throughout the duration of the activity. The release of these discharges, providing they are compliant with MARPOL requirements are permitted in Australian waters under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, which enacts MARPOL requirements. Good housekeeping and minimising waste as far as practicably possible will have a positive impact on the volume of material discharged. MARPOL requirements are internally accepted and utilised globally and are considered to be the most appropriate standard to adhere to in this environment given the nature and scale of the activity. Therefore, with the control measures implemented, adverse impacts from routine discharges would be negligible, which is considered an acceptable level of environmental impact.			
Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Minor (possible short-term effect)	Near certainty	ALARP - Low
Residual Risk	Slight (Negligible) Effect	Near certainty	ALARP - Low

5.5 Routine Discharges - Putrescible Waste Discharge

Hazard			
During normal vessel operations putrescible wastes are discharged to the marine environment.			
Extent			
Small volumes of discharged material are likely to be localised to the survey vessel and surface waters.			
Duration			
Intermittently throughout the duration of the survey.			
Impact			
Potential impacts from the discharge of putrescible waste include: • Temporary and localised increase in the content of nutrients in the surrounding surface waters; • Increase scavenging behaviour of marine fauna and seabirds; and • Marine pollution from debris (direct or indirect), physiological impacts through entanglement and ingestion including infection and death.			
Receptors			
• Marine fauna; and • Seabirds.			
Environmental Performance Standards			
Galley crew will contain all food scraps for discharge in accordance with MARPOL Annex V (enacted by AMSA Marine Orders Part 95, Garbage).			
Permission from the bridge will be acquired prior to discharge.			
Galley crew will ensure that all non-putrescible galley waste (i.e. packing, cooking oils and grease) is securely stored prior to transfer back to shore for recycling or disposal.			
All wastes not treated on-board disposed of at an appropriate licensed facility.			
Waste management in accordance with Vessel Shipboard Garbage Management Plan and in line with the Company's Waste Management Plan.			
Waste records maintained (controlled waste transfer note).			
Galley crew adequately training and notified of all waste management requirements.			
All wastes not treated on-board will be disposed at an appropriate licensed facility.			
Solid wastes will be segregated into clearly marked containers.			
Waste management in accordance with MARPOL (Annex V) (enacted by AMSA Marine Orders 94, Packaged harmful substances and Marine Order 95 Garbage), Garbage Management Plan and Company's Waste Management Plan.			
All bins on deck will be covered to prevent rubbish blowing overboard.			
Crew inductions will include details for correct waste disposal, spill response and good housekeeping practices.			
Waste records maintained (controlled waste transfer note).			
Details of Residual Impacts and Risks			
Routine discharges will be generated throughout the duration of the activity. The release of these discharges, providing they are compliant with MARPOL requirements are permitted in Australian waters under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, which enacts MARPOL requirements. Good housekeeping and minimising waste as far as practicably possible will have a positive impact on the volume of material discharged. MARPOL requirements are internally accepted and utilised globally and are considered to be the most appropriate standard to adhere to in this environment given the nature and scale of the activity. In the absence of a macerator, food scraps requiring disposal are only permitted at a distance of at least 12 nm from the nearest land. Therefore, with the control measures implemented, adverse impacts from routine discharges would be negligible, which is considered an acceptable level of environmental impact.			
Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Minor (possible short-term effect)	Near certainty	ALARP - Low
Residual Risk	Slight (Negligible) Effects	Near certainty	ALARP - Low

5.6 Atmospheric Emissions

Hazard
Combustion of fuel from the vessel's engines, generators, mobile and fixed plant and equipment will result in greenhouse gas emissions such as carbon dioxide (CO_2), methane and nitrous oxide (N_2O). The use of ozone depleting substances (ODS) in closed systems i.e. rechargeable refrigeration systems is permitted for use on vessels.
Extent
Localised around the point source, and under normal circumstances gaseous emissions quickly dissipate into the atmosphere.
Duration
Temporary, throughout the duration of the activity (~3-4 days).
Impact
Potential impacts from the discharge of putrescible waste include: • Temporary and localised increase in the content of nutrients in the surrounding surface waters; • Increase scavenging behaviour of marine fauna and seabirds; and • Marine pollution from debris (direct or indirect), physiological impacts through entanglement and ingestion including infection and death.
Receptors
• Marine fauna; and • Seabirds.
Environmental Performance Standards
All machinery will undergo planned service and maintenance in accordance with the vessels PMS.
Incineration will be in compliance with Annex VI, i.e. no incineration of substances that will have an adverse effect on air emissions (oily rags, tyres).
Compliance with MARPOL (Annex VI) for the Prevention of Air Pollution from Ships (AMSA Marine Order Part 97 (Air pollution)) including: • Low sulphur diesel will be selected in line with MARPOL Annex VI requirements to minimise SOx emissions; • No discharge of ozone-depleting substances (ODS) MARPOL Annex VI; • Vessel maintains records of ODS onboard; and • Transport use will be carefully planned to essential travel only to keep fuel use to a minimum
Ozone-depleting substances managed in accordance with Regulation 13 of MARPOL Annex VI.
Comply with Fuel Management Standard (M31SM/P008) - Automotive diesel fuel to be purchased from a registered supplier that confirms fuel to contain less than 3.5% m/m sulphur.
Monitor of vessel's fuel usage or abnormal consumption and in the event of high usage the chief engineer will initiate corrective action to minimise excessive air pollution.
Details of Residual Impacts and Risks
Atmospheric emissions from vessels are permissible under MARPOL Annex VI requirements and the *Protection of the Sea* (Prevention of Pollution from Ships) *Act 1983*, which enacts MARPOL legislative requirements. Automotive diesel is used by *Pacific Conquest*, which is lower in sulphur oxides compared to heavy fuel oil. The fuel will meet regulated sulphur content levels (detailed in fuel receipt) in order to control emission quality and will be sourced through an approved supplier. Air pollution is regulated internationally by the IMO through the International Convention for the Prevention of Pollution from Ships (MARPOL, Annex VI) and national legislation that acts to implement the requirements of MARPOL. *Pacific Conquest* meets the requirements with respect to atmospheric emissions (IAPP certificate), fuel use is monitored and controls / vessel procedures are in place to monitor these emissions to ensure continual compliance. Therefore, with the control measures implemented, adverse impacts to the atmospheric environment would be negligible, which is considered an acceptable level of environmental impact.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Slight (Negligible) Effects	Near certainty	ALARP - Low
Residual Risk	Slight (Negligible) Effects	Near certainty	ALARP - Low

6 ENVIRONMENTAL RISKS AND MANAGEMENT – UNPLANNED ACTIVITIES

This section provides details of the hazards, impacts and risks, and Environmental Performance Standards (control measures) associated with the following aspects are described and discussed in the subsections below:

- Introduction of Marine Pests;
- Disturbance of the Seabed or Loss of Equipment;
- Hazardous and Non-Hazardous Solid Wastes;
- Physical Presence of Vessel (Marine Fauna or Vessel Collision, Entanglement of Fishing Gear);
- Spillage of Hazardous Chemicals and Liquid Waste (excluding fuel) to the Sea; and
- Accidental Hydrocarbon (Fuel) Spill.

The control measures proposed to reduce the risk of impact to ALARP are described in the relevant tables below.

6.1 Introduction of Marine Pests

Hazard
Vessels originating outside Australian waters may act as a vector for Introduced Marine Species (IMSs). This can arise through a number of mechanisms: • Biofouling on the vessel's external hull, equipment (such as seismic array) or internal systems (e.g., sea chest, seawater systems); and • Ballast water may contain organisms such as fish, invertebrate larvae and phytoplankton from foreign-sourced waters.
Extent
Localised (seabed and water column in immediate vicinity of vessel) to widespread establishment of IMP along the east coast of Australia (and potentially the whole coast) as a worst case.
Duration
Temporary (activity of the vessel) to long term (if IMP successfully established).
Impact
Once established, an IMP has the potential to spread, disrupt and displace native ecosystems and associated values and sensitivities (e.g. tourism, commercial fisheries, and heritage values).
Receptors
• Marine environment; and • Socio-economic.
Environmental Performance Standards
Vessel anti-fouling systems are maintained in compliance with International Convention on the Control of Harmful Anti-fouling Systems on Ships and regulations of the *Biosecurity Act 2015* (Australian Ballast Water Management and Anti-fouling and In-water Cleaning Guidelines).
Vessel has DAWR clearance to be in Australian waters.
A bio-fouling vessel risk assessment (VRASS) was completed prior to mobilisation to Australia as defined within the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009) and ranked as "low".
Immersible equipment and the survey vessel hull, sea chests and other niches must be 'clean' before the survey activity begins.
The suspected or confirmed presence of any marine pests or disease must be reported to NOPSEMA as a reportable incident.
Under normal operations of the survey activity, no ballast water discharge will take place.
Details of Residual Impacts and Risks

Pacific Conquest has been active within Commonwealth waters since the previous dry-dock cleaning and inspection (January 2016). The majority of known IMPs require shallow water environments, permanent hard substrates, or both to become established. Given the depth at the location, it is unlikely that IMS would be able to successfully translocate from the vessel to the Operational Area. *Pacific Conquest* will be required to adhere to strict Commonwealth quarantine requirements and practices consistent with the National Biofouling Management Guidance for Petroleum Production and Exploration Industry (Australian Quarantine Inspection Service, 2011). Therefore, adherence to these regulations will reduce the risk of species translocation to negligible, which is considered an acceptable level of environmental impact.			
Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Massive – long term, potentially permanent damage to local environment (dependant on the species)	Slight possibility – not expected to occur as vessel originates from within Australia.	Unacceptable
Residual Risk	Slight (Negligible) Effect	Slight Possibility, (very unlikely)	ALARP - Low

6.2 Disturbance of the Seabed / Loss of Equipment

Hazard
Disturbance of the seabed habitat from anchoring or dropped objects. Loss of equipment (including floating debris) causing entanglement of marine fauna and a navigational hazard to other marine users (i.e. commercial shipping, fisheries).
Extent
Direct impacts due to the anchor making contact (including anchor drag) with the seabed or dropped objects would be restricted to the impact zone within the Operational Area. Depending upon the nature of the item(s) dropped or lost overboard, some could be carried by currents and drift beyond the area of operation. The loss of equipment essential to the completion of the survey could result in significant delays with time schedules impacting upon other aspects of the environmental management plan.
Duration
The hazard will exist throughout the timeframe of the activity. Anchoring is not a planned activity during the survey, and the water depth in the Operational Area is greater than appropriate for anchoring.
Impact
• Damage to benthic habitats and associated biota that lie directly within the footprint of the dropped object or anchor; and • Hazard to other marine users.
Receptors
Benthic habitat.
Environmental Performance Standards
The *Pacific Conquest* cannot anchor in the Operational Area due to water depth (except in the event of an emergency).
Any incidents of vessel anchoring or grounding shall be reported to NOPSEMA as a reportable incident.
Capstans and anchor handling equipment maintained in accordance with the Planned Maintenance System (PMS), and operation of the anchor winch and associated deployment and recovery equipment in accordance with procedures.
All lifting equipment used on the vessel to be certified.
Streamers will be: • retrieved if lost accidentally; and • checked/inspected prior to use (including associated equipment).
Capstans and anchor handling equipment maintained in accordance with the Planned Maintenance System (PMS), and operation of the anchor winch and associated deployment and recovery equipment in accordance with procedures.
Shipboard safety procedures to be followed, all equipment checks to be completed prior to deployment (deployment and recovery of streamers handled in accordance with vessel-specific procedure).
Competent personnel onboard operating lifting equipment and overseeing deployment and recovery of equipment.
Emergency procedures in place for equipment entanglement, loss and retrieval.
In-water equipment lost will be recovered (where possible) and detailed records maintained of any loss of in-water equipment lost.
If equipment lost is irretrievable, maintain records of the circumstances that prohibited the equipment from being recovered and inform AMSA of the potential navigation hazard to other mariners.
Streamer tow depth will be 3 m and no closer than 50 m from the seabed.
Details of Residual Impacts and Risks
Disturbance of the seabed will only occur from dropped equipment as part of deployment of the seismic equipment (i.e. gun array or streamer) or general boat operations. All equipment required for deployment and retrieval will be maintained as per *Pacific Conquest* PMS and operational procedures. Potential environmental impacts from a seabed disturbance would most likely be minor and related to indents in the soft sediment habitat assumed to cover the Operational Area. The application of controls to ensure that the risk of loss or entanglement of towed equipment is reduced to ALARP (i.e. 2 nm safety exclusion zone) acts will lessen the likelihood of such an occurrence. Therefore, with the control measures implemented, adverse impacts to the seabed would be negligible, which is considered an acceptable level of environmental impact.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Moderate, depending upon the item(s) lost / dropped.	Slight possibility – (not expected to occur)	ALARP - Low
Residual Risk	Slight (Negligible) Effect	Slight Possibility, (very unlikely)	ALARP - Low

6.3 Hazardous and Non-Hazardous Solid Wastes

Hazard			
Hazardous (e.g. aerosol cans, batteries, fluorescent tubes or medical wastes) and non-hazardous solid wastes (paper, drink cans, plastics and packaging) may be released unintentionally to the marine environment.			
Extent			
The hazard originates within the area of operation. All non-buoyant waste material is expected to remain within the area of operation. However buoyant waste material would potentially extend well beyond the boundaries of the survey area due to wind and currents.			
Duration			
An unplanned release of waste may occur during the survey. However, the potential impacts may continue long after the completion of the survey (i.e. until the waste degrades or is removed from the environment).			
Impact			
• Reduction of water quality and long term 'pollution' of the marine environmental; • Physiological harm through ingestion or entanglement may occur to individual fish, cetaceans, marine reptiles or seabirds, and potentially terrestrial organisms when debris is beached; and • Damage to fishing gear (trawl / gill nets) and aesthetic impacts (beach litter) may also occur.			
Receptors			
Marine environment (flora and fauna).			
Environmental Performance Standards			
All wastes collected, stored, processed and disposed of in accordance with *Pacific Conquest*'s Shipboard Garbage Management Plan, as required under MARPOL Annex V, Regulation 9.			
All non-hazardous waste (including scrap metal and wood) stored within suitably enclosed bins or stowed appropriately below decks.			
Hazardous wastes separated, labelled and stored within secondary containment (e.g. bin located in bunded areas).			
Vessel crew to take precautions against the loss of waste over the side, including ensuring all equipment on deck to be secured when not in use.			
Induction and crew training in good housekeeping and correct stowage of solid waste material.			
Non-food waste will be disposed of onshore at a suitable waste facility or to a carrier licensed to receive the waste should the port of demobilisation not have sufficient facilities.			
Accidental release of waste to the marine environment reported and investigated, and corrective actions are implemented.			
Details of Residual Impacts and Risks			
Good housekeeping and minimising waste as far as practicably possible will have a positive impact on the containment of these materials. Adequate crew training and reminders throughout the duration of the voyage will assist in minimising the risk of accidental release of solids. MARPOL requirements are internationally accepted and utilised globally and are considered to be the most appropriate standard to adhere to in this environment given the nature and scale of the activity. With adherence to these standards, adverse impacts to the marine environment would be negligible, which is considered an acceptable level of environmental impact.			
Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Major effect	Reasonable probability	Unacceptable
Residual Risk	Slight (Negligible) Effect	Slight Possibility, (very unlikely)	ALARP - Low

6.4 Physical Presence of Vessel (Marine Fauna / Vessel Collision, Entanglement of Fishing Gear)

Hazard
The potential exists for interactions or collisions between *Pacific Conquest* and marine fauna, and entanglement with fishing gear. Collision with commercial / recreational vessels, potentially catastrophic impacts (fatalities, sinking, marine pollution).
Extent
Restricted to the immediate area around *Pacific Conquest* while underway during transit to and from the port of mobilisation to the area of operation and throughout the area of operation.
Duration
Throughout the duration of the activity (3-4 days).
Impact
• Marine fauna, causing injury (lacerations) or death due to vessel / propeller strike, entanglement / entrapment in streamers and tail buoys. The main risk involves large marine fauna such as slow-moving cetaceans, dolphins, dugongs, whale sharks and marine turtles to differing degrees; and • Entanglement with fishing gear, especially trap and lines.
Receptors
Marine fauna and other users of the sea.
Environmental Performance Standards
At all times during the survey, the vessel will implement control measures based on the EPBC Act Part 8 (Interacting with cetaceans and whale watching) / Australian National Guidelines for Whale and Dolphin Watching (2005): • the vessel will not travel at speeds greater than 6 knots within 300 m (caution zone) of a cetacean and will not approach closer than 100 m from an animal (with the exception animals bow riding); • the survey vessel must not enter the caution zone of a calf; and • if a calf appears in the caution zone, then the vessel must either: ▪ disengage the gears; or ▪ withdraw the vessel from the caution zone at a constant speed of less than 6 knots.
Vessels to be equipped with navigational aids, radar, vessel GPS tracking/AIS, qualified crew, vessel and management systems.
Maintain appropriate lighting, communication and navigation equipment (including operational maintenance) as required to satisfy navigation / marine safety legislation (i.e. *International Regulations for the Prevention of Collisions at Sea 1972 (as amended), International Convention of the Safety of Life at Sea (SOLAS), 1974 and Navigation Act 2012).*
Tail buoy markers maintained and visible.
Enforcement of 2 nm exclusion zone around the vessel to avoid entanglement and collision.
Look-out duties maintained 24 hours per day by competent crew, with additional watch officer / rating for night time activities as required through international legislation (i.e. SOLAS) and internal vessel procedures.
Regular updates with relevant stakeholders (local fisheries) on vessel movements and intended movements (line plan) to avoid overlap with fishers.
MFO to maintain vigilant observations for marine cetaceans and other marine fauna noting precaution zones and vessel planned path.
Visual observations to be maintained on animals approaching the vessel to avoid collision.
Marine cetacean sightings and any interactions reported to the DOtE within two months of survey completion.
Tail buoys used are designed to avoid entrapment of turtles. Vessel and survey crew to attend environmental induction containing basic information and legal requirements on procedures to manage interactions between survey vessel, survey equipment and marine fauna.
Details of Residual Impacts and Risks
Application of the proposed management controls and adherence to Commonwealth regulations will reduce the likelihood of vessel interactions with marine fauna. While the potential exists for a collision to occur, it is considered a rare scenario and extremely unlikely given the speed of the vessel and the limited number of individual animals expected to be encountered during the survey (i.e. outside the known migration period of humpback whales). *Pacific Conquest* will be travelling at a slow steady speed (maintaining course) within the area of operation, allowing any approaching animal time to alter its course, thereby reducing the likelihood of a strike. Given that there is no universal solution to vessel strike, adherence to management controls, including vigilant observations maintained during all day light hours (by the MFO, EPBC Regulations and speed limits) will ensure that adverse impacts to the marine fauna would be minor to short-term, which is considered an acceptable level of environmental impact.

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Massive effect	Slight possibility (unlikely to occur)	ALARP - Medium
Residual Risk	Minor (Short Term) Effect	Slight	ALARP - Low

6.5 Spillage of Hazardous Chemicals and Liquid Waste (excluding fuel) to the Sea

Introduction

Hazard
Hazardous liquids including, hydraulic / lubricating oils and a variety of miscellaneous chemicals (e.g. cleaning and cooling agents, stored or spent chemicals) will be used or stored on board *Pacific Conquest* as part of normal operations. Accidental loss of liquid wastes to the marine environment could occur via pipework failure or rupture, inadequate bunding and / or storage, insufficient fastening or inadequate handling (e.g. during bunkering).
Extent
The maximum volume of hazardous substances that could be released during routine operations (excluding vessel fuel) is likely to be limited to small volume on-deck spills. In the event that the spill is not contained on deck, there would be a release to the marine environment, which would likely disperse rapidly given the low spill volume and the massive dilution afforded by the open ocean. Large scale spills of hydrocarbons are addressed separately in Section 6.6.
Duration
Duration of the survey (3-4 days).
Impact
Short term reduction in water quality
Receptors
Marine environment (flora and fauna).
Environmental Performance Standards
Hazardous liquids to be packaged, labelled and stowed in accordance with MARPOL Annex III and in accordance with Pacific Conquests Shipboard, Safety Procedures Manual; *Handling and control of harmful substances* (i.e. use of bunded areas).
Harmful substances shall be properly stored in accordance with relevant material safety data sheets (MSDS).
Transfer of fuel to and from *Pacific Conquest* in compliance with *Pacific Conquest's* fuel transfer procedure. No fuel transfer to take place at sea (unless in an emergency situation).
Implement Shipboard Oil Pollution Emergency Plan (SOPEP) and Emergency Spill Response Plan (spill incident).
Tools and resources available to clean up spills consistent with SOPEP.
Crew inductions will include details for correct waste disposal, spill response and good housekeeping practices (including minimising the level of waste).
Contaminated material contained onboard for onshore disposal in accordance MARPOL Annex III and in accordance with Pacific Conquests Shipboard, Safety Procedures Manual; *Handling and control of harmful substances.*
All shipboard chemical spills / hydrocarbon spills managed in accordance with vessel's SOPEP.
All ocean hydrocarbon spills managed in accordance with vessel's SOPEP.
Spill clean-up equipment located where chemicals and hydrocarbons are stored and frequently handled.
Scupper plugs or equivalent deck drainage control measures available where chemicals and hydrocarbons are stored and frequently handled.
Only non-hazardous, biodegradable detergents used for deck washing.
Excess water to be cleared from decks (especially following rainfall).
All equipment / machinery containing involved in the discharge and transfer of hazardous liquids to be maintained to manufacturer's specifications and in accordance with PMS.
Details of Residual Impacts and Risks
Mitigation and management controls and checks are in place on the vessel to ensure that the risks of spills and leaks occurring and subsequent impacts are minimised. This includes: • Ensuring chemicals and hydrocarbons used pose the lowest risk possible to the environment; • Appropriate storage and handling procedures undertaken at all times; and • Equipment maintenance schedules maintained. The volume of liquid spilt on deck would be of a volume covered under the vessel's SOPEP. The resulting impacts to marine fauna that potentially result from a spill of this size would be negligible, with impacts restricted the immediate area. With the controls in place to prevent accidental spills and the negligible impacts predicted from a spill of this size, the environmental risk of using and handling the required chemicals is considered acceptable

Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Minor (possible short-term effect)	Slight Possibility	ALARP - Low
Residual Risk	Slight (Negligible) Effects	Slight Possibility	ALARP - Low

6.6 Accidental Hydrocarbon (Fuel) Spill

Hazard			
Vessel-vessel collision occurring between the *Pacific Conquest* and a commercial vessel or fishing vessel within the Operational Area resulting in a diesel spill of 24.5 m^3.			
Extent			
The maximum volume of diesel that could be released to the marine environment in a vessel collision is 24.5 m^3.			
Duration			
Duration of the survey (3-4 days) and for a spill of 24.5 m^3 of diesel, evaporation and dispersion of ~97% of the release volume would occur within 42 hours in summer and 75% within 16 hours in autumn.			
Impact			
• Localised short-term reduction in water quality - given the low spill volume, high evaporation and dispersion capability of diesel and the massive dilution afforded by the open ocean; • Acute toxicity or physical effects on marine fauna (if contacted immediately < 24 hours); • Injury or death of marine fauna resulting from toxic compound (if contacted immediately, < 24 hours); and • Impact to stakeholders (especially commercial fishing).			
Receptors			
Marine environment (flora and fauna).			
Environmental Performance Standards			
Notification provided to key stakeholders including relevant Australian Government agencies.			
Australian Hydrographic Office (AHO) (including hydro.NTM@defence.gov.au) notified of Operational Area, exclusion zone, activity and duration at least 14 days prior to mobilisation. They will then issue a 'Notice to Mariners'.			
AMSA RCC notified of Operational Area, exclusion zone, activity and duration prior to mobilisation, which triggers RCC to issue an AusCoast Warning.			
Australian Fisheries Management Authority (AFMA), Department of Fisheries and commercial fishing stakeholders notified prior to mobilisation.			
Navigation equipment and vessel procedures compliant with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 2012.			
Pacific Conquest equipped with an automatic identification system (AIS) and an ARPA system which can identify, track and project the closest approach for any vessel (time and location) within the Operational Area and radar range (<70 km away).			
All refuelling to occur while vessel is in port.			
Bridge-watch on vessel 24 hours per day.			
Sulphur content of fuel complies with Regulation 14 of MARPOL Annex VI to control SO_X and particulate matter emissions.			
Diesel storage tanks and fluid transfer hose maintenance (including replacement of refuelling hoses every six months and base oil transfer lines at least every 12 months) undertaken in accordance with the PMS.			
In line with MARPOL Annex I, Pacific Conquest will have a current Shipboard Oil Pollution Emergency Plan SOPEP in place and a valid IOPP certificate.			
Oil spill response executed in accordance with the Activity OPEP.			
Oil spill response executed in accordance with the vessel's SOPEP as required under MARPOL.			
Oil spill exercise conducted prior to the commencement of the Activity.			
Details of Residual Impacts and Risks			
In the unlikely event that a vessel collision did occur resulting in a release of 24.5 m^3 of diesel within the Operational Area, the potential impacts to the environment would be greatest within several kilometres from the spill when the toxic aromatic components of the fuel will be at their highest concentration and when the hydrocarbon is at its thickest on the surface of the receiving waters. The potential sensitive receptors in the surrounding areas of the spill will include fish, marine mammals, marine reptiles and seabirds at the sea surface, which may ingest the automotive diesel or become coated. The number of receptors present at the immediate activity location are expected to be limited to a small number of transient individuals, given the distance from the nearest shoreline is approximately 20 km and no significant areas of habitat are present in the immediate vicinity of the Operational Area. As diesel is a relatively high volatile substance, the potential impacts to receptors would decline rapidly within 24-48 hours. Additionally, the modelling showed that a spill would only reach shorelines under very rare circumstances and present as an extremely low sheen, non-toxic and patchy. Although there is potential shipping traffic within the Operational Area, the management controls in place are considered to result in a low risk of a collision occurring. Given the management controls in place to prevent a vessel collision (including a SOPEP and OPEP), the timing of the survey, the distance offshore of the survey, the low volume of diesel released, the low frequency of significant volume spills that occur in the industry and the highly evaporative, volatile and dispersible nature of diesel, the risk of is considered acceptable.			
Risk Ranking	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk	Massive	Slight Possibility	ALARP - Moderate
Residual Risk	Major	Slight Possibility	ALARP - Moderate

Spill response mitigation measures described in the OPEP will be implemented as appropriate to reduce the likelihood of impacts to key marine environmental receptors. Based upon the outcome of the predictive spill modelling and the properties of diesel, the following spill response options are considered applicable:

- Source control - which will include reducing the head of fuel or emptying the leaking tank by transferring contents into another empty or slack tank onboard; pumping water into the leaking tank to create a water cushion to prevent further fuel loss; attempt temporary repair by plugging hole or rupture; and trimming or lightening the vessel to avoid further damage to intact tanks;
- Monitor and evaluate the trajectory and extent of the spill – which includes aerial and vessel surveillance, and oil spill trajectory modelling,
- Mechanical Agitation;
- Oiled Wildlife Plan; and
- Scientific Monitoring Plan.

The above spill response options are not expected to introduce additional hazards to the marine environment or to result in significant additional potential impacts. The response options of source control, monitor and evaluate and assisted natural dispersion will use existing survey and/or support vessels, and the potential impacts associated with the use vessels is evaluated in Section 5.2 for planned activities.

7 IMPLEMENTATION STRATEGY

The Implementation Strategy in the EP describes:

1. The Asset Energy Environmental Management System (EMS);
2. Roles and responsibilities, competency and training;
3. Arrangements for ongoing stakeholder consultation and notifications.
4. Compliance assurance arrangements, including arrangements for monitoring, review and reporting of environmental performance; and
5. Preparedness for responding to oil pollution emergencies through an OPEP and appropriate arrangements for environmental monitoring.

The Baleen 2D HR Seismic Survey will be undertaken in accordance with the control measures, environmental performance outcomes, environmental performance standards and measurement criteria defined in the NOPSEMA-accepted EP, applicable legislation and the Asset Energy Environmental Management System.

7.1 Systems Practices and Procedures

Compliance with this EP is assured and reviewed using Asset Energy and its contractor(s) systems, practices and procedures that are followed throughout the duration of the seismic survey to mitigate and control environmental impacts and risks to ALARP and acceptable levels.

7.2 New Information

At least four weeks prior to the survey, Asset Energy shall undertake pre-survey planning that will review and consider the following at a minimum:

- Ongoing consultation process with relevant stakeholders and initiate pre-survey notification including but not limited to:
    - Review fisheries (commercial and recreational) peak spawning and fishing periods and fishing areas that overlap the operational area;
    - Changes to commercial fishery license areas, fishery status, current fishing effort and licence holders overlapping the OA based on:
        - Current status reports of the fisheries and aquatic resources;
        - Information provided directly by fishers, the NSW DPI and AFMA through the stakeholder consultation process;
        - Fishing locations; and
        - Spawning areas.
- Consultation with the NSW Office of Environment and Heritage on permitted research within or adjacent to the survey area;
- New issues and or concerns raised by stakeholders;
- Changes to all relevant legislation or regulatory guidelines;
- Existing information in relation to any component of the receiving environment described in Chapter 3 (including BIAs);
- Australian Marine Parks (AMP) status (including any changes in status) and relevant IUCN principles;
- Avoidance of multiple surveys undertaken in same area in less than one month apart.
- Newly-available scientific research;
- Conservation advice and/or Recovery Plans under the EPBC Act and from the Department of the Environment and Energy; and
- Any other new information relevant to the environmental management of the activity.

If new information regarding the receiving environment relevant to the Baleen Operational Area is found, Asset Energy will undertake an internal risk assessment as per the Risk Management Process. Any new or increased impacts or risks that may arise will be managed through the Management of Change process.

7.3 Training, Competencies and On-going Awareness

All vessel personnel, including subcontractors, will participate in a project specific induction session prior to joining the vessel. The induction will include a section on Health, Safety and Environment to complement the policies and procedures outlined in the company's International safety management system (ISM) and will include environmental information specific to the activity location.

Prior to the commencement of the survey, Asset Energy representatives will hold a pre-job meeting with all vessel crew. This meeting will include an EP induction and will provide an opportunity to address any specific environmental sensitivities or commitments associated with the program, as required.

During operations monthly HSE meetings will be held on the vessel involving all crew. Regular tool box meetings are held prior to any activity / task that takes place on the vessel between OoW, surveyors (navigators) and all crew involved in the task.

All personnel involved in survey operations will be trained and competent to carry out their role. A training matrix will be maintained onboard the Vessel for vessel personnel.

Training may be in the form of 'On the Job' or external training. Job specific project managers are responsible for undertaking the final quality control in ensuring appropriately trained survey personnel are provide. Vessel managers are responsible for ensuring marine crew joining the vessel are adequately trained.

7.3.1 *MFO Training Requirements*

As per the EPBC Policy Statement 2.1 requirements, the MFO will be "trained and experienced in whale identification and behaviour, distance estimation, and be capable of making accurate identifications and observations of whales in Australian waters."

7.4 Monitoring, Auditing, Management of Non-conformance and Review

7.4.1 *Monitoring Environmental Performance*

The following environmental records will be maintained during the execution of the survey as supporting evidence that the requirements as stated in the environmental commitments table Appendix E of this EP were successfully achieved:

- Daily log of survey activities
- Waste / garbage record log
- Incident reports and non-conformances with this EP (Section 7.4)
- Induction records (Section 7.3)
- Emissions and discharge records
- Cetacean sightings and associated survey reports (Section 8.2)
- Records of internal inspections and audits (Section 7.4)
- Monitoring in the event of a spill.

7.4.2 *Auditing and Review*

In addition to the statutory audits and inspections that are undertaken to maintain the ship in class and comply with SOLAS, ISM / SPS and MARPOL, an environmental audit / performance will take place.

A programme of review and verification will be undertaken by Asset Energy's offshore representative during the survey and on completion of the survey. These reviews will include the collation of relevant supportive documentation and records which will be assessed against the established measurement criteria. This programme will ensure that environmental performance outcomes and standards are being implemented and will highlight areas where their applicability is insufficient, arduous or unnecessary, concluding with potential amendments. The following arrangements will be established to review environmental performance and the implementation strategy of the activity:

- An inspection of the vessel will be completed before the survey commences to ensure that procedures and equipment for managing routine discharges and emissions are in-place to ensure compliance with the EP;
- An inspection of the vessel will be completed with every new contractor to ensure that contractor HSE management systems are in accordance with all relevant requirements of Asset Energy's HSE management system and this EP's environmental management framework;
- A summary of the EPO, EPS and MC for the activity will be distributed aboard the survey vessel and monitored each day by the MFO via environmental audits and inspections; and
- A test of the oil spill emergency response arrangements will be conducted during the mobilisation phase of the survey (unless a test has already been undertaken in Australian waters within a month prior to mobilisation) to ensure that the vessel SOPEP is current and applicable.

Upon completion of the survey, Asset Energy will review the Post Survey Environmental Performance Report, including the environmental management framework, the environmental performance and implementation strategy. The results of the review and any identified improvements or recommendations will be incorporated into processes and procedures for future surveys to help facilitate continuous improvements.

7.4.3 *Management of Non-conformance*

Following a reported event, Asset Energy and vessel contractor will review the circumstances and take all necessary time to fully investigate what can be done to prevent re-occurrence and harm. Depending upon the severity potential will decide what course of investigation type is considered i.e. non-conformance and improvement or incident response as per Asset Energy's procedures.

7.5 Emergency Response Preparedness and response

Asset Energy's Emergency Preparedness procedure provides the frame work and requirements for incident response and crisis management, experience, knowledge and availability. During offshore operations emergency response teams include both onshore (EMT and CMT) and offshore personnel (Emergency Management Team, ERT).

A project specific emergency response plan (ERP) is developed for every project. The plan details contact information of emergency services available including those particular to the region in which the activity is being undertaken (i.e. closest hospital, port authorities). It also details medevac procedures and contact numbers for relevant project personnel and other relevant third parties.

7.6 Oil Pollution Emergency Plan

To incorporate the nature and scale of the survey and respond to the identified credible spill scenarios, the Oil Pollution Emergency Plan (OPEP) for the survey encompasses multiple levels of planning and response capability. The seismic survey OPEP is therefore represented by various levels of emergency planning, which comprise of:

• Vessel(s) SOPEP – for spills contained on the vessel or spills overboard which can be managed by the vessel;
• The National Plan for Maritime Environmental Emergencies (National Plan) (AMSA 2014) - for spills from vessels which affect Commonwealth waters and waters of the Ashmore and Cartier Territory.

AMSA is the jurisdictional authority and control agency for spills from vessels which affect Commonwealth waters and waters of the Operational Area.

In the unlikely event of a spill of hydrocarbons or chemicals to the marine environment, Asset Energy will notify AMSA. AMSA will advise of any response actions required.

7.7 Record Keeping

In addition to statutory requirements, a record system will be in place for the identification, maintenance and storage of environmental records in accordance with Sub-regulation 14(7) and Part 3 of the OPGGS(E)R. All environmental records will be legible, identifiable and traceable to the activity involved.

8 ENVIRONMENTAL REPORTING

8.1 Routine Reporting (Internal)

8.1.1 *Start and end of activity notifications*

Asset Energy shall notify NOPSEMA that the survey is to commence, at least 10 days before the activity commences. This pertains to each phase within the survey activity.

Asset Energy shall notify NOPSEMA that an activity is completed within 10 days after the completion. This pertains to each phase within the survey activity.

Asset Energy shall notify NSW Department of Planning and Environment that an activity is to commence. This pertains to each phase within the survey activity.

8.1.2 *Daily Progress Report*

The Daily Progress Report (DPR) is a key component of internal reporting. It is critical to any project that key support personnel and the client (Titleholder) are kept fully informed of all mechanical, weather, positional and data acquisition details regarding the activity being undertaken.

8.1.3 *Dedicated Safety Meetings*

At commencement of the survey a dedicated safety meeting is to be held onboard the vessel, chaired by the Master and including all crew currently employed on the vessel. Dedicated health, safety and environmental meetings are held between the offshore and Perth-based management and advisers to address health, safety and environment incidents and initiatives.

8.2 Routine Reporting (External)

In accordance with the requirements of the OPGGS(E)R (Regulation 26, Sub-regulations 26A, 26AA 26B and 26C) Asset Energy are required to report information on environmental performance to NOPSEMA. Table 8-1 details environmental performance reporting and notification specific to the seismic activity and vessel detailed within this EP.

8.3 Incident Reporting (Internal)

Asset Energy will report on the below incidents.

Table 8-1 Summary of Reporting Requirements and Schedule

Reporting Requirements	Type	Timing	Recipient
Cetacean Sighting Report	Electronic ('Cetacean Sightings Application')	Within two months of survey completion	DOtEE sightingsdata@aad.gov.au
Environmental Performance Report (End of Activity)	Written	Following completion of all project closeout actions and documentation. Within 3 months of completion of the seismic survey.	NOPSEMA
Report on Recordable Incidents	Written	Monthly, on or prior to the 15th day of each month	NOPSEMA
Notification of Reportable Incident	Oral	As soon as practicable and not later than two hours of the incident occurring or Asset Energy becoming aware of the incident	NOPSEMA
	As soon as practicable	Written (including record of notification)	NOPSEMA; Titles Administrator Department of the responsible State Minister

8.4 Environment Plan Revision and Resubmission

New information, changes or updates will be considered against Regulation 17 of the OPGGS (E) Regulations, to determine if resubmission of the EP to NOPSEMA is required. Relevant sub regulations and triggers for EP resubmission under Regulation 17 include the following:

- 17(1) New Activity
- 17(5) Significant modification of the activity
- 17(5) New stage of the activity
- 17(6) New or increased environmental impact or risk
- 17(7) Change in Titleholder

An internal risk assessment will be undertaken for all changes in scope to assess potential impacts of the change. If the change meets any of the criteria detailed above, a revision/resubmission of the EP will occur.

8.4.1 *Risk Assessment Process*

The risk assessment methodology and decision-making framework adopted has been designed to ensure that activities do not pose an unacceptable environmental risk, are ALARP and are in line with AS/NZS ISO 31000:2009 Risk management–Principles and guidelines and Oil & Gas UK Guidance on Risk Related Decision Making (2014).

8.4.2 *Management of Change*

Amendments made to the accepted EP are done via the Management of Change (MoC) in accordance with the process described in the EP, Asset Energy will:

- Implement the rigorous methods of environmental assessment;
- Keep a comprehensive record of the consideration of Regulation 17 for each change;
- Demonstrate continuous reduction of environmental impacts and risks to ALARP and acceptable levels by appropriately applying MoC processes to incremental improvements; and
- Implement MoC processes prior to a change occurring, thus allowing for exploration of alternative management options.

9 STAKEHOLDER CONSULTATION

9.1 Consultation Strategy

Asset Energy has a Stakeholder Consultation Strategy of which the principle goals are:

- to identify and successfully engage in a 2-way process with all relevant stakeholders through recognition that the activity (i.e. seismic survey) may affect legal uses of the marine space by communities, organisations and people;
- to effectively communicate and discuss the risks and consequences of the activity;
- to identify and agree practicable and fit-for-purpose mitigation measures taking in to account realistic potential effects with resultant residual risks being both acceptable and ALARP; and
- to continually improve the stakeholder engagement process.

Asset Energy maintains a comprehensive stakeholder database, which was developed during previous campaigns in the region. This database has been updated and managed throughout the preparation of this EP and will remain live throughout the duration of the activity.

Relevant stakeholders were identified as:

- Departments and agencies of the Commonwealth to which the activities to be carried out may be relevant;
- Departments and agencies of the State of NSW to which the activities to be carried out may be relevant;
- Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out;
- Government departments or other agencies that have a role in emergency preparedness and response in relation to unplanned vessel incidents and spills; and
- Any other person or organisation that Asset Energy consider relevant.

9.2 Key Issues Raised During Consultation

Prior to the commencement of the consultation process, Asset Energy identified two key areas of interest that may be affected by the seismic campaign. These included commercial / merchant shipping and fishing activities (commercial and recreational). While other impacts were considered, such as tourism, they were not deemed key with respect to potential impacts and no concerns were raised during the consultation period from any tourism related organisation (e.g. whale watching tours).

Commercial shipping, is likely to pass through the proposed survey location, for example bulk carriers en-route to Newcastle or container ships en-route to Sydney. Consultation with the relevant port authorities took place to assess the level of impact. Neither port has anchorage sites to their approaches and there are no designated shipping routes / lanes that cross the survey area, i.e. once a vessel is underway they chart their own course.

Neither port authority or safety regulators raised concerns regarding the seismic survey. However, management is required in terms of shipping safety (issuance of notice to mariners, identification of an acceptable exclusion zone, oil spill response) which will require a coordinated approach and careful management between Asset Energy, the vessel and AMSA / AHO.

Six fisheries overlap with the survey location including, Eastern Tuna and Billfish (ETBF), Ocean Trap

and Line, Ocean Trawl, Ocean Haul and Lobster fisheries. Negotiations took place with fisheries regulator(s) at both state and Commonwealth levels to better understand the management of these fisheries and to assess more accurately the level of impact to individual fishers specific to the survey location (Appendix A).

Non-governmental fisheries organisations and associations with strong local membership were also consulted, including: Fisheries Association, South East Trawl Fishing Industry Association, Professional Fishermen's Association, Commercial Fishermen's Cooperative and Australian Marine Alliance. Correspondence with these, and similar groups, aid in reaching a variety of individuals who may have an interest in the proposed activity. Consulting through these avenues provided the means of effective consultation, enabling individuals to respond through a central point of contact, i.e. as noted with the Commercial Fishermen's Cooperative who took a proactive approach in inviting stakeholders to partake in proposed discussions.

The main concerns raised by fishers during the public consultation process included:

- Physical exclusion from fishing grounds (especially during prime fishing periods i.e. Christmas and Easter);
- Physiological impact on lobster larvae; and
- Behavioural responses of fish species to seismic activity resulting in a loss of catch.

At the consultation meeting (25 May 2017), fishers identified the region as a highly-profitable and viable fishing region, which was nicknamed "the Farm". Fishers expressed concern regarding the damage to local fish species and fishing activity due to the previous seismic surveys conducted. The meeting noted that this impact would not be recorded on Logbook Return Records as fishers move fishing efforts elsewhere, but it does impact on catch efficiencies and creates more cost to a business in locating alternate fish stocks. Stakeholders noted that fish from the areas were dead and rotting on the seafloor and coming up in the trawl nets. It appeared to these fishers that targeted fish species did not return to the area for many months afterwards.

Also, at the meeting, fishers advised that the area was considered of significance for the local commercial and recreational fishing fleets. Due to the use of the single gun and streamer, it was emphasised that there would be a lower likelihood for an impact in comparison to previous years. However, several commercial fishers and recreational fishing representatives expressed that the area was considered too important and sensitive to risk the consequence of impact to the commercial and recreationally important species. Additionally, concerns were expressed that there is no true knowledge regarding the potential impacts and the consequences of the survey to fish, which was of great concern to the fishers.

The meeting noted the high use by international traffic of the region and the risk this would mean in any petroleum activity in the area.

Asset Energy acknowledged and considered the concerns raised by all and provide responses where appropriate. During the activity, Asset Energy will communicate with the stakeholders regarding any effects and interactions observed.

Recreational and game fishing is also known to take place within the area, which is supported by fish attraction devices (FADs) installed along the NSW coast, with the primary purpose of aggregating pelagic fish and therefore increasing recreation fishing opportunities. FAD's are installed by NSW DPI and are not located within the Operational Area.

Asset Energy understand additional stakeholders may be identified as part of ongoing consultation.

Should additional stakeholders be identified prior to, or during the survey, these stakeholders will be contacted, provided information about the survey and invited to make comment.

Table 9-1 summarises all of the stakeholders who were contacted with information on the activity (consultation document).

Table 9-1 Stakeholders Contacted

Discipline	Stakeholder
Activity Administrator	• National Offshore Petroleum Titles Authority (NOPTA)
Shipping / Safety (including Commonwealth / Sate departments or agencies, to which the activities to be carried out under the EP, or the revision of the EP, may be relevant)	• Australian Maritime Safety Authority (AMSA) • Port of Newcastle • Newcastle Port Corporation • Port Authority of NSW • Roads and Maritime Services NSW • Department of Defence (Australian Hydrographic Office) • Department of Defence (Defence Force Australia) • DAWR • NSW Marine Police
Fisheries (commercial (state and Commonwealth), recreational, associations and persons, whose functions, interests or activities may be affected by the proposed activities).	• Australian Fisheries Management Association (Environment Division) (AFMA) • NSW Department of Primary Industries (Fisheries) (NSW DPI) • Commonwealth Fisheries Association (CFA) • Recreational Fishing Alliance of NSW • South East Trawl Fishing Industry Association (SETFIA) • Tuna Australia • Tropical Tuna Management Advisory Committee (AFMA) • Commercial Fishermen's Cooperative • Coastal Reef and Game Fishing Charters • Professional Fishermen's Association • Australian Marine Alliance • Fisheries Warehouse (Recreation / Game fishing) Mr Denis Brown (Ocean haul fisher) * • Mr's Daniel and Noel Gogerly (Lobster, Ocean Trap and Line fishers) * • Mr Denis Brown (Ocean Trap and Line fisher) • Mr Robert Bryant (Lobster fisher) • Sydney Fish Market • Recreational Fishing Association NSW
Conservation Groups / NGO's (persons or organisations considered relevant)	• The Nature Conservation Council of NSW • Whale and Dolphin Conservation Society • Catherine Hill Bay Progress Association • Living Ocean • Ocean Watch • Central Coast Community Environment Network • Rising Tide Australia • Donna Cook
State councils / Government Departments (Environmental departments) (persons or organisations considered relevant)	• Australian Marine Parks s, Department of the Environment and Energy • City of Lake Macquarie • Marine Parks Authority NSW (Port Stephens Marine Park) • Swansea and Districts Chamber of Commerce • Port Stephens Council • Newcastle City Council • Wyong Shire Council • Gosford City Council (now Central Coast Council) • Pittwater Council (now Northern Beaches Council) • NSW Office of Environment and Heritage • NSW Department of Planning and Environment

9.3 Consultation Correspondence and Summary

A summary of the key issues and concerns raised by stakeholders during consultation, including an assessment of the merits of objections and claims, is provided in Appendix A. The summary also describes any mitigation identified to reduce effects and notes if the residual effects are acceptable and ALARP, Asset Energy will remain available before, during and after the completion of the survey.

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Note : these references were used in the preparation of the EP and not all are referenced in the summary

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APPENDIX A STAKEHOLDER CONSULTATION SUMMARY

Summary of Key Responses from Stakeholder

Stakeholder* (Discipline)	Information Provided (Date, Method)	Summary of Response (Date, Method)	Assessment of Merit
Shipping / Safety			
AMSA	Email (09 May 2017) with consultation documentation.	No response received. Delivery failure to email recipients.	Follow-up phone call 4 July 2017 and re-sent information to generic AMSA email address
		AMSA emailed (5 July 2017) guidance and advice (See Table 8.3).	Asset confirmed (email 18 Oct 2017) that the survey will implement and adhere to AMSA advice (Table 8.3) and provided updated fact sheet of EP revisions.
	Emailed (20 October 2017) fact sheet regarding EP revision and resubmission.	AMSA confirmed revisions (e.g. new commencement date) and previous advice (email 20 Oct 2017).	Asset provided feedback (email 27 Oct 2017) regarding warranted use of a chase vessel (Table 8.3).
		Return receipt (30 Oct 2017)	No further action until response received.
Newcastle Port Corporation (aka Port Authority of NSW)	Email (09 May 2017) with consultation documentation	No response nor email error message received.	
	Follow-up phone call 4 July 2017 and confirmed change of name to Port Authority NSW, whom Asset emailed previously 22 May 2017 (see below).	Confirmed receipt of email (22 May 2017) and unable to attend community meeting. No direct impacts expected on the port and only minor impacts on shipping in area.	Asset thanked Port Authority for their response (email 22 May 2017) and confirmed future consultation.
	Email (19 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Port of Newcastle	Email (09 May 2017) with consultation documentation.	No expected impacts on Port's operations, do not intend to attend the consultation meeting. Advised that Port Authority of NSW responsible for navigation safety.	Asset thanked Port of Newcastle (email 10 May 2017) and attempted to contact Port Authority NSW.
	Email (20 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Division Roads and Maritime Services	Email (09 May 2017) with consultation documentation.	Emailed response (10 May 2017) that unable to attend community meeting and will discuss survey later with phone call	Asset set-up conference call for 17 May 2017.
		Noted to ensure that Asset Energy is aware of maritime requirements (i.e. notice to mariners and requirements of the AHO). No concerns.	Asset confirmed that all maritime requirements will be implemented and compliant. No further action required.
	Email (19 October 2017) fact sheet regarding EP revision and resubmission.	Thanked Asset for updated information (email 20 Oct 2017) and provided updated contact details.	No further action required until pre-survey notification.
Australian Hydrographic Office (AHO)	Email (09 May 2017) with consultation documentation and again on 11 May 2017 (correct email address)	Emailed response (11 May 2017), with details of change of address for AHO. No additional response received after resending information to new address.	No further action required until pre-survey notification.
	Email (22 October 2017) fact sheet regarding EP revision and	Confirmed receipt and no additional comments (email 24 oct 2017).	No further action required until pre-survey notification.

	resubmission.		
Australian Department of Defence (Offshore Petroleum)	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
AQIS Central East Region Biosecurity Services	Email (09 May 2017) with consultation documentation.	Delivery failure.	Alternate email address found
	Email (20 October 2017) fact sheet regarding EP revision and resubmission.	Confirmed receipt (email 20 Oct 2017) and email forwarded to DAWR, who confirmed receipt and new contact information (email 24 Oct 2017).	No further action required until pre-survey notification.
		Automatic reply from DAWR (email 20 Oct 2017) with updated vessel information.	No further action required until pre-survey notification.
NSW Marine Police (Newcastle Water Police)	Email (09 May 2017) with consultation documentation.	Confirmed receipt (email 22 May 2017) and attendance at community meeting. No concerns were raised.	No further action required.
	Email (19 October 2017) fact sheet regarding EP revision and resubmission.	Confirmed receipt (email 20 Oct 2017) and no further comments provided.	No further action required until pre-survey notification.
Fisheries**			
Australian Fisheries Management Association (Environmental Division) AFMA	Email (09 May 2017) containing information on proposed survey location.	No response nor email error message received.	Follow-up phone call and emailed response (08 Jun 2017) containing links to consultation process and promise of further response.
		Emailed receipt (8 June 2017) and replied with suggestions for stakeholders with whom to consult and fishery status reports by ABARES.	Asset Energy thanked AFMA for their response (email 30 Oct 2017) and confirmed consultation with the suggested stakeholders and acknowledged the fishery information from ABARES. No further action required.
	Emailed (20 October 2017) fact sheet regarding EP revision and resubmission to AFMA email.	No response nor email error message received.	No further action required until pre-survey notification.
	Email (30 October 2017) PEP11 stakeholder update – reduced scale and duration of seismic survey	Response received by Asset Energy confirming email received (email 9 November 2017)	No further action required
NSW DPI, Fisheries NSW	Email (09 May 2017) with consultation documentation.	Email response (12 May 2017) with previous response document from 2016	Asset acknowledged receipt and was reviewing document.
	Email (15 May 2017) with follow-up question regarding FADs nearby.	Email response (15 May 2017) confirming no FADs in or close to the survey area.	No further action required.
		Email (19 May 2017) confirming attendance at community meeting	Asset invited DPI for an in-person meeting before community meeting
		In-person meeting with DPI Fisheries and Asset Energy: discussed potential concerns that will be raised at community meeting. Attended community meeting and	No further response required.

		no concerns were raised from DPI.	
		Email (26 June 2017) provided Asset Energy with new scientific publications FYI.	Emailed response (29 June 2017) acknowledged receipt and requested further information on coral snapper.
		Email response (29 June 2017) was unable to confirm species and suggested contacting PFS or fishers directly.	Emailed response (29 June 2017) confirming no response from PFA.
		Confirmed coral snapper species information (email 30 June 2017)	Emailed thanks and confirmation (30 June 2017).
	Verbal communication (25 May 2017) to obtain information on local fisheries to determine most appropriate contacts / method of disseminating survey information.	NSW DPI will assist where applicable regarding dissemination of information.	No further action required until pre-survey notification.
	Email (26 Sept 2017) fact sheet regarding EP revision and resubmission.	Confirmed receipt (email 12 Oct 2017)	Asset requested response as soon as possible (email 12 Oct 2017)
		Emailed updated response (23 Oct 2017) see details in Table 8.3	Emailed response (26 Oct 2017) see Table 8.3
	Requested update on Swansea FAD 2018 location, type and deployment (email 24 Oct 2017)	Confirmed Swansea FAD position and deployment date (email 24 Oct 2017). And further email 6 December 2017)	No further action required until pre-survey notification.
	Requested information on how FADs work (email 6 Dec 2017.	Email (6 Dec 2017) described how fish aggregate around any floating object, hence why FADs are effective	Emailed response (6 Dec 2017) querying whether FAD has any active electronic components. Received response (email 6 Dec 2017) that FADs are passive devices other than having a light for navigation purposes. No further action required.
		Email (18 Dec 2017) acknowledging timing of survey is Asset's decision and noting that leadup to Easter is commercially important.	Email (19 Dec 2017) detailing proposed survey dates and why these were selected. Also discussed behavioural impact effects likely to be temporary only plus use of DPI's social media to advise fishers of survey. No response received. No further action required
NSW DPI, Fisheries NSW	Phone call (16 June 2017) requesting further information about rock lobster spawning.	The following information was provided to Asset Energy: • main spawning area from Port Stephens northwards to Far North Coast • Likelihood of some spawning near survey area • Spawning area between 10—30 m water depth on mid-continental shelf • Life cycle stages – eggs laid in September and carried for 3 months	Email (16 June 2017) thanking DPI for phone conversation, summarising main points and providing public consultation document. No further action required until pre-survey notification.
NSW DPI, Fisheries NSW (Recreation	Phone call and follow-up email (27 Oct 2017) to about general discussion of	Email response (27 Oct 2017) with additional information such as peak periods, main area ('carpark') and target	Emailed thanks for information and confirmation (28 Oct 2017) that main area 'carpark' is 10 km sound of

Fisheries)	survey and potential concerns for recreational fisheries (see Table 8.3 for details)	species (see Table 8.3).	New Seaclem well site, and thus no impacts are expected.
		Emailed (30 Oct 2017) additional information about game fishing.	Emailed thanks for information and confirmation with map (30 Oct 2017) that main area 'carpark' is 10 km sound of New Seaclem well site, and thus no impacts are expected. Requested specific details about size of carpark area.
		Emailed (31 Oct 2017) additional information about carpark variability (+/- 10 nm) with coordinates.	Emailed thanks and receipt of information (31 Oct 2017).
	Asset Energy advised potential dates for survey (email 8 Dec 2017) and requested offshore tournament dates. No response received. Followed up via phone call 13 December requesting same information	Email (13 December 2017) provided to Asset Energy with offshore tournament dates for NSW	Emailed thanks for information on tournaments (15 Dec 2017), queried date of tournament in late March and discussed how proposed dates of survey were selected to minimise overlap with seasonal peaks for recreational and commercial fishing.
		Email (18 Dec 2017) suggesting April / May less recreational fishing activity and asking plans for contacting fishing clubs / organisations	Email (19 Dec 2017) detailing proposed survey dates and why these were selected. Also discussed behavioural impact effects likely to be temporary only plus use of DPI's social media to advise fishers of survey. No response received. No further action required
Commonwealth Fisheries Association	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 Oct 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Recreational Fishing Alliance of NSW	Email (10 May 2017) with consultation documentation.	Email response (10 May 2017) requesting details of depth range, GPS coordinates of the survey area and differences between the proposed airgun source for this survey compared with previous surveys. Confirmed attendance at community meeting.	Follow-up with phone call (10 May 2017) and emailed (12 May 2017) with survey details (e.g. coordinates, track lines, etc.)
		Attended community meeting (25 May 2017) and no further comments raised.	No further actions required.
	Emailed (19 Oct 2017) updated fact sheet regarding EP revision and resubmission	Emailed receipt (20 Oct 2017) and noted Swansea FAD location and deployment. Requested testing and sampling regarding potential impacts to fish (see Table 8.3).	Asset emailed response (23 Oct 2017) and see Table 8.3 for details. No further action required until pre-survey notification.
South East Trawl Fishing Industry (SETFIA)	Email (5 Apr 2017) with consultation documentation	. Email response (7 April 2017) that SETFIA trawl fishery ends at Barrenjoey Point and offshore Newcastle does not affect them. Asked to be removed from stakeholder	No further action required as no longer a stakeholder

		group.	
	Email (30 October 2017) advising of updated timeframe for survey	Email response received 1 November 2017 advising of planned fish survey for 2018	
	Email (1 November 2017) advising updated timeframe concerns for fishers	Email response 1 November 2017 requesting clarification of maps.	No response from SETFIA. Asset Energy investigation determined that the nearest extremity of map was 40 km south of Operational Area. Not considered to be impacted, no further action required as SETFIA requested to be removed from stakeholder group.
Sydney Fish Market	Emailed (27 Oct 2017) updated fact sheet	Email received and read, but no response	No further action required until pre-survey notification
Tuna Australia (ETBF Industry Association) (via AFMA)	Email (4 July 2017) to AFMA requesting a contact within Tuna Australia to forward information	Awaiting AFMA's response, will forward consultation documentation to Tuna Australia in due course	No further action required.
	Emailed (22 Oct 2017) updated fact sheet regarding EP revision and resubmission	No response nor email error message received.	Follow-up phone call (24 Oct 2017) and emailed additional information about revised EP (24 Oct 2017).
		Emailed follow-up with tuna longline fishing companies (30 Oct 2017) and confirmed no impacts expected. Suggested to contact Nelson Bay/Newcastle Fishermen's Co-op.	Emailed (30 Oct 2017) thanks for response and confirmed on-going consultation with fisherman contact. No further action required until pre-survey notification.
Tropical Tuna Management Advisory Committee (via AFMA)	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	See Tuna Australia.
Commercial Fishermen's Cooperative	Email (09 May 2017) with consultation documentation.	Email response (06 April 2017) requesting details of effects of seismic on economic returns of individual fishers, health of benthic flora and fauna, movement of pelagic species in the area and fecundity and mortality of primary and secondary species targeted by commercial fishers	Asset Energy provided these details in their presentation at the community meeting, which was later emailed to the Commercial Fishermen's Cooperative. No further concerns were raised and no further actions were required.
	Email (22 Oct 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Central Coastal Reef and Game Fishing Charters	Email (09 May 2017) with consultation documentation.	Unable to attend Community Consultation meeting but interested in outcomes	Email response (11 May 2017) acknowledged receipt and confirmed that future communications will be provided.
	Email (19 Oct 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	Followed-up with phone call and email (26 Oct 2017) confirming no expected impacts from new survey timing and that main area of operations is offshore Terrigal and south of survey area.
Professional Fishermen's Association	Email (09 May 2017) with consultation documentation.	Proposal to host Community Consultation meeting so that as many local fishermen can directly participate in	

		the consultation process.	
	Follow-on email communications related to Community Consultation Meeting on 25 May 2017.	Requested PowerPoint presentation (30 May 2017)	Asset provided PowerPoint presentation (30 May 2017)
		Provided signed attendance list and draft outcomes document (23 June 2017).	Emailed thanks and edits to document (26 June 2017).
		Emailed request for EP and concerns regarding survey location and impacts on fish stocks and industry, as well as potential impacts on zooplankton (2 Aug 2017).	Emailed response (19 Oct 2017) see Table 8.3.
	Email (12 Oct 2017) fact sheet regarding EP revision and resubmission.	Emailed thanks for update and effort to reduce impact (23 Oct 2017) and emailed additional concerns for restricting access, zooplankton impacts and copy of EP (see Table 8.3).	Emailed response (27 Oct 2017) and map of 'farm' area (see Table 8.3). No further actions required until pre-survey notification.
Fishermen's Warehouse	Email (09 May 2017) with consultation documentation.	Requested in email (11 May 2017) GPS coordinates of survey area. Planned to attend Community Consultation on 25 May 2017. No direct response.	Asset re-sent documentation (11 May 2017) and clarified that survey coordinates provided the following confirmations: • Survey coordinates were included in the consultation document provided • Water depth is approximately 125 m • No significant bottom structures • Water depth is 143 m at New Seaclem-1 drilling site, which is also featureless bottom.
		Attended community meeting (25 May 2017) and no concerns raised.	No actions required.
	Email (19 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Mr Daniel and Noel Gogerly	Email (05 April 2017) with details of proposed survey.	No response nor email error message received.	No actions required.
	Follow-up email (09 May 2017) with consultation documentation.	No response nor email error message received.	No actions required.
Mr Dennis Brown	Email (09 May 2017) with consultation documentation.	Emailed thanks (9 May 2017) and unable to attend community meeting. Advised of his communications to the Professional Fisherman's Association regarding the proposed survey	No further action required.
	Email (20 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Mr Robert Bryant	Email on 29 June 2017 requested confirmation of survey area overlapping with lobster traps and provided survey coordinates	Emailed response (29 June 2017) regarding lobster trap procedures and requested date for survey	Email response (29 June 2017) acknowledged receipt and informed that survey proposed for September. Confirmed that more information will be provided closer to the survey date.
		Email (29 June 2017) acknowledged receipt and future	No further action required until pre-survey notification.

		communications.	
	Email (18 October 2017) fact sheet regarding EP revision and resubmission.	Emailed additional information (19 Oct 2017) regarding lobster fishing in area until end of March and hopes to be finished before survey commences. Requested updates.	Emailed thanks and confirmation of all updates (19 Oct 2017). No further action required until pre-survey notification.
Sydney Fish Market	Email (27 October 2017) consultation documentation and fact sheet regarding EP revision and resubmission.	Return receipt received 30 Oct 2017.	No further actions required until pre-survey notification.
Conservation Groups / NGO's			
The Nature Conservation Council of NSW	Email (09 May 2017) with consultation documentation.	Advice received that the communication was received and will be responded to in seven days. No further response received	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	Emailed receipt and response pending (20 Oct 2017).	No further action required until pre-survey notification.
Whale and Dolphin Conservation Council	Email (09 May 2017) with consultation documentation.	Delivery failed.	Asset found alternate contact.
	Email (20 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Catherine Hill Bay Progress Society	Email 09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Rising Tide Australia	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	Delivery failed.	Asset could not find other contact information.
Ocean Watch	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Living Ocean	Email (5 April 2017) updated correspondence on seismic survey	No response nor email error message received.	No further action required.
	Email (9 May 2017) inviting Living Ocean to stakeholder engagement discussion on seismic survey	Phone call on 25 May 2017 Living Ocean requesting status of survey.	Phone call 25 May 2017 Living Ocean advising survey was small scale, short duration. Agreed to provide survey information and include in future stakeholder engagements. No further action required until pre-

			survey notification.
	Email (31 May 2017) slide presentation on Proposed 2D Seismic Survey offshore Newcastle / PEP11 provided	Letter received (06 July 2017) confirming receipt of slide presentation and advising of concerns to humpback whale migration interactions. Asset Energy responded with confirmation receipt via email 17July 2017. Advised that modelled noise output was low and unlikely to affect whales and that EPBC policy on interactions with cetaceans would be followed,	Asset Energy considered all stakeholder responses and advised Living Ocean (email 13 October 2017) that new survey dates early 2018. No further action required.
	Emails (7 and 26 September 2017) information on EP progress and updated factsheet	Phone call from Living Ocean (9 Oct 2017) to confirm that resubmission meant survey date would be early 2018 and great for avoiding whale migration times. Thanked Asset for transparency	No further action required.
	Email (13 October 2017) advising on what impact Living Ocean had on decision to alter survey dates.	Email received from Living Oceans (13 Oct 2017) acknowledging Asset Energy's response.	No further action required
		Phone call from Living Ocean (30 Nov 2017 and 1 Dec 2017) asking status of EP resubmission. Advised response not yet received from NOPSEMA	No further action required
Central Coast Community Environmental Network	Email (09 May 2017) with consultation documentation	Delivery failed.	Asset could not find other contact information.
	Email (19 October 2017) fact sheet regarding EP revision and resubmission.	Delivery failed.	Asset could not find other contact information.
Donna Cook	Email (5th April 2017) stakeholder update	No response nor email error message received	No further action required.
State Councils / Government Departments			
Marine Parks Authority NSW (Port Stephens Marine Park)	Email (09 May 2017) with consultation documentation.	Out of office reply (9 May 2017) but will respond upon return.	No further actions required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	Out of office reply (22 Oct 2017) but will respond upon return.	No further action required until pre-survey notification.
Swansea and District Chamber of Commerce	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	Email delivery failed (22 Oct 2017).	Asset re-sent to president of Chamber of Commerce (22 Oct 2017) and no response nor email error message received. No further action required.
Port Stephens Council	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet	No response nor email error message received.	No further action required until pre-survey notification.

	regarding EP revision and resubmission.		
Newcastle City Council	Email (09 May 2017) with consultation documentation.	Emailed (9 May 2017) that the communication was received and will be forwarded to the appropriate person for their action.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission	Emailed (22 Oct 2017) that the communication was received and will be forwarded to the appropriate person for their action.	No further action required until pre-survey notification.
Wyong Shire Council	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	Emailed thanks (20 Oct 2017) and forwarded email to council member for action.	No further action required until pre-survey notification.
Central Coast/Gosford City Council	Email (09 May 2017) with consultation documentation.	Advice received that the communication was received and will be forwarded to the appropriate person for their action.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	Emailed thanks (20 Oct 2017) and forwarded email to council member for action.	No further action required until pre-survey notification.
Lake Macquarie City Council	Email (09 May 2017) with consultation documentation.	No response nor email error message received.	No further action required.
	Email (22 October 2017) fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.
Office of Environment and Heritage, NSW National Parks and Wildlife Service		Email (21 August 2017) concern of survey overlap with southern migration of humpback whales and consideration in EP and asked if NSW National Parks and Wildlife were consulted	Email response (22 August 2017) providing the following information: • confirming that survey unlikely to overlap with southern migration of humpback whales • survey vessel information and risks from vessel presence • soft start summary • survey duration and details in Commonwealth waters • confirmed consultation with Port Stephens Great Lakes Marine Parks group.
		Email response (23 August 2017) acknowledged receipt, satisfied that survey will not occur during whale migration season and requested future communications as 'relevant person'.	Email response (27 September 2017) with fact sheet of revised EP.
		Email response (4 October 2017) acknowledged receipt of fact sheet and requested future communications regarding survey.	No further action required until pre-survey notification.

NSW Department Planning & Environment	Phone call 04 August 2017	Asset discuss information provided and request if department requires additional information. Department stated “No additional information required from Asset Energy”	No further action required until pre-survey notification
	Email (02 June 2017) provision of Presentation from Newcastle consultation meeting	No response required	No further action required.
	Newcastle consultation meeting (25 May 2017)	Department attends face to face meeting with Asset	No further action required.
	Emails (23 May – 25 May 2017) Request for Title permit map to meeting.	Asset asks Department to bring a map of NSW Petroleum titles to Newcastle Consultation meeting. Department confirms it will be available at meeting.	No further action required.
Australian Marine Parks, Department of Environment and Energy	Email (22 October 2017) initial consultation document and recent fact sheet regarding EP revision and resubmission.	No response nor email error message received.	No further action required until pre-survey notification.

** Please note that all stakeholders were contacted prior to the 23 June 2014 to confirm current contact details and the most appropriate department / individual to direct communications. ** Numerous verbal communications were held between Asset Energy and NSW State Fisheries throughout the consultation period which continues to be an on-going process. Only communications deemed relevant have been captured in the table above.*

Summary of Issues Raised during Consultation and Asset Energy's Response

Impact of underwater noise affecting commercial fish stocks	Commercial Fishermen's' Cooperative, Professional Fishermen's Association (PFA)	This issue is fully recognised by Asset Energy as having the potential to occur. However, (as set out in Section 5.3.6.2) the overall risk is determined to be minor (i.e. potential short term behavioural effects (avoidance of the noise source) due to the variation in response by different species, the temporary nature of the survey and the implantation of mitigation controls to reduce the risk of impact to ALARP. To date no research has attributed adult fish mortality with seismic activities. In order to mitigate any undesirable outcomes, the following mitigation has been committed to: - Soft start procedures will be followed each time the acoustic sources are initiated; - No overcharging of the guns will occur; and - Regular communications with relevant stakeholders during the survey with information on vessel movement and intended movements will occur every 24 hours (a central point of contact will be decided upon following face to face consultation. Considering the scientific information available, the baseline characterisation of the fishery within the survey area and consultations it is considered that residual effects are acceptable and ALARP.
		The following summary of impacts and risk from underwater noise was provided to the Commercial Fishermen's Cooperative and PFA: • The noise source (compressed air release via "airgun") is incredibly small. Our survey will not be effective with a smaller noise source, and the number of days over which it will be activated will be 3-4. It will not be activated during the numerous line turns. The noise levels are very low. Additional acoustic modelling is presently being undertaken, however we don't believe the acoustic impacts of our survey will threaten the mortality of any species in the area. We are also aware of the potential impacts of large seismic surveys on zooplankton (as identified in that paper you referred to) but understand also that CSIRO's paper (29 June 2017, "Potential impacts on zooplankton of seismic surveys") responded to McCauley's paper and described that zooplankton populations recovered after the survey. We note that the modelled survey in CSIRO's paper was of much greater duration than our planned survey. We believe we will not have any impacts on mortality or local population of any species due to the small airgun size and short duration of the survey, and that behavioural impacts, if any, will be temporary. • We reiterate that our understanding of zooplankton impacts (from McCauley, CSIRO and others) are that population-level recovery will occur rapidly (within a few days) following our seismic survey. The accurate and robust environmental risk assessment in the EP acknowledged that acoustic impacts are likely to occur to zooplankton, but based on the survey's short duration (3–4 days) and low levels of underwater noise, long-term, population-level impacts are not likely and the risk to zooplankton is minor. Furthermore, based on the independent, underwater noise modelling, our single source will generate sound levels lower than those used in the study. The survey sound source will be 90 in3 (150 in3 in the study) with estimated received sound levels of SEL 143 dB re 1µPa2·s (SEL 153 dB re 1µPa2·s at 1 km in the study). • Thanks again for the provision of material related to the farm. We can appreciate that this information may be sensitive to some in the fishing industry, and therefore acknowledge the interest you and your members have with our proposed survey and its location. We reiterate that our survey will only restrict access to this area for a very short duration (3–4 days), and that no permanent impacts on the fishery in this region will result.
Exclusion from fishing grounds impacting commercial/	Commercial Fishermen's Cooperative, Professional Fishermen's Association	This issue if fully recognised by Asset Energy as likely to occur. However, (as set out in Section 5.4) the overall risk is determined to be moderate (i.e. short term (days) with no lasting effects or impact) due to the mitigation measures which will be implemented and the temporary nature of the survey. While Asset Energy are aware of the legitimacy of

recreational fishing activities.		concerns with respect to this particular impact, it is very difficult to quantify the effect to individual fishers due to the variety of factors that would influence their necessity to access specific areas of the survey location at any particular time. The most effective way forward is to employ practical mitigation measures in discussion with local fishers with the goal of reducing potential impacts. While these may change as the consultation process, the following mitigation has been committed to: • Face to face consultation with relevant stakeholders; • Identification of main point of contact (TBC); • Regular communications with relevant stakeholders during the survey with information on vessel movement and intended movements every 24 hours; Considering the difficulty in quantifying the impact to individual fishers, the ability of fishers to potentially target other species and / or other areas of the ocean and on-going consultation, it is considered that residual effects area acceptable and ALARP
		PFA raised concerns about the restriction on access would also apply to Ocean Trap & Line fishers and East Coast Tuna fishers; we also note your statement that the size of the farm is small. However, it is highly productive and important compared to any other area within that region due to the nature of the significant geographical features of the area that attract large quantities and variety of species that are commercial and recreationally significant. We reiterate that the survey will have onerous impact on our commercial fishing activities.
		The following response of impacts and risk from temporary restriction on fishing access was provided to the Commercial Fishermen's Cooperative and PFA: • We note this is a very small area of impact, and the survey will be for a very small duration (~3-4 days). Therefore, we believe this highly localised and very short duration isn't of onerous impact on your activities. • Please be assured that we are aware of the highly-productive and important area to commercial fisheries. We do, however, reiterate that our survey area is generally small, and that an exclusion zone of 2 nautical miles around the vessel during the 3-4 days of operations will ensure safety to all other users, vessels and infrastructure. Based on the relative size of the potential fisheries in the offshore central coast area (i.e. thousands of square kilometres, pending location restrictions and key fish locations), our environmental risk assessment concluded that a very short term overlap of a relatively miniscule area (~15km2) will have a minor, temporary and localised impact on any fishery.
Request for further consultation i.e. face to face meetings (before, during and after the survey)	Recreational Fishing Alliance of NSW, Commercial Fishermen's Cooperative, Professional Fishermen's Association, NSW DPI	Due to the concerns raised above Asset Energy expected a high level of consultation. As with previous experience in the region, Asset Energy are looking to improve upon the consultation process with the goal of delivering clear information on realistic risks and potential impacts. In order to address this request Asset Energy are committed to: • Liaising with NSW Department of Fisheries in the first instance; • Schedule community consultation meeting(s) prior to the commencement of the survey (during and on completion of the survey, as required); • Respond to all concerns in a reasonable time.
		In direct response to these concerns, Asset Energy had a community public meeting hosted by PFA on 25 May 2017 (see Table 8.4).
Management of commercial shipping / other marine users.	Roads and Maritime Services (NSW)	No issues were raised with respect to the management of commercial shipping. Comments obtained from Roads and Maritime were gentle reminders of the necessary management procedures to be followed during offshore operations. Asset Energy and their contractor are committed to executing a safe and successful project. Vessel collision is

		considered to be low, providing the survey vessel operates as required under maritime law. In order to mitigate any undesirable outcomes, the following mitigation has been committed to: • Information regarding the location and survey schedule will be provided to AHO at least two weeks prior to commencement (for issue of Notice to Mariners); • The vessel will operate at all times in compliance with maritime law i.e. International Regulations for the Prevention of Collisions at Sea 1972 (as amended), International Convention of the Safety of Life at Sea (SOLAS), 1974 and Navigation Act 2012); • All vessel management systems will be adhered to; and • Adequately trained and competent crew. Through complying with relevant legislation and undertaken consultation with appropriate stakeholders, Asset Energy consider that residual risk involved in potential safety at sea impacts (i.e. vessel collision) are considered acceptable and ALARP.
		Via phone call 11 May 2017Asset Energy confirmed directly with Roads and Maritime Services (S Wilde) that the survey will operate in compliant with all maritime laws (e.g. MARPOL Conventions, etc.).
	AMSA	AMSA provided advice regarding maritime safety: • escort/guard vessel is recommended when the survey vessel is conducting activities from the coast out to the 4,000m depth contour or to the 153° line of longitude, whichever is the farthest. • Given the length of tow of 900m, any guard/support vessel, in cooperation with the survey vessel, will need to be active and maintain exceptional communications with commercial shipping in the survey area noting there will be a considerable speed • difference between these craft and the survey vessel whilst the latter is conducting operations. • The seismic vessel must display appropriate day shapes, lights, streamers and reflective tail buoys, to indicate the vessel is towing and is therefore restricted in her ability to manoeuvre. Visual and radar watches must be maintained on the bridge at all times. • Please have the survey vessel notify AMSA's Joint Rescue Coordination Centre (JRCC) through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings 24-48 hours before operations commence. • AMSA's JRCC will require the survey vessel's details (including vessel name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end. • The Australian Hydrographic Service must be contacted through datacentre@hydro.gov.au no less than four working days.
		Asset Energy responded with the following: • Thanked AMSA for comments and advice on the upcoming Baleen 2D High Resolution Seismic Survey. • It has always been planned that the vessel being used for the survey will follow normal convention in relation to displaying appropriate day shapes, lights and reflective tailbuoys as well as maintaining visual and radar watches on the bridge at all time. • We have noted the advance times required to notify the JRCC and the Hydrographic Service and will advise accordingly. • At present the issue of using a guard vessel during operations is still under consideration. • Please see attached updated information regarding our proposed seismic survey. The key change is the anticipated timing – now likely an early 2018 survey.
		Asset Energy further responded with:

		• We believe that the reduced scale of operations in conducting the seismic survey do not warrant the use of a chase vessel. The survey will be 3-4 days in duration involving one day deploying equipment, two days of operations and possibly another day for weather downtime plus retrieval of the equipment. The survey vessel is small (30m) when compared with those normally used for seismic survey (~100m) and the seismic streamer at 900m length is also reduced in length to those used for a typical survey (5-6kms or longer). • By following the requirements for maintaining bridge and radar watches at all time combined with the safety measures described within the Environment Plan to be submitted to NOPSEMA, we believe that the risks will be reduced to ALARP. • As an additional comment, advice has been received from the Newcastle Harbour Master that he is of the opinion the survey will have "only minor impacts on shipping in the area".
Management of waste and oil spills	Roads and Maritime Services (NSW)	Asset Energy and their contractor are committed to executing a safe and successful project. Disposal of waste will follow MARPOL requirements. The vessel's Waste Management Plan provides for no waste, other than food, to be disposed of at sea. Food waste can be disposed of past the 12 nm limit. All solid waste to be offload onshore for disposal as per vessel management systems.
		This information was confirmed to Roads and Maritime Services (S Wilde) via phone call on 11 May 2017.
Impacts to recreational fisheries	NSW DPI, Recreational Fisheries	NSW DPI provided the following information regarding recreational fishing activities (via phone call and emails): • Peak recreational fishing period is January to March, with more activity at Xmas and Easter holidays. Peak game fishing activity in usually Feb - March inc. with slightly less activity in both January and April - although this is very much dependent on environmental conditions. • Most of the game fishing activity is targeting dolphinfish, marlin and some shark fishing. There will also be some deep-water bottom fishing. • A particularly important area for game fishing is the 'carpark' which encompasses a relatively large area (several miles north/ south) from the GPS co-ords 33.02 S 152.24 E. This area can have upwards of 100-150 boats accessing it if the bait (blue mackerel/ jack mackerel) is gathered here and the marlin are present. Activity here is usually controlled by the EAC strength, if the EAC is particularly strong and the water particularly warm then the baitfish don't tend to aggregate here. However, if the EAC eddies in this area, the bait gathers and the fishing can be world-class. • Target fish species and associated water depths are: o Marlin generally 60- 100 fathoms o Black marlin can be caught inshore or can be found around the shelf o Striped marlin is generally on the shelf area between 60-100 fathoms o Blue marlin is generally on the shelf edge and beyond • Fishing tournaments currently include: o Bigfish Bonanza - Lake Macquarie 9-11 Feb o The Billfish Shootout - Port Stephens 16-18 Feb o Port Stephens Interclub 23-26 Feb o East Coast Classic - Newcastle 10-11 March. • There can be upwards of 200 boats competing in good years. • Carpark area can move around 10 nm in either direction. Well-known areas are at the following coordinates: o 32.50–32.54 S o Main area around 33.00–33.04 S o Can run down to 33.12 S.
		Asset Energy responded that the centre of the 'carpark' is about 10 km south of the well site in the survey area and 48 km away from the main survey area. It is possible that the survey would be near to the 'carpark' area for less than 8 hours, given the slow speed of the vessel. A map was provided to show the relative location of the 'carpark' and the

		survey area. And further information was requested regarding the extent of the 'carpark'.
		NSW DPI raised concerns about: • the significance of recreational and charter fishing activity within the survey area, including associated expenditure and benefit to regional economies. • impact on popular and peak recreational and charter fishing times to minimise disruption to fishing and fishing competitions during the peak recreational fishing season. • effective consultation directly with recreational and charter fishers. • Seismic activity may disturb schooling baitfish • Notification to Department regarding the proposed dates the survey vessel will be operating, and the proposed routes or area coverage within specified periods.
		Asset Energy agrees and confirmed that: • recreational and charter fishing activity and interest in the proposed area are significant, though we note from the recreational fishing report by L. West in December 2015 that less than 2% of recreational fishing is done at distances greater than 5km from the shoreline. We confirm engagement with recreational fishers/representatives, charter vessel operators and associated tackle shop stakeholders with an interest in our proposed survey. Similar to above, the EP contains an accurate and robust environmental impact and risk assessment, including the commissioning of site-specific, underwater noise modelling undertaken independently by an acoustic consultancy. Based on the modelling prediction of low received sound levels (i.e. not exceeding acoustic thresholds for fish or other marine fauna) and the survey's short duration (3–4 days), impacts to recreational fishing activities were assessed to be recoverable, localised and ALARP. The risk was assessed to be minor and acceptable. • Survey activities will not be impacting the key recreational and charter fishing period around Christmas and Easter, and notes that the location of the closest FADs (Swansea and Newcastle) are approximately 8km and 19.5km shoreward of their closest points to the survey area. Based on independent, underwater noise modelling, the survey is not likely to have acoustic impacts at these distances away (i.e. received sound levels will be <170 dB re 1 µPa2·s beyond 4 km away). • Proposed dates for survey will avoid fishing tournaments, peak recreational activity in the week before and after Easter (1 April 2018) and lobster spawning period • Survey activity will have a short overlap period (< 6 hours) with small portion of 'carpark' and that any effects on fish dispersal would be temporary. • effective consultation with recreational fishermen has been initiated and will continue throughout the valid period of the EP. • Asset Energy will use DPI's social media (Newscast, Charter Chatter and Facebook) to advise recreational and commercial fishers of activity when survey commences. • Asset Energy notified Department and are awaiting response.
Request for scientific trawling exercise to determine effects of seismic surveys on fishers in area	Commercial Fishermen's Cooperative, Professional Fishermen's Association, Recreational Fishing Alliance of NSW	The concern was raised that should this project go ahead, we are supportive of a scientific trawling exercise to determine the effect of the seismic survey on fisher in the area. We would expect that Asset Energy would commission and fund a scientifically robust project and we would be happy to provide some form of assistance.
		Asset Energy agrees with PFA and the Commercial Fishermen's Cooperative and recognises the value of scientific research on impacts from seismic surveys, especially with assistance from commercial fisheries. However, at this time, Asset Energy does not have the capacity to fund a scientific trawling exercise in the area. With the short survey duration and low levels of environmental impacts, our environmental risk assessment assures that all control measures are sufficient to protect the marine environment and reduce impacts to ALARP and acceptable levels. In addition, we are aware that numerous scientific reports into effects of the oil and gas industry on the environment and fisheries have become recently available, and that a number of suitable research organisations have an interest in

		continuing research. As this new scientific literature can impact the development of an Environment Plan, please be assured that we are obliged to consider all new scientific evidence as it is published.
		Also, Asset Energy informed the Recreational Fishing Alliance of NSW that based on the available scientific literature we don't expect any long-term impacts on fish species in the area of our survey. Whilst we are supportive of a suitable pre/post fishing exercise, we recognise that our competencies lie in gas exploration and would leave this to the expert research organisations to undertake. We are happy to liaise with fishing industry and the relevant research organisation to provide information about our proposed survey if requested. .
Potential impacts on viability of individual fishing businesses and operations	NSW DPI (Commercial Fisheries)	NSW DPI raised concerns about: • Potential impacts on the viability of individual fishing businesses and operations before, during and after the survey activity. • Minimise impacts on economically important periods, including prime fishing periods in the lead-up to Christmas and Easter.
		Asset Energy responded with: • has always and continues to recognise the significance of commercial fishing in the vicinity of the survey area and the potential impacts on the viability of individual fishing businesses and operations before, during and after the survey. The EP contains an accurate and robust environmental impact and risk assessment, including the commissioning of site-specific, underwater noise modelling undertaken independently by an acoustic consultancy. Based on the modelling prediction of low received sound levels (i.e. not exceeding acoustic thresholds for fish or other marine fauna) and the survey's short-duration (3–4 days), impacts to commercial fishing activities were assessed to be recoverable, localised and ALARP. The risk was assessed to be minor and acceptable. • By the nature and scale of our survey, we believe we will have minimal impact on commercial fishing at all times. As the survey is now anticipated to be undertaken in early 2018, we will avoid the lead up to Christmas 2017. We are aware that Good Friday is on Friday 30 March 2018, but cannot commit to a survey date until receiving acceptance by NOPSEMA. Please know that we hope to have as little overlap as possible with peak fishing periods. We will continue to engage with relevant commercial fisheries stakeholders regarding our proposed survey date.
Provide effective consultation engagement directly with commercial fisheries, Fishermen's cooperatives, the NSW PFA and/or other key stakeholders	NSW DPI (Commercial Fisheries)	NSW DPI recommended that: • sound consultation (including post survey) will be critical in ensuring industry confidence in Advent Energy's operations and commitment to reducing the impact on current and/or future exploration or production programs. • engage Fishermen's Cooperatives and the Sydney Fish Market as significant primary receivers of commercial seafood products. • Advent Energy notifies Department regarding the proposed dates the survey vessel will be operating, and the proposed routes or area coverage within specified periods.
		Asset Energy confirmed that: • We will continue to consult directly with commercial fishers, fishermen's cooperatives, the PFA and other stakeholders (including the Sydney Fish Market) before, during and after the survey. We appreciate that continued dialogue will maximise the industry confidence in our operations present and future. • We have and will continue to liaise with the Department around our proposed survey, including notification of commencement of operations. We believe the information provided to date gives sufficient advice surrounding the specific area/coverage.
Potential impacts on	Living Ocean	Living Ocean raised concerns about: • the planned survey dates (August-September 2017) overlapped the humpback whale southern

whales		migration period (mid-August to mid-December) and occupation of the area by Southern Right Whales (May to November) • unlikely that proposed procedures for whale sighting will result in insignificant fraction of whales being observed • there was risk of collision with whales by the vessel
		Asset Energy responded with: • Risk of striking whales was low considering volume of other shipping traffic in the area • Modelled noise output is low, therefore unlikely to impact whales • Will be implementing EPBC Act policy on interaction of seismic vessels with cetaceans, including ramp-ups / soft starts, whale sighting shutdown zones.

Summary of Issues Raised during Asset Energy's Consultation Meeting 25 May 2017

Issue or Concern Raised	Asset Energy's Response	Actions

• Fishers identified the region as a highly-profitable and viable fishing region (nicknamed "the Farm").
• Fishers expressed concern regarding the damage to local fish species and fishing activity due to the previous seismic surveys conducted.
• Fishing activities would not be recorded on Logbook Return Records as fishers move fishing efforts elsewhere, but it does impact on catch efficiencies and creates more cost to a business in locating alternate fish stocks. Fish from the areas were dead and rotting on the seafloor and coming up in the trawl nets. Targeted fish species did not return to the area for many months afterwards.
• Concerns were expressed that there is no true knowledge regarding the potential impacts and the consequences of the survey to fish.
• In addition, the meeting noted the high use by international traffic of the region and the risk this would mean in any petroleum activity in the area.
• The meeting noted that if the project was to be approved then research should be undertaken both before and after the event to capture the impact and recovery of the area.
• Species of concern include tiger flathead and coral snapper which are sensitive species located in these small prolific regions. These species are highly important to both commercial and recreational industries.
• Some individuals expressed in informal conversation that they wouldn't complain about a lack of access to the survey area if for only a few days, given that it is a relatively small area and short duration.
	• Asset Energy provided a PowerPoint presentation with the following information:
	  ○ the company history
	  ○ permit area and previous projects
	  ○ proposed new survey details and line plans
	  ○ initial acoustic modelling results
	  ○ environmental impacts and risks
	  ○ NOPSEMA EP process
	  ○ Next steps.
	• The meeting recognised that due to the use of the single gun and streamer, etc., that there was less likelihood for an impact.
	• Advent Energy will consider the feedback and provide responses where appropriate.
	• They would then submit their plan to NOPPSEMA and communicate the process and determinations to stakeholders.
	• During the activity, Advent Energy will communicate with the stakeholder around any effects and interactions.
		• Identification of "at risk" species to be provided to Advent Energy
		• GPS coordinates for the "farm" to be provided to Advent Energy.

• Impact of seismic noise on humpback whales in migration season and concern for potential vessel strikes	• Survey timeframe has been altered to be outside of the northern migration season for humpback whales. Low likelihood of encountering whales. • Explanation of adherence to EPBC Act Policy Statement 2.1 and function of MFO (two MFOs operating as back-to-backs onboard vessel throughout the survey).	• No further action