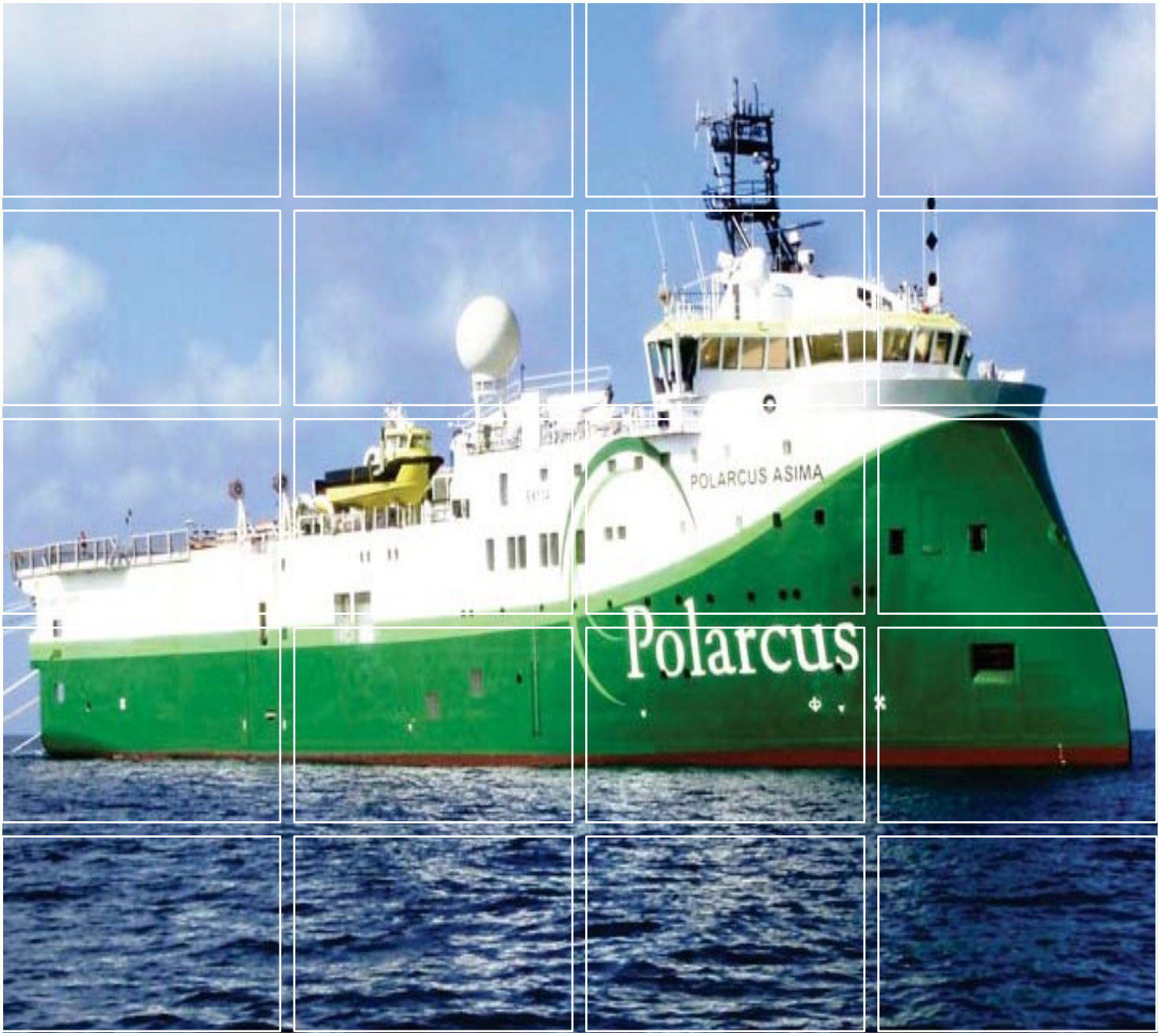

Environment Plan Summary Cygnus 3D Marine Seismic Survey (Phase 3) 2017 - 2018

Polarcus Seismic Limited

Revision 1: 11 December 2017

0402889 (EP Summary)

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Environment Plan Summary

Cygnus 3D Marine Seismic Survey
Phase 3
2017 – 2018

Revision 1: December 2017

Reference: 0402889 (EP Summary)

Environmental Resources Management Australia

Document Revision History

Revision No.	Purpose/Change	Date
1	Submission to NOPSEMA	11/12/2017

CONTENTS

ANNEXES

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

Acronym/ Abbreviation	Definition
ºC	Degrees centigrade
3D MSS	Three-dimensional marine seismic survey
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHS	Australian Hydrographic Service
ALARP	As low as reasonably practicable
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
BIA	Biologically Important Area
BWM-T	Class notation for vessels with ballast water treatment complying with International Convention for the Control and Management of Ship's Ballast Water and Sediments
CEO	Chief Executive Officer
CLEAN-DESIGN	Class notation for vessels that are designed, built and operated in a way that gives additional protection to the environment
COLREGS	International Regulations for Preventing Collisions as Sea
COO	Chief Operations Officer
cui / cu. in.	Cubic inches
CV	Curriculum Vitae
DEWHA	Department of the Environment, Water, Heritage and the Arts
DNV	Det Norske Veritas
DOE	Department of the Environment
DoEE	Department of the Environment and Energy
DOF	Department of Fisheries
DPIRD	Department of Primary Industries and Regional Development (formerly Department of Fisheries)
EHSQ	Environment, Health, Safety and Quality
ENVID	Environmental Risk Assessment
EP	Environment Plan
EPBC	*Environment Protection and Biodiversity Conservation Act*
GHG	Greenhouse Gas
GPS	Global Positioning System
HSE	Health, Safety and Environment
Hz	Hertz
IAPP	International Air Pollution Prevention
IMO	International Maritime Organization
IMS	Invasive marine species
IOPP	International Oil Pollution Prevention
ISPP	International Sewage Pollution Prevention
ITOPF	International Tanker Owners Pollution Federation
KEFs	Key Ecological Features

Acronym/ Abbreviation	Definition
Km	Kilometres
Km^2	Square kilometres
m	Meters
m/s	Meter per second
m^3	Cubic metres
MARPOL	(Marine Pollution) International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978
MFO	Marine fauna observer
MGO	Marine Gas Oil
MNES	Matters of National Environmental Significance
MOP	Marine Oil Pollution
MOSCP	Marine Oil Spill Contingency Plan
MOU	Memorandum of Understanding
National Plan	National Plan for Maritime Environmental Emergencies
NAUT-AW	Vessel class notation for enhanced nautical safety, incorporating a grounding avoidance system
NES	National Environmental Significance
Nm	Nautical miles
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NOx	Nitrogen Oxides
NRSMPA	National Representative System of Marine Protected Areas
NSW	New South Wales
NZS	New Zealand Standards
OPEP	Oil Pollution Emergency Plan
OPGGS (E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OPRC	Oil Pollution Preparedness, Response and Cooperation
OSMP	Operational and Scientific Monitoring Programs
OSRC	Oil Spill Response Coordination
POB	Persons on board
Polarcus	Polarcus Seismic Limited
POLREP	Oil Pollution Reports
ppm	Parts per million
psi	Per square inch
JRCC	Joint Rescue Coordination Centre
SA	South Australia
SDS	Safety Data Sheet
SEL	Sound exposure level
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SITREPS	Situation Reports

Acronym/ Abbreviation	Definition
SOLAS	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SPA	Special Prospecting Authority
SPS	Special Purpose Ships
STCW95	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1995 Revision
ULSTEIN	Ulstein Group, provider of ship designs, shipbuilding and solutions in power and control systems, heavylift, crane & barge services
UV	Ultraviolet
WA	Western Australia
ZPI	Zone of Potential Influence

1 INTRODUCTION

The Cygnus 3D Marine Seismic Survey (MSS) is a three-dimensional marine seismic survey being undertaken by Polarcus Seismic Limited (Polarcus) in Commonwealth waters of the Vulcan Sub-basin (in the Western Bonaparte Basin). The Operational Area is located approximately 170 km off the Kimberley coast of northern Western Australia (WA) and 180 km from the Indonesian archipelago and East Timor (*Figure 1.1*). The Acquisition Area (within which 3D seismic acquisition will be undertaken) covers an area of 7,240 km² within a larger Operational Area (refer to *Section 2* for further details). The survey will be undertaken in Commonwealth waters in water depths of up to approximately 245 m.

A previous period of acquisition was completed for the Cygnus 3D MSS (the Phase 1 and Phase 2 areas presented in *Figure 1.1*) between 14th December 2015 and 9th March 2016 in accordance with environmental management measures detailed in a separate Environment Plan (EP) accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) (Cygnus 3D Marine Seismic Survey 2015–2017 Environment Plan, Revision 2, NOPSEMA reference 3446).

A new EP for Phase 3 of the Cygnus 3D MSS (NOPSEMA reference 4218) was accepted by NOPSEMA on 1st December 2017 and is valid until 31st December 2018. This document provides a summary of the EP.

1.1 EP NOMINATED LIAISON PERSON

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123°0'0"E 124°0'0"E 125°0'0"E 126°0'0"E 127°0'0"E 128°0'0"E

11°0'0"S 12°0'0"S 13°0'0"S 14°0'0"S

Big Bank Shoal
Dillon Shoal
Sahul Bank Shoals
Barton Shoal
Sahul Bank Shoals
Fantome Shoal
Sahul Bank Shoals
Mangola Shoal
Pee Shoallabiru Shoals
Vee Shoal
Hibernia Reef
Ashmore Reef
Johnson Bank
Woodbine Bank
Cartier Island
Barracouta Shoal
Shoal 25
Unnamed Shallow Areas
Unnamed Shallow Areas
Vulcan Shoal
Goeree Shoal
Eugene McDermott Shoal
Heywood Shoal
Echuca Shoal
BROWSE ISLAND
Gale Bank
Favell Bank
Van Cloon Shoal
Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal
WA
KALUMBURU

Cygnus Aquisition Area (GDA 94)		
Point	Latitude	Longitude
1	-12.022084	124.556455
2	-12.287255	124.917902
3	-12.415258	124.917903
4	-12.415260	124.751237
5	-12.581926	124.751238
6	-12.581927	124.667907
7	-12.840522	124.667943
8	-13.208194	124.388891
9	-12.863496	123.917906
10	-12.748597	123.917909
11	-12.504945	124.071050
12	-12.170014	124.447909

Cygnus Operational Area (GDA 94)		
Point	Latitude	Longitude
1	-11.832213	124.528646
2	-12.218958	125.055656
3	-12.549941	125.056259
4	-12.550841	124.889249
5	-12.705725	124.890338
6	-12.706337	124.806021
7	-12.884617	124.806120
8	-13.398285	124.417522
9	-12.931201	123.779379
10	-12.710130	123.779609
11	-12.417278	123.963988
12	-12.083086	124.338270

Legend

- Operational Area
- Acquisition Area
- Previous Cygnus Survey Area
- Phase 1 (acquired)
- Phase 2 (acquired)
- Phase 3 South (planned)
- Phase 3 North (planned)
- 1997 Perth Treaty Seabed Boundary with Indonesia
- Exclusive Economic Zone Limit
- Coastal Waters (State Jurisdiction)

Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 3 Oct 2017
Bathymetry Grid and Depth Contours - GA Australian Bathymetry 2009
EEZ, Treaty Boundary - Geoscience Australia 2017

Survey Location

1.1

Drawing No:	0402889b_Phase3EP_G001_R0.mxd		Polarcus Cygnus 3D MSS Phase 3 Environment Plan
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994

0 25 50km

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2 DESCRIPTION OF THE ACTIVITY

2.1 LOCATION

The area within which 3D seismic acquisition will be undertaken is defined as the Acquisition Area and covers approximately 7,240 km² (*Figure 1.1)*. The Acquisition Area is surrounded by a larger Operational Area (*Figure 1.1*), which comprises additional area for the purpose of line run-ins, run-outs, source testing, soft starts and turns etc. The Operational Area covers approximately 13,630 km^2 and, at its closest, is approximately 441 km north of Derby, Western Australia and 184 km south of the islands of Indonesia and East Timor.

Approximately 337 km^2 of the Operational Area in the north is located within an area of overlapping jurisdiction (the Perth Treaty Area), subject to the seabed jurisdiction of Australia and the water column jurisdiction of Indonesia. This area is beyond the limits of Commonwealth waters and the Exclusive Economic Zone and is also beyond the limits of the Australian Fishing Zone.

The Cygnus 3D MSS will be conducted over multiple phases of acquisition. Seismic data were acquired previously in the Phase 1 and Phase 2 areas between 14th December 2015 and 9th March 2016. Future planned acquisition is now expected to comprise the following:

- Phase 3 North;
- Phase 3 South; and
- Potential additional orthogonal infill lines within the Phase 1 area.

The layout of these phase areas is presented in *Figure 1.1.*

2.2 ACTIVITY DETAILS

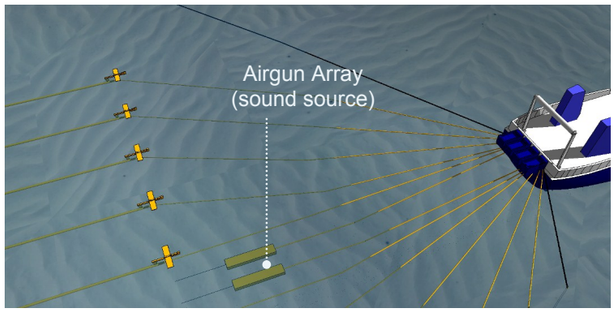
The core activity that forms the basis for this EP is the undertaking of a marine seismic survey. A survey vessel will tow the seismic array and hydrophone streamers along pre-determined north-west to south-east survey lines within the Operational Area. Occasional orthogonal lines may be sailed north-east to south-west where data infill is required, including up to a maximum of 30 lines in the Phase 1 area, but such lines will generally be infrequent. Tail buoys will be used to maintain position in the water and clearly indicate the streamer ends.

Associated activities in support of undertaking the survey are likely to include refuelling and resupply, use of support vessels as required, and crew changes within the Operational Area.

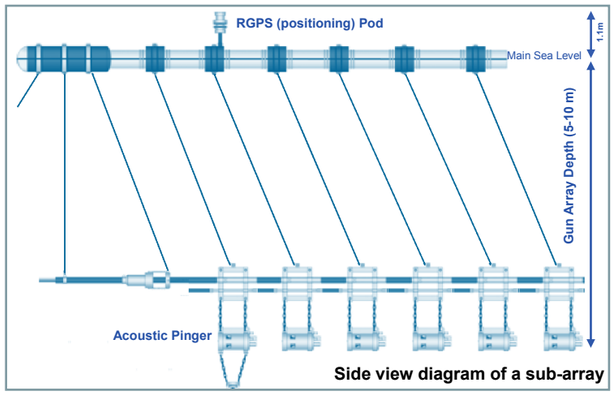
Key details of the Cygnus 3D MSS relevant to the purpose and objectives of the EP are summarised in *Table 2.1* and described below. A representative figure of a towed seismic array and 3D survey pattern is presented in *Figure 2.1*.

Table 2.1 Key Seismic Survey Details

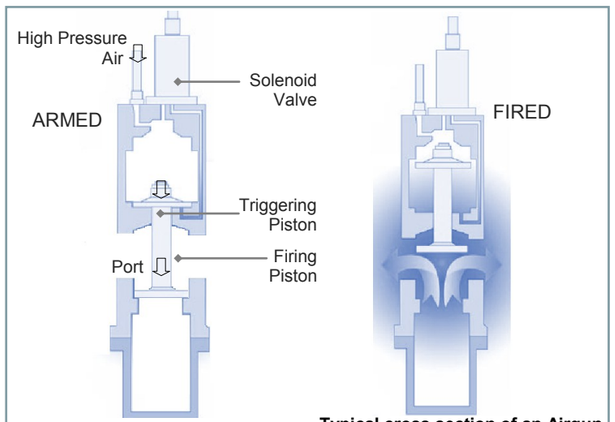
Feature	Indicative Information
Seismic vessel	
Number	One purpose built seismic vessel
Class	ULSTEIN SX124/134 and DNVGL CLEAN-DESIGN
Length	90-95 m
Beam	19-21 m
Gross tonnage	6,500-7,500 tonnes
Fuel type	Marine Gas Oil (MGO)
Fuel capacity	1,540-1,925 m^3
Largest fuel tank size	280 m^3
Number of personnel	60
Seismic Source	
Type	Airgun / three subarrays
Size	3,090 cubic inches
Pressure	2,000 pounds per square inch (psi) (nominal)
Source levels (McPherson and Wood 2017)	249 dB re 1µPa @ 1 m (Pk) 225 dB re 1μPa^2.s @ 1 m (0.01–2 kHz)
Towing depth	5 – 10 m
Streamer	
Type	Solid
Number	10
Length	8,100 m (extending up to 8,900 m astern)
Spacing	112.5 m
Towing depth	Approximately 15 m
Seismic Activity	
Speed	Approximately 4.5 knots
Seismic line spacing	Approximately 562 m
Discharge interval	Approximately every 12.5 m (approximately every 5 seconds) along survey lines
Operational (safety) exclusion zone	500 m from the 20 m depth contour
Line orientation	North-west to south-east survey lines within the Operational Area. *Note: Occasional orthogonal lines may be sailed north-east to south-west where data infill is required*
Logistics	
Number of support/supply vessels	Two
Refuelling	At sea every 10 to 14 days
Crew change	Via helicopter transfers approximately every 35 days



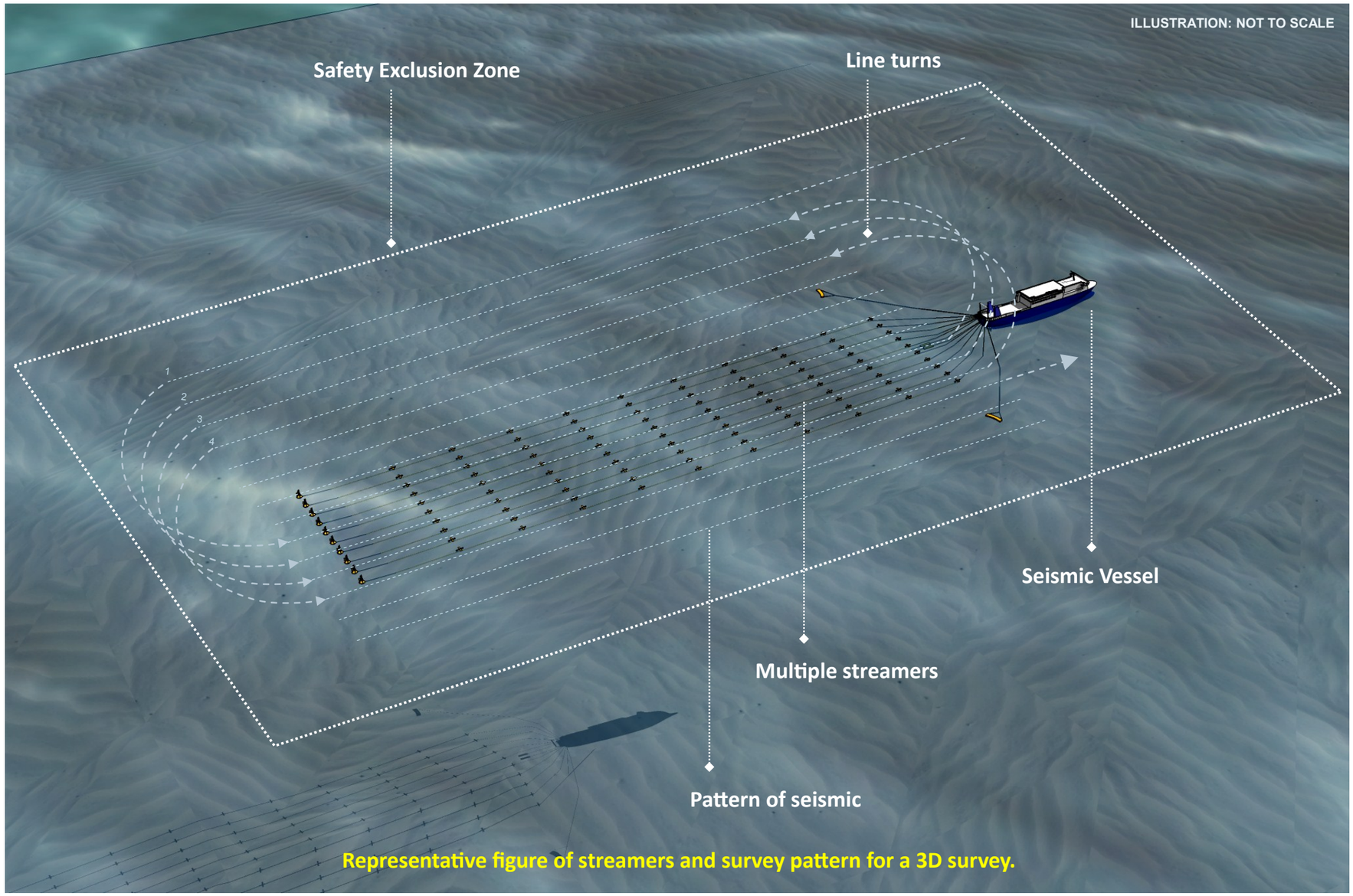
Airgun arrays deployed behind the seismic vessel in a 3D survey



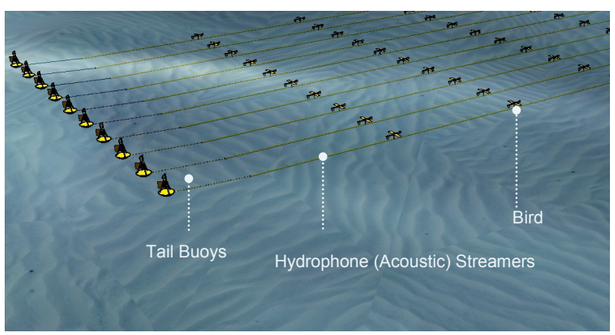
Side view diagram of a sub-array



Typical cross section of an Airgun

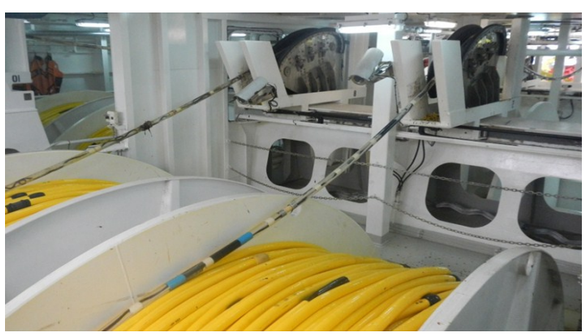


Representative figure of streamers and survey pattern for a 3D survey.



Layout of hydrophones, tail buoys and birds for a 3D seismic survey

Airguns On-board a Seismic Vessel Prior to Deployment



A Typical Streamer Ready to be Deployed

Indicative 3D seismic vessel (Polarcus Alima)

Figure 2.1 Representative Figure of a Towed Seismic Array and 3D Survey Pattern.

DRAWING NUMBER AND TITLE: 1	CLIENT: Polarcus	ERM 4th Floor, 5 Mill Street, Perth WA 6000 www.erm.com	SIZE: A3	DATE: DRAWN: CR	CHECKED: APPROVED: JP	PROJECT NO: 0267070	PROJECT: Polarcus Seismic EP

Photo Source: ERM

2.3 SCHEDULE

An initial period of acquisition, comprising 'Phase 1' and 'Phase 2' areas (*Figure 1.1*) was completed between 14th December 2015 and 9th March 2016 under the pre-existing EP.

The next phases of the Cygnus 3D MSS are anticipated to take a total of approximately 2 – 3 months to acquire, completed over the multiple phases between 2017 and 31st December 2018. This is based on the following estimated timeframes:

- Phase 3 North: Expected to take up to approximately 29 days in total to acquire and is expected to be undertaken prior to 30th April 2018;
- Phase 3 South: Expected to take up to approximately 30 days in total to acquire and is expected to be undertaken sometime after 31st March 2018 but prior to 31st December 2018;
- Additional lines in the Phase 1 and Phase 2 areas: Expected to take up to approximately 12 days in total to acquire and expected to be undertaken after 31st March 2018 but sometime prior to 31st December 2018.

Exact start and end dates of each Cygnus 3D MSS acquisition phase will be communicated by Polarcus based on seasonal restrictions due to environmental sensitivities, availability of vessel and weather conditions.

3 DESCRIPTION OF THE ENVIRONMENT

This section describes the existing environment of the Operational Area and the Zone of Potential Influence (ZPI), the area that may be affected in the event of a credible "worst-case" hydrocarbon spill scenario.

3.1 OVERVIEW

The Operational Area is approximately 170 km off the Kimberley coast of northern Western Australia (WA) and 180 km from the Indonesian archipelago and East Timor (refer to *Section 2.1* for activity location details). It lies mostly within the North-west Marine Region (the region) (*Figure 3.1*) with part of the Operational Area located within the Perth Treaty Area (refer to *Section 2.1*).

The region comprises Commonwealth waters from the Western Australian/ Northern Territory border to Kalbarri, south of Shark Bay and covers 1.07 million km^2 of tropical and subtropical waters (DEWHA 2008a). The Operational Area lies within two provincial bioregions (*Figure 3.1)*:

- The Timor Province, located on the continental slope between Broome and Cape Bougainville in water depths ranging from 200 m near the shelf break to 5,920 m over the Argo Abyssal Plain; and
- The Northwest Shelf Transition Bioregion, located along the continental shelf with only a small proportion extending onto the continental slope in water depths ranging from 10 to 100 m.

The deeper waters of the shelf break and continental slope also extend beyond Commonwealth waters into the Perth Treaty Area to the north.

Further details on the physical, ecological and socio-economic environments of the Operational Area in the context of the Timor Province and Northwest Shelf Transition Bioregion are provided in the following sections.

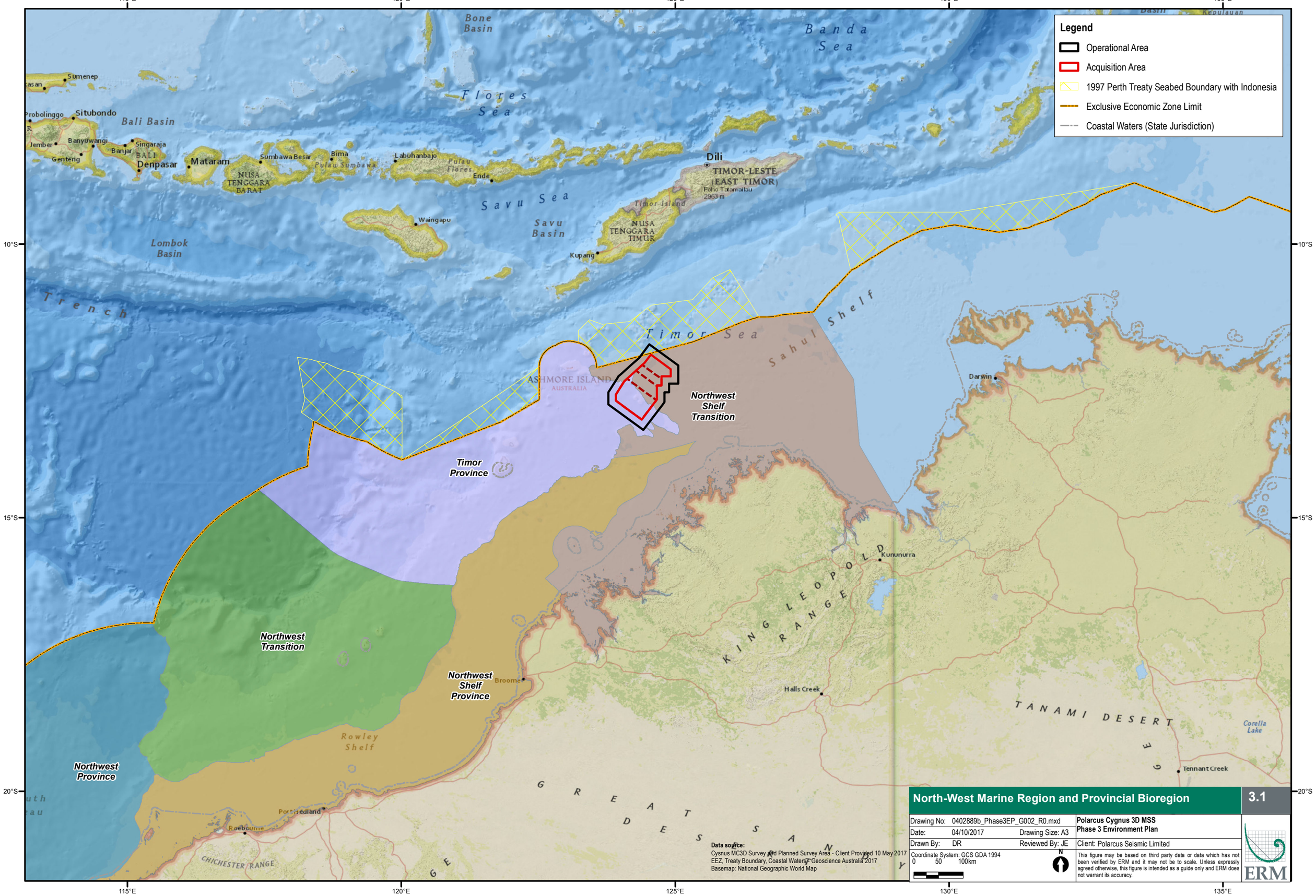
3.2 PHYSICAL ENVIRONMENT

3.2.1 Climate

The Operational Area is characterised by two distinct seasons; a mild, dry winter during the months of April to September and a hot, wet summer during the months of October to March. There are also rapid transitional months between the main season generally April and September/October.

3.2.2 Tides

The tides of the region are mixed and predominantly semi-diurnal (two high tides and two low tides per day), with well-developed spring to neap tidal variation (DEWHA 2008a). The mean spring and neap tidal ranges west of the Operational Area at Ashmore Reef (approximately 90 km away) are approximately 4.7 m and 2.8 m respectively (Berry 1993).



Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters - Geoscience Australia 2017
Basemap: National Geographic World Map

North-West Marine Region and Provincial Bioregion

3.1

Drawing No:	0402889b_Phase3EP_G002_R0.mxd		Polarcus Cygnus 3D MSS Phase 3 Environment Plan
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited
Coordinate System: GCS GDA 1994 0 50 100km		N	This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

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3.2.3 Waves

The wave climate in the region is influenced by sea and swell waves, as well as the location of storms and the local bathymetric effects that occur in the region. Ashmore Reef (approximately 90 km away from the Operational Area) has a mean wave height of 1 to 2 m (Glenn and Collins 2005).

3.2.4 Currents

The Operational Area is dominated by surface currents heavily influenced by both tidal motions and the Indonesian Throughflow, which transports warm waters from the Pacific Ocean into the Indian Ocean through the Indonesian seas. Tidal currents average approximately one metre per second (Glenn and Collins 2005).

3.2.5 Temperature and Salinity

Sea temperatures and salinity in the region are heavily influenced by the warm, low salinity waters of the Indonesian Throughflow. Surface waters have summer sea surface temperatures of approximately 26 ºC and winter temperatures of approximately 22 ºC (DEWHA 2008a).

3.2.6 Water Quality

The region is characterised by low background levels of metals and organics. The Indonesian Throughflow brings in oligotrophic (low in nutrients) waters from the western Pacific Ocean through to the Indian Ocean (DEWHA 2008a).

3.2.7 Bathymetry, Geomorphology and Sedimentology

The region comprises large areas of seabed that are dominated by soft sediments. The soft sediments typically consist of sandy and muddy substrate, occasionally made up of patches of coarser sediments (DEWHA 2008a).

The Operational Area lies in water depths up to approximately 245 m. A number of bank and shoals in the region rise to less than 30 m depth in some places.

The southern portion of the Operational Area includes ancient coastline along the 125 m depth contour. The north-eastern corner of the Operational Area overlaps 0.3% of the Carbonate bank and terrace system of the Sahul Self, with an approximate depth of 100 m, both of which are identified as Key Ecological Features (refer to *Section 3.3.1*).

Shoals and banks in the Operational Area are abrupt geomorphological features that typically rise to within 5 to 30 m from the sea surface and extend along the continental shelf edge (*Table 3.1* and *Figure 3.2* to *Figure 3.3*). Initially the shoals rise steeply from depths of 100 to 200 m or more on the continental shelf and begin to plateau around 40 to 50 m depth (PTTEP 2013). The main plateau area of each shoal is typically at depths of 20 - 30 m, with occasional higher ground rising to within approximately 5 to 10 m of the sea surface (Heyward et al 2010).

Table 3.1 Significant Banks and Shoals in relation to the Operational Area

Bank/Shoals	Within Operational Area	Approximate shallowest depth (m) (Heyward et al. 1997; Heyward et al. 2011a; National Imagery and Mapping Agency 2004)	Distance and direction from Operational Area where relevant
Vulcan Shoal	Yes	9.5	-
Goeree Shoal	Yes	Not available	-
Eugene McDermott Shoal	Yes	11.1	-
Heywood Shoal[2]	No	Not available	29 km south
Barracouta Shoal	Yes	10.3	-
'Shoal 25'	Yes	30	-
Southern portion of Sahul Bank (several unnamed shoals)	No	5-29.5	17 km northwest
Karmt Shoal	No	Not available	172 km northeast
Jabiru Shoals	No	Not available	28 km northeast
Pee Shoal	No	10.3	26 km northeast
Mangola Shoal	No	9.0	54 km northeast
Barton Shoal	No	13.7	93 km northeast
Dillon Shoal	No	13.1	143 km northeast
Echuca Shoal[2]	No	Not available	78 km south
Basset Smith Shoal	No	4.8	112 km southeast
Penguin Shoal[1]	No	9.7	116 km southeast
Gale Bank[1]	No	22.0	113 km southeast
Baldwin Bank[1]	No	15.5	122 km southeast
Favell Bank[1]	No	22.0	120 km southeast
Fantome Shoal	No	7.3	65 km north
Vee Shoal	No	13.4	60 km north
Johnson Bank	No	8.5	61 km west
Woodbine Bank	No	11.5	43 km west
Wave Governor Bank	No	36.5	25 km west
Big Bank Shoals	No	16.0	199 km northeast

1) Part of the Carbonate bank and terrace system of the Sahul Shelf KEF
2) Part of the ancient coastline along the 125 m depth contour KEF

As well as the defined (named) shoals and banks within the Operational Area, patches of 'unnamed shallow areas', shallower than 60 m, also exist within the Operational Area that are not associated with the above mentioned shoals and banks (*Figure 3.2* to *Figure 3.3*). These areas can be distinguished from the defined shoals and banks as they occur over a relatively broad expanse of open seabed, are predominantly deeper, rising to approximately 40 to 45 m depths, and display far shallower gradient profiles with an average gradient of 0.02 (1 vertical metre for every 50 horizontal metres). Approximately 90 km^2 of the 'unnamed shallow areas' comprise seabed less than 60 m water depth. Approximately 3 km^2 of the 'unnamed shallow areas' extend to less than 45 m water depth.

123°E
124°E
125°E
126°E
11°S
12°S
13°S

Dillon Shoal
Sahul Bank Shoals
Barton Shoal
Sahul Bank Shoals
Sahul Bank Shoals
Fantome Shoal
Mangola Shoal
Pee Shoal
Jabiru Shoals
Vee Shoal
Hibernia Reef
Ashmore Reef
Johnson Bank
Woodbine Bank
Barracouta Shoal
Shoal 25
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Unnamed Shallow Areas
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Goeree Shoal
Eugene McDermott Shoal
Heywood Shoal
Gale Bank
Van Cloon Shoal
Favell Bank
Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal

Legend

- Operational Area
- Acquisition Area
- Exclusive Economic Zone Limit
- Coastal Waters (State Jurisdiction)
- 100m Depth Contours (between 100 and 1000 m)

Shallow Contours

- 60m Contour
- 45m Contour
- 30m Contour
- 20m Contour

Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters - Geoscience Australia 2017
Basemap: National Geographic World Map

Banks, Shoals and Other 'Unnamed Shallow Areas' Within and Around the Operational Area

3.2

Drawing NA:	0402889b_Phase3EP_G003_R0.mxd		**Polarcus Cygnus 3D MSS Phase 3 Environment Plan**
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994

0 25 50km N

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124°0'0"E

125°0'0"E

13°0'0"S

Barracouta Shoal

Shoal 25

Unnamed Shallow Areas

Unnamed Shallow Areas

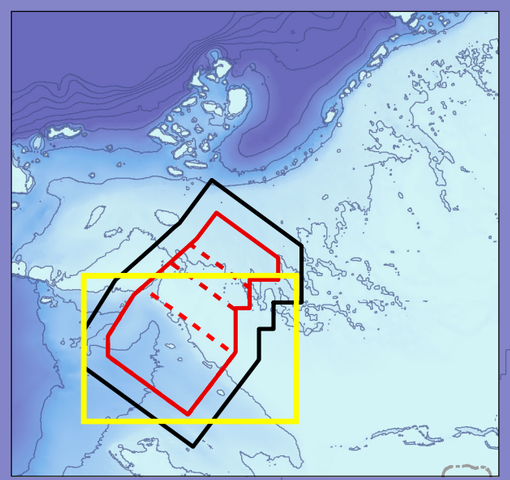
Vulcan Shoal

Goeree Shoal

Eugene McDermott Shoal

-100

-200



Legend

100m Depth Contours (between 100 and 1000 m)

Shallow Contours

60m Contour

45m Contour

30m Contour

20m Contour

Data source:
Bathymetry (1) - Grid and Depth Contours - GA Australian Bathymetry 2009
Bathymetry (2) - Shoal Depth Contours - Client Provided

Banks, Shoals and Other 'unnamed shallow areas' in the Southern Part of the Operational Area

3.3

Drawing No:	0402889b_Phase3EP_G004_R0.mxd		**Polarcus Cygnus 3D MSS Phase 3 Environment Plan**
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994

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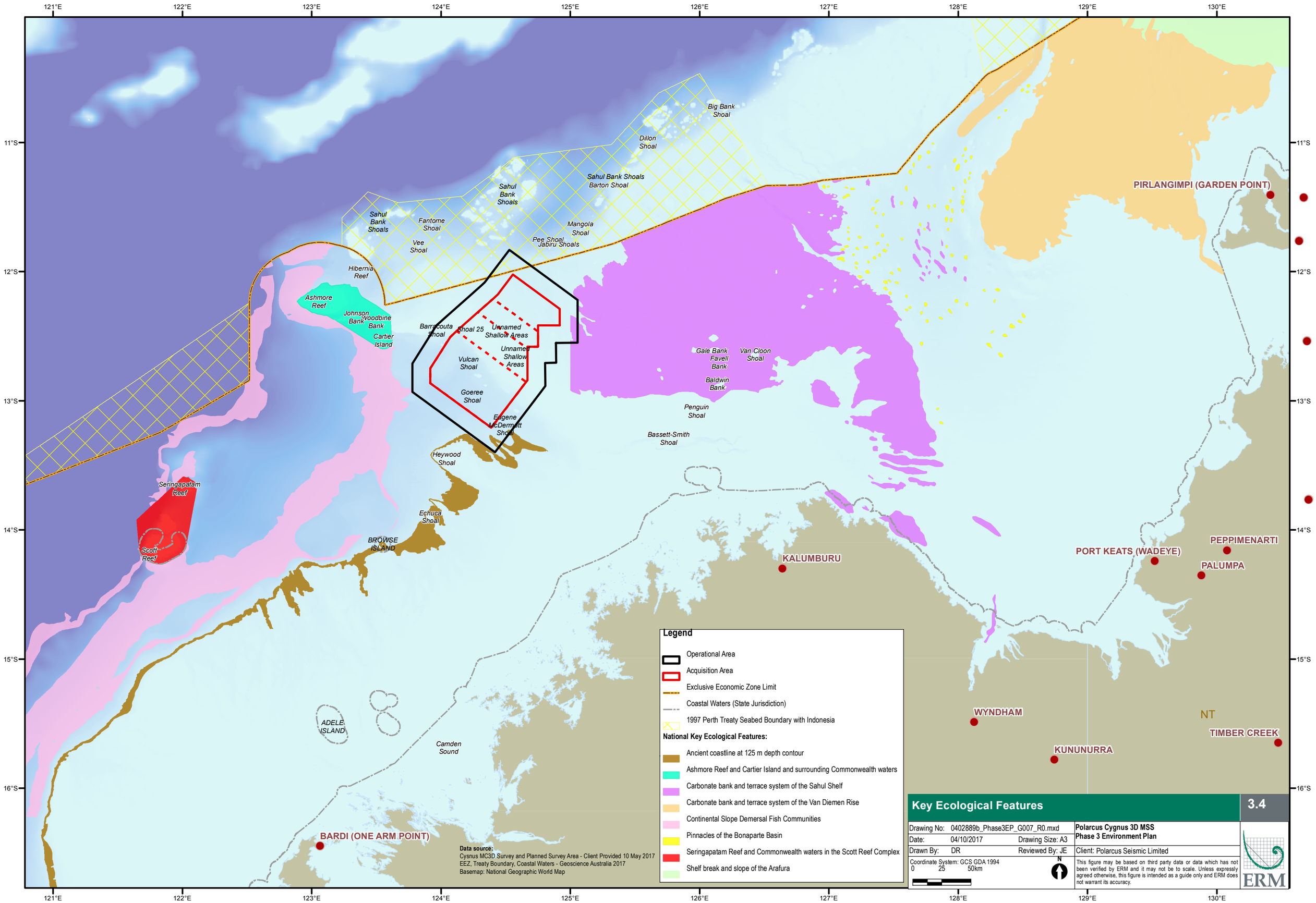
3.3 ECOLOGICAL ENVIRONMENT

3.3.1 Key Ecological Features

Key Ecological Features (KEFs) are components of the Commonwealth marine environment recognised for their regional importance for either the region's biodiversity or ecosystem function and integrity (Commonwealth of Australia 2012). KEFs that are relevant to the Cygnus 3D MSS are summarised in *Table 3.2* and shown in *Figure 3.4*. *Figure 3.4* also presents the level of overlap between KEFs and the Operational Area.

Table 3.2 Key Ecological Features located in and around the Operational Area (Commonwealth of Australia 2012)

Key Ecological Feature	Present in Operational Area?	Present in ZPI?	Values	Description
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	No	Yes	High productivity and aggregations of marine life.	Ashmore Reef is the largest of only three emergent oceanic reefs present in the north-eastern Indian Ocean and is the only oceanic reef in the region with vegetated islands. Ashmore Reef and Cartier Island and the surrounding Commonwealth waters are regionally important for feeding and breeding aggregations of birds and other marine life; they are areas of enhanced primary productivity in an otherwise low-nutrient environment. Ashmore Reef supports the highest number of coral species of any reef off the West Australian coast.
Continental slope demersal fish communities	No	Yes	High levels of endemism	The diversity of demersal fish assemblages within this KEF is high compared to elsewhere along the continental slope.
Ancient coastline at 125 m depth contour	Yes	Yes	Unique seafloor feature with ecological properties of regional significance	Migratory pelagic species (e.g. humpback whales and whale sharks) may use this escarpment as a guide. The topographic complexity of escarpments associated with this feature may facilitate vertical mixing of the water column, providing relatively nutrient-rich localised environments.
The Carbonate bank and terrace system of the Sahul Shelf	Yes	Yes	Unique seafloor feature with ecological properties of regional significance	Regionally important because of its likely ecological role in enhancing biodiversity and local productivity relative to its surrounds. Banks that rise to at least 45 m, and to within 30 m water depth, allow light dependent organisms to thrive and support more biodiversity (Nichols *et al.* 2013; NERP 2014). Supports a high diversity of organisms including reef fish, sponges, soft and hard corals, gorgonians, bryozoans, ascidians and other sessile filter feeders. The banks are known to be foraging areas for loggerhead, olive ridley and flatback turtles. Cetaceans and green and largetooth sawfish are likely to occur in the area.
Seringapatam Reef and Commonwealth waters in the Scott Reef complex	No	Yes	High productivity and aggregations of marine life	Seringapatam Reef and the Commonwealth waters in the Scott Reef complex are regionally important in supporting the diverse aggregations of marine life, high primary productivity and high species richness associated with the reefs themselves. As two of the few offshore reefs in the north-west, they provide an important biophysical environment in the region.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Dillon Shoal
Sahul Bank Shoals
Barton Shoal
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Fantome Shoal
Sahul Bank Shoals
Mangola Shoal
Vee Shoal
Pee Shoal
Jabiru Shoals
Hibernia Reef
Ashmore Reef
Johnson Bank
Woodbine Bank
Cartier Island
Barracouta Shoal
Shoal 25
Unnamed Shallow Areas
Unnamed Shallow Areas
Vulcan Shoal
Goeree Shoal
Eugene McDermott Shoal
Heywood Shoal
Seringapatam Reef
Scott Reef
Echuca Shoal
BROWSE ISLAND
ADELE ISLAND
Camden Sound
BARDI (ONE ARM POINT)
Gale Bank
Favell Bank
Van Cloon Shoal
Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal
PIRLANGIMPI (GARDEN POINT)
KALUMBURU
PEPPIMENARTI
PORT KEATS (WADEYE)
PALUMPA
WYNDHAM
NT
TIMBER CREEK
KUNUNURRA
Legend
Operational Area
Acquisition Area
Exclusive Economic Zone Limit
Coastal Waters (State Jurisdiction)
1997 Perth Treaty Seabed Boundary with Indonesia
National Key Ecological Features:
Ancient coastline at 125 m depth contour
Ashmore Reef and Cartier Island and surrounding Commonwealth waters
Carbonate bank and terrace system of the Sahul Shelf
Carbonate bank and terrace system of the Van Diemen Rise
Continental Slope Demersal Fish Communities
Pinnacles of the Bonaparte Basin
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex
Shelf break and slope of the Arafura
Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters - Geoscience Australia 2017
Basemap: National Geographic World Map
Key Ecological Features
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Date: 04/10/2017
Drawing Size: A3
Drawn By: DR
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Phase 3 Environment Plan
Client: Polarcus Seismic Limited
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
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3.3.2 Plankton Communities

The main driver of planktonic primary productivity in the region is from seasonal influences. In the tropical northern regions of Australia, higher phytoplankton concentrations, as indicated by surface chlorophyll concentrations, generally occur during the winter months (June to August) and are lower in summer (December to February) (Hayes *et al*. 2005), although there is some variability.

Chlorophyll-a concentrations are considered to be a proxy for phytoplankton biomass. NASA satellite imagery for the past ten years indicates average chlorophyll-a concentrations in the Operational Area are relatively low compared to levels immediately surrounding Ashmore Reef and Cartier Islands, which likely reflects localised upwelling around the coral atolls (NASA 2015).

3.3.3 Benthic Habitats and Communities

The distribution of benthic fauna depends on water depth, the substrate and sediment characteristics, the nature of the substrate and available food.

The sandy and muddy substrates that cover the majority of the Operational Area support relatively little sea bed structure or sessile epibenthos. They are sparsely covered by sessile filter-feeding organisms (e.g. gorgonians, sponges, ascidians and bryozoans) and mobile invertebrates (e.g. echinoderms, prawns and detritus-feeding crabs) (Brewer *et al*. 2007; DEWHA 2008a). Heyward *et al.* (1997) also noted that benthic macro-invertebrate infauna and epifauna such as worms, crustaceans, molluscs, gastropods, sea urchins, starfish, sea cucumbers, etc. typically occur in low numbers in water depths greater than 50 m in the region.

Scattered throughout the Operational Area are shoals and shallow, hard substrate supporting more diverse benthic assemblages, such as hard and soft corals, gorgonians, encrusting sponges, seagrass and macroalgae, particularly at shoals which are noted for their enhanced local productivity relative to surrounding areas (DEWHA 2008a) and associated fish communities.

Banks and Shoals

The bank and shoal systems in and around the Operational Area support diverse biological communities including corals, sponges, seagrasses and a variety of reef fish, with dominant organisms ranging from the macroscopic alga *Halimeda* to soft and hard coral communities (Heyward *et al*. 1997). Shoals in the region may also provide feeding habitats for macrofauna such as marine turtles and dugongs, particularly where the seabed rises to a depth of less than 20 m (Whiting 1996). Banks and shoals in the region that rise to at least 45 m and particularly within 30 m water depth, allow light dependent organisms to thrive and support more biodiversity (Nichols et al. 2013; NERP 2014).

There is adequate light on the shoal plateaus to support photosynthetic organisms, benthic primary producer habitats, such as algae and reef building corals, and diverse communities to depths of up to 50-60 m (Heyward *et al.* 2010; 2011a; 2013). The relatively shallow gradient shoal plateaus occur in water depths between 20-45 m

and curve rapidly at the shoal rim to descend past the 60 m contour where they slope steeply into deeper water (Heyward et al. 2010; 2011a).

Studies of shoals in the region by Heyward et al. (2010; 2011a; 2013) and ERM (2012) identified a correlation between the depth of the shoals and biota, with the richest, most diverse and abundant communities found on the shallower areas of each shoal. Benthic habitats include hard coral cover and other light dependent biota down to approximately 30 m depth, which was observed to decline gradually as depths extended to 40-50 m. Hard coral cover in depths of depths of 50-60 m is sparse and deeper portions of the upper slopes comprise predominately more sand and scattered rubble patches with more light-independent filter-feeding biota such as soft corals, sponges, sea fans, sea pens, and sea whips. The deeper slope substrates are predominantly sand, with some shell and rubble fragments. Benthic assemblages include patches of hydroid seabed matting and scattered filter-feeders between ~60-70 m. The deeper portions of the lower slopes are characterised by sparse and isolated individual filter feeders in large areas of bare sand with rubble.

Other 'unnamed shallow areas'

The benthic assemblages of the other 'unnamed shallow areas' (<60 m depth) within the Operational Area (*Figure 3.2* and *Figure 3.3*) are expected to be comparable to other areas studied nearby and comprise sparse patches of hydroid seabed matting and isolated sea fans, sea pens, sea whips, crinoids, sponges, and sabellid fan worms (ERM 2012). Benthic assemblages are expected to support some sponge and filter feeder biota on relatively featureless sand and rubble seafloor.

Platform and Fringing Coral Reef Communities

Coral reefs in the region generally fall into two groups: fringing reefs around the coastal islands and the mainland shoreline; and large platform reefs, banks and shelf edge atolls in offshore waters. Offshore coral reefs in the wider region include Ashmore Reef, Cartier Island, Hibernia Reef, Scott Reef and Browse Island.

3.3.4 Fish Assemblages

The region contains a diverse range of fish of tropical Indo-west Pacific affinity that are characterised by high levels of endemism and species diversity (Commonwealth of Australia 2012; DEWHA 2008a). The continental slope of the Timor Province and the North-west Transition Bioregion supports more than 418 and 505 species of demersal fish respectively, of which 64 species are considered endemic (Last et al 2005). The diversity of the continental slope demersal fish communities in the Timor Province Bioregion has been identified as a KEF (*Section 3.3.1*) (DEWHA 2008a).

Banks and Shoals

The fish fauna identified at the shoals in the south-western part of the Operational Area are biologically rich and relatively diverse and varied within and between the shoals (PTTEP 2013). Surveys identified 262 species of fish and sharks from 43 families (Heyward *et al.* 2013).

Site-attached reef fish assemblages are typically associated with small, isolated patches of coral reef, where fish are able to move locally among the available habitat, but where their home range and potential for larger-scale fish movements beyond these areas may be prevented by the absence of contiguous and adjoining habitats (Ault and Johnson 1998; Nagelkerken 2009). Since the banks/shoals within the Operational Area (including those of the Carbonate bank and terrace system of the Sahul Shelf) are known or expected to host coral reef and calcareous reef communities, it is expected that some of these banks/shoals will support some site-attached fish. This is especially the case in the portions of those banks/shoals occurring in waters shallower than 30 m, where the highest abundances of fish and coral cover are expected (Heyward *et al*. 2011a; 2013). Minimal hard coral cover is expected at depths greater than 60 m (Heyward *et al*. 2011a; 2013), and subsequently the presence of site-attached fish assemblages at those depths is not expected.

The highest levels of fish species richness and total abundance are generally observed at shallow depths (less than 30 m) and in association with reef substrate (Heyward et al 2011a; 2013). In water depths greater than 30 m, fish assemblages gradually become more dominated by species that are less restricted by habitat (many occur in a variety of habitats) and across large depth ranges (i.e. they are not restricted to specific habitats), although some site-attached species also occur in lower abundance in association with patches of reef and other biota down to approximately 60 m.

Site-attached reef fish are not expected to be significant components of the fish assemblages at depths greater than 60 m.

'Unnamed shallow areas'

The identified 'Unnamed shallow areas' are commonly deeper with lower relief than the shoals. Only a very small portion of these unnamed shallow areas extend shallower than 45 m. The 'unnamed shallow areas' are therefore unlikely to provide significant or extensive reef habitats for site-attached fish as they are expected to have a relatively low cover of coral and other benthic primary producers. Such habitats are not expected to support significant assemblages of site-attached fish.

3.3.5 Commercially Targeted Fish Stocks and Spawning

Seasonal spawning periods for commercial species occur throughout the year. The spawning seasons for a number of key commercially targeted species occur in the wider region. The WA Department of Fisheries (2013) guidance statement on undertaking seismic surveys in Western Australian waters reports the following key species and spawning periods in the North Coast Fisheries Bioregion:

- Blacktip shark (*Carcharhinus tilstoni and C. limbatus*): November to December;
- Rankin cod (*Epinephelus multinotatus*): August to October;
- Sandbar shark (*Carcharhinus plumbeus*): October to December;

- Spanish mackerel (*Scomberomorus commerson*): August to November: and
- Pink snapper (*Pagrus auratus*): May to July (rare occurrence in this region).

A desktop review of the ecological characteristics of these species suggests that the preferred spawning habitats for the majority of those identified by DOF primarily include hard/rocky substrates, reefs, and/or shallow coastal waters. Many of the identified species spawn in coastal waters and the Operational Area is not expected to be of particular significance for spawning of these species compared to anywhere else in the region.

Goldband snapper and red emperor also spawn throughout the region and have been identified as significant indicator species that may spawn within and around the Operational Area. Consultation with the WA Department of Primary Industries and Regional Development (DPIRD, formerly Department of Fisheries) and a comprehensive desktop review indicated that adult goldband snapper occur in continental shelf waters in depths of 40-245 m, in association with offshore reefs, shoals, and areas of hard flat bottom with occasional benthos or vertical relief, and often form large schools (Ovenden *et al.* 2004; Newman *et al*. 2008). ERM (2012) also recorded adult goldband snapper over relatively featureless sediment habitats in 80 m to 90 m water depths in the Montara, Padthaway, Bilyara and Tahbilk gas fields, in the south-western part of the Operational Area, but did not observe this species at similar depths on the slopes of shoals in the region. Juveniles typically occur on uniform sedimentary habitat with no relief (Newman *et al*. 2008).

The Department of Fisheries (2013) guidance statement reports that goldband snapper spawns between January and April with a peak predicted in March. However, consultation with Principal Research Scientists at DPIRD (Fisheries) identified that:

- The species is more typically found between approximately 50 m and 200 m water depths, with evidence of a greater concentrations associated with submerged ancient coastline between 80 m and 140 m depths;
- The species is a schooling species and likely spawn throughout their range, noting the concentration of adults between 80 m and 140 m depth contours;
- Goldband snapper are serial/multiple batch spawners, releasing multiple batches of eggs into the water column over a wide area during the spawning period, and likely spawn every few days throughout the spawning period, or in response to environmental cues such as water temperature and the moon cycle;
- Recent data collection and analyses undertaken since the Department of Fisheries (2013) Guidance Statement was published, indicates that spawning more likely occurs between September and May, with peaks occurring between December and March;

Although goldband snapper are understood to be broadcast spawners, it is also understood that eggs and larvae do not travel long distances between regions and there is limited genetic connectivity between the northern Kimberley stock and stocks in the Timor and Arafura Seas, the west Kimberley stock around Broome, and the Pilbara and Exmouth stocks (Lloyd et al. 2000; Newman et al. 2000; Ovenden et

al. 2002; Newman et al. 2008; Department of Fisheries 2015). The Kimberley stock and its spawning biomass are assumed to be separate, as both larval dispersal and movement of adults between the stocks is understood to be negligible (Department of Fisheries 2015; Newman et al. 2008; Lloyd et al. 2000; Newman et al. 2000; Ovenden et al. 2002).

While adults are understood to be a relatively vagile (free to move) species, the genetic subdivision indicates constrained home ranges and limited migration of adults over long distances, potentially where significant changes in water depth or other factors may influence adult movements (Ovenden *et al*. 2004). The range of the North Kimberley stock is therefore considered separate from the adjacent Timor and Arafura Seas stocks to the east, Indonesian stocks to the north, and the west Kimberley (Broome) stock. The geographical extent of the north Kimberley stock appears to encompass genetically similar sub-stocks identified over the following range (Lloyd *et al*. 2000; Newman *et al*. 2000; Ovenden *et al.* 2002; Department of Fisheries 2015):

- at least as far to the west as 14.9^{o}S, 122.0^{o}E (Lynher Bank), but unlikely as far west as the Broome stock sampled at 17.5^{o}S, 120.5^{o}E;
- including areas near Vulcan Shoal sampled at approximately 12.5.0^{o}S, 124.3^{o}E; and
- at least as far east as 12.0^{o}S, 126.0^{o}E, but unlikely as far east as the Timor Sea stock sampled at 10.2^{o}S, 129.5^{o}E.

Red emperor may also spawn in offshore waters in the region. They are widely distributed across the continental shelf in up to 180 m water depths and are associated with reefs, lagoons, epibenthic communities, limestone sand flats and gravel patches (Newman *et al*. 2008). The species spawns between at least October and March, with a peak in October (Newman et al. 2008, Department of Fisheries 2013). The species is also a serial batch spawner, releasing multiple batches of eggs into the water column over a wide area during the spawning period. While movement of adults between the Gascoyne, Pilbara and Kimberley stocks is understood to be limited, the stocks across northern Australia (from north Queensland to the mid-west coast of WA) are understood to be biologically connected, with genetic homogeneity maintained by the wide dispersal of pelagic eggs and larvae between these regions (Newman *et al*. 2008; Department of Fisheries 2015).

Also of note in proximity to the Operational Area is the single known spawning ground for southern bluefin tuna in the Indian Ocean, extending between northern WA and Java from 7° S to 20° S. Spawning grounds are broadly understood to occur approximately 125 km to the west of the Operational Area (DOE 2015a; Majkowski *et al*. 1988) (*Figure 3.5*). Spawning occurs between August and April (with a peak period from October to February) (DOE 2015a).

3.3.6 Threatened and Migratory Species Overview

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 identified 20 threatened species and 31 migratory species (which is inclusive of the aforementioned threatened species). No Threatened Ecological Communities were identified. *Table 3.3* below lists the identified listed threatened and migratory species.

Biologically important areas for key marine fauna within and near the Operational Area are presented in *Figure 3.5*.

Table 3.3 Threatened and Migratory Species that May Occur within and around the Operational Area

	Scientific Name	Common Name	Status
Birds	*Anous tenuirostris melanops*	Australian lesser noddy	Vulnerable
	Calonectris leucomelas	Streaked shearwater	Migratory
	Fregata ariel	Lesser frigatebird	Migratory
	Fregata minor	Great frigatebird	Migratory
	Phaethon lepturus	White-tailed tropicbird	Migratory
	Sula sula	Red-footed booby	Migratory
	Calidris ferruginea	Curlew Sandpiper	Critically Endangered, Migratory
	Numenius madagascariensis	Eastern Curlew	Critically Endangered, Migratory
	Calidris Canutus	Red Knot	Endangered, Migratory
	Papasula abbotti	Abbott's Booby	Endangered
	Anous stolidus	Common Noddy	Migratory
	Actitis hypoleucos	Common Sandpiper	Migratory
	Calidris acuminata	Sharp-tailed Sandpiper	Migratory
	Calidris melanotos	Pectoral Sandpiper	Migratory
Reptiles	*Caretta caretta*	Loggerhead turtle	Endangered, Migratory
	Chelonia mydas	Green turtle	Vulnerable, Migratory
	Dermochelys coriacea	Leatherback turtle	Endangered, Migratory
	Eretmochelys imbricata	Hawksbill turtle	Vulnerable, Migratory
	Lepidochelys olivacea	Olive ridley turtle	Endangered, Migratory
	Natator depressus	Flatback turtle	Vulnerable, Migratory
	Aipysurus apraefrontalis	Short-nosed sea snake	Critically Endangered
	Aipysurus foliosquama	Leaf-scaled sea snake	Critically Endangered
Mammals	*Balaenoptera musculus*	Blue whale	Endangered, Migratory
	Megaptera novaeangliae	Humpback whale	Vulnerable, Migratory
	Balaenoptera bonaerensis	Antarctic minke whale	Migratory
	Balaenoptera edeni	Bryde's whale	Migratory
	Orcinus orca	Killer whale	Migratory
	Physeter macrocephalus	Sperm whale	Migratory
	Balaenoptera borealis	Sei whale	Vulnerable, Migratory
	Balaenoptera physalus	Fin whale	Vulnerable, Migratory
	Orcaella brevirostris	Irrawaddy dolphin	Migratory

	Scientific Name	Common Name	Status
	Tursiops aduncus	Spotted bottlenose dolphin (Arafura/Timor Sea populations)	Migratory
	Dugong dugon	Dugong	Migratory
Fish, Sharks and Rays	*Carcharodon carcharias*	Great white shark	Vulnerable, Migratory
	Rhincodon typus	Whale shark	Vulnerable, Migratory
	Glyphis garricki	Northern river shark	Endangered
	Pristis pristis	Largetooth sawfish	Vulnerable, Migratory
	Pristis zijsron	Green sawfish	Vulnerable, Migratory
	Isurus oxyrinchus	Shortfin mako	Migratory
	Isurus paucus	Longfin mako	Migratory
	Manta birostris	Giant manta ray	Migratory
	Manta alfredi	Reef Manta Ray	Migratory

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Big Bank Shoal
Dillon Shoal
Sahul Bank Shoals
Barton Shoal
Sahul Bank Shoals
Sahul Bank Shoals
Fantome Shoal
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Mangola Shoal
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Jabiru Shoals
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Favell Bank
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Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal
Seringapatam Reef
Scott Reef
Echuca Shoal
BROWSE ISLAND
ADELE ISLAND
Camden Sound

PIRLANGIMPI (GARDEN POINT)
KALUMBURU
PEPPIMENARTI
PORT KEATS (WADEYE)
PALUMPA
WYNDHAM
TIMBER CREEK
KUNUNURRA
BARDI (ONE ARM POINT)

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Legend

- Operational Area
- Acquisition Area
- Exclusive Economic Zone Limit
- Coastal Waters (State Jurisdiction)
- 1997 Perth Treaty Seabed Boundary with Indonesia
- Southern Bluefin Tuna Spawning Ground

Biologically Important Areas:

- Humpback Whale - Migration
- Pygmy Blue Whale - Migration
- Humpback Whale - Breeding
- Pygmy Blue Whale - Foraging
- Whale Shark - Foraging
- Marine Turtle - Breeding
- Marine Turtle - Foraging

Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters - Geoscience Australia 2017
Basemap: National Geographic World Map

Marine Fauna

3.5

Drawing No: 0402889b_Phase3EP_G006_R0.mxd		**Polarcus Cygnus 3D MSS Phase 3 Environment Plan**
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Drawn By: DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994
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3.3.7 Birds

Many migratory shorebirds (including those frequenting offshore islands) and seabird species are known to occur in the region. Migratory shorebird species forage and rest in the region on their way between Northern Hemisphere breeding grounds and Northern Australian feeding grounds, known as the East Asian–Australasian Flyway. Seabird species spend the majority of their lives foraging across large distances over the open ocean and many also breed within the region.

Important areas for seabirds and migratory shorebirds in proximity to the Operational Area include (DEWHA 2008a):

- Ashmore Reef CMR and Cartier Island (approximately 90 km and 31 km away respectively);
- Scott Reef is an important staging area for migratory shorebirds and foraging area for seabirds (approximately 260 km away from the Operational Area).

One threatened and five migratory bird species were identified by a search of the EPBC Act Protected Matters Database as potentially occurring in the Operational Area through foraging, feeding, breeding or other related behaviours.

3.3.8 Marine Reptiles

Marine Turtles

There are several key locations for turtle species throughout the region, including along the coastline and offshore islands in close proximity to the Operational Area. The following areas in proximity to the Operational Area are considered to be particularly important for turtle nesting (DEWHA 2008a):

- Ashmore Reef and Cartier Island (approximately 90 km and 31 km away, respectively), are critical habitats for large populations of breeding and feeding marine turtles (Commonwealth of Australia 2002). Ashmore Reef and Cartier Island and surrounding waters are designated BIAs for marine turtles to highlight breeding, inter-nesting and foraging behaviours in the area.
- Sandy Islet at Scott Reef is a known green turtle nesting site (approximately 260 km away); and
- Lacepede Islands is a critical nesting and inter-nesting habitat for green turtles. The islands comprise the largest green turtle rookeries in WA (approximately 455 km away).
- The Carbonate bank and terrace system of the Sahul Shelf KEF (*Section 3.3.1*) is a foraging area for loggerhead, olive ridley and flatback turtles (Commonwealth of Australia 2012). A portion of the Carbonate bank and terrace system of the Sahul Shelf overlaps with the eastern portion of the Operational Area (*Figure 3.6*).

Given that Ashmore Reef, Cartier Island and the Carbonate bank and terrace system of the Sahul Shelf support a large number of foraging turtles (approximately 11,000),

the shoals and banks in and around the Operational Area may also provide foraging habitat for turtles.

Six threatened and migratory turtle species were identified in the EPBC Act Protected Matters Database search as having the potential to occur in the vicinity of the Operational Area.

Sea snakes

At least 19 species of sea snake occur within the region (DEWHA 2008a). Some species have extensive distributions and individuals may cover large distances, while other species have limited home ranges (Heatwole and Cogger 1993). Most sea snake species tend to be found in the shallower parts of the region to allow for increased benthic foraging time (DEWHA 2008a).

3.3.9 Marine Mammals

Several species of marine mammals are known to occur in the region and have wide distributions that are associated with feeding and migration patterns linked to reproductive cycles. There are 26 species of marine mammals that occur regularly in the waters of the region. This includes two threatened/migratory, seven migratory and 17 listed marine mammals, which were identified by a search of the EPBC Act Protected Matters Database as potentially occurring in and around the Operational Area. There are no known important breeding and foraging habitats for listed marine mammals within the Operational Area, with the exception of a minor portion of the pygmy blue whale migration BIA (described below).

Dugongs are also present in the region, preferring shallow waters along the coast and around shoals where seagrass habitat is available (DEWHA 2008a). Ashmore Reef AMP (approximately 90 km away) supports a small population of dugongs. DNA studies indicate that this population may be genetically distinct from other Australian populations (Whiting 1999). The ranges of these genetically distinct dugongs are thought to possibly extend to Cartier Island and other submerged in the area (Whiting 1999).

Several biologically important areas have been identified within and around the Operational Area as follows:

- The pygmy blue whale migration BIA passes along the shelf edge at depths between 500 m and 1,000 m. The Operational Area does not overlap with this BIA. The broader pygmy blue whale distribution BIA passes the most northerly point of the Operational Area, approximately 17 km north of the Acquisition Area at the closest point (*Figure 3.5*);

- The humpback whale migration BIA extends along the length of the coast of Western Australia, to its northernmost extent offshore of the Kimberley region (*Figure 3.5*). The northern boundary of the BIA is approximately 140 km south-west from the Operational Area. As part of the BIA, Camden Sound (approximately 225 km away) is recognised as the main humpback whale breeding and calving ground (DSEWPaC 2012); and

- Ashmore Reef and surrounding waters (approximately 60 km away) form the designated BIA for dugongs to highlight breeding and foraging behaviours in the area (DOE 2015b).

3.3.10 Fish, Sharks and Rays

Nine species of threatened and/or migratory sharks and rays were identified by a search of the EPBC Act Protected Matters Database, including the Whale Shark (*Rhincodon typus),* Shortfin mako (*Isurus oxyrinchus),* Longfin mako (*Isurus paucus)* and Reef mata ray (*Manta alfredi)*.

3.3.11 Timing of Key Ecological Sensitivities

Table 3.4 shows the approximate timing of key ecological sensitivities that may occur within or in proximity to the Operational Area.

Table 3.4 Timing of Key Ecological Sensitivities within or in proximity to the Operational Area

	January	February	March	April	May	June	July	August	September	October	November	December
Corals: spawning												
Birds: breeding at Ashmore Reef and Cartier Island												
Green turtle: nesting at Ashmore Reef and Cartier Island												
Green turtle: foraging at Ashmore Reef												
Hawksbill turtle: nesting at Ashmore Reef												
Hawksbill turtle: foraging at Ashmore Reef												
Sea snakes at Ashmore Reef and Cartier Island, also likely to occur at shoals in the region												
Blue whales: northern migration												
Blue whales: southern migration												
Dugong: breeding and foraging at Ashmore Reef												
Whale shark: foraging												
Southern bluefin tuna: spawning												
Goldband snapper spawning												
Red emperor spawning												
Key:	Peak Times											

3.4 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

3.4.1 Protected Areas

Overview

A network of Australian Marine Parks (AMPs) has been formed around Australia as part of a national representative system of marine protected areas.

The Cygnus 3D MSS is located within the North-west AMP Network, which includes 13 Reserves. The Ashmore Reef, Cartier Island, Kimberley and Oceanic Shoals AMPs are the closest, located between 25 km and 100 km from the Operational Area. These protected areas are shown in *Figure 3.6* and described below, including their key conservation values.

Ashmore Reef and Cartier Island AMPs

The Ashmore Reef and Cartier Island AMPs are significant because they include habitats, species and ecological communities associated with the Timor Province. They each include two key ecological features: Ashmore Reef and Cartier Island and surrounding Commonwealth waters (valued for high productivity and breeding aggregations of birds and other marine life); and continental slope demersal fish communities (valued for high levels of endemism). Both AMPs are areas of enhanced biological productivity and are biodiversity hotspots, supporting a range of pelagic and benthic marine species.

Oceanic Shoals AMP

The Oceanic Shoals Marine Park is significant because it contains habitats, species, and ecological communities associated with the Northwest Shelf Transition (DoNP, 2017). It contains four key ecological features: carbonate bank and terrace systems of the Van Diemen Rise; carbonate bank and terrace systems of the Sahul Shelf; pinnacles of the Bonaparte Basin; and shelf break and slope of the Arafura Shelf (all valued as unique seafloor features with ecological properties of regional significance).

121°E 122°E 123°E 124°E 125°E 126°E 127°E 128°E 129°E 130°E

11°S 12°S 13°S 14°S 15°S 16°S

Big Bank Shoal
Dillon Shoal
Sahul Bank Shoals Barton Shoal
Sahul Bank Shoals
Sahul Bank Shoals
Fantome Shoal
Vee Shoal
Mangola Shoal
Pee Shoal
Jabiru Shoals
Hibernia Reef
Ashmore Reef (Sanctuary Zone)
Ashmore Reef
Johnson Bank
Woodbine Bank
Cartier Island
Cartier Island (Sanctuary Zone)
Barracouta Shoal
Shoal 25
Vulcan Shoal
Goeree Shoal
Eugene McDermott Shoal
Heywood Shoal
Seringapatam Reef
Scott Reef
Echuca Shoal
BROWSE ISLAND
Oceanic Shoals (Multiple Use Zone)
Gale Bank
Favell Bank
Van Cloon Shoal
Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal
PIRLANGIMPI (GARDEN POINT)
Joseph Bonaparte Gulf (Special Purpose Zone)
KALUMBURU
PEPPIMENARTI
PORT KEATS (WADEYE)
PALUMPA
Joseph Bonaparte Gulf (Multiple Use Zone)
WA
NT
WYNDHAM
TIMBER CREEK
KUNUNURRA
ADELE ISLAND
Camden Sound
Kimberley (Multiple Use Zone)
Kimberley (Marine National Park Zone)
Kimberley (Habitat Protection Zone)
BARDI (ONE ARM POINT)

Legend

- Operational Area
- Acquisition Area
- 1997 Perth Treaty Seabed Boundary with Indonesia
- MOU 74 Box
- Commmonwealth Marine Reserve
- Exclusive Economic Zone Limit
- Coastal Waters (State Jurisdiction)
- Shipwrecks

Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters, Shipwrecks, Marine Reserves - Geoscience Australia 2017
Basemap: National Geographic World Map

Commonwealth Marine Reserves and Heritage Characteristics

3.6

Drawing No:	0402889b_Phase3EP_G008_R0.mxd		Polarcus Cygnus 3D MSS Phase 3 Environment Plan
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994

0 25 50km

N

ERM

3.4.2 Commercial Fisheries

The diverse range of habitats and species within the region has allowed for various fisheries to develop and operate throughout the region.

The key Commonwealth and WA-managed fisheries that may operate in or near the Operational Area include:

- Northern Demersal Scalefish Fishery (primarily trap with some line fishing);
- Mackerel Managed Fishery (trolling or handline);
- Kimberley Prawn (trawl) (although expected to operate in more coastal waters);
- North West Slope Trawl (trawl)
- Northern Shark Fishery (Joint Authority Shark Fishery and Western Australia North Coast Shark Fishery) (line fishing) in low numbers should fishing recommence in 2017/18.

3.4.3 Indonesian Commercial and Traditional Fishermen

Indonesian fishers have traditionally visited reefs in the region to collect target species such as trepang (sea cucumber), shark fin and other marine species for sale in Indonesia. The Operational Area is not located within the typical route for traditional Indonesian fishermen from Indonesia to Ashmore Reef to Scott Reef, but they have the potential to occur from time to time.

Indonesian commercial vessels may also be encountered from time to time in the area of overlapping jurisdiction (the Perth Treaty Area).

3.4.4 Commercial Shipping

The Operational Area overlaps with the Osborne Passage and Preferred Route commercial shipping routes where trading vessels may pass through the Operational Area on occasion. However, no shipping fairways exist within the Operational Area. A low density of shipping is expected in the Operational Area. The closest port to the Operational Area is the Port of Broome (over 550 km away), which provides support for the Browse Basin offshore oil and gas industry.

3.4.5 Tourism and Recreation

Most recreational and tourism activities in the region occur predominantly in WA State waters adjacent to population centres, such as Broome, and not within the Commonwealth waters of the Operational Area. Interactions between tourism activities and the survey in the Operational Area are considered unlikely due to the remoteness and predominantly deep waters of the Operational Area.

Data source:
Cysnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters, Shipwrecks, Marine Reserves - Geoscience Australia 2017
West Australian Fishery - Department of Fisheries Status reports of the fisheries and aquatic resources of Western Australia 2017
Basemap: National Geographic World Map

121°E 122°E 123°E 124°E 125°E 126°E 127°E 128°E 129°E 130°E

11°S 12°S 13°S 14°S 15°S 16°S

Big Bank Shoal
Dillon Shoal
Sahul Bank Shoals Barton Shoal
Sahul Bank Shoals
Sahul Bank Shoals
Fantome Shoal
Mangola Shoal
Pee Shoal Jabiru Shoals
Vee Shoal
Hibernia Reef
Ashmore Reef
Johnson Bank
Woodbine Bank
Cartier Island
Barracouta Shoal
Shoal 25
Vulcan Shoal
Goeree Shoal
Eugene McDermott Shoal
Heywood Shoal
Seringapatam Reef
Echuca Shoal
BROWSE ISLAND
Scott Reef
ADELE ISLAND
Camden Sound
Gale Bank Favell Bank
Van Cloon Shoal
Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal

PIRLANGIMPI (GARDEN POINT)
PEPPIMENARTI
PORT KEATS (WADEYE)
PALUMPA
KALUMBURU
WYNDHAM
TIMBER CREEK
KUNUNURRA
BARDI (ONE ARM POINT)

WA
NT

Legend

- Operational Area
- Acquisition Area
- Exclusive Economic Zone Limit
- Coastal Waters (State Jurisdiction)
- 1997 Perth Treaty Seabed Boundary with Indonesia
- Pearl Oyster Managed Zone
- Kimberley Prawn Managed
- Northern Shark
- Mackeral Managed
- Northern Demersal Scalefish

Western Australian Fisheries

3.7

Drawing No:	0402889b_Phase3EP_G009_R0.mxd		Polarcus Cygnus 3D MSS Phase 3 Environment Plan
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994
0 25 50km
N

ERM

3.4.6 Defence Activities

Customs Coastwatch, Navy and Customs vessels undertake civil and maritime surveillance within the region with the primary purpose of monitoring the passage of illegal entry vessels and illegal fishing activity within these areas.

Cartier Island and the area within a 10 km radius surrounding the island is a gazetted Defence Practice Area, although no longer in active use for military exercise (Commonwealth of Australia 2002). It was formerly used as a bombing range and access to the island and to the area within a 10 km radius is prohibited because of the risk associated with the potential presence of unexploded ordnances.

3.4.7 Other Marine Users

Nextgen Network's North West Cable System is located approximately 15 km to the south of the Operational Area (*Figure 3.8*). The fibre optic telecommunications cable system runs between Port Hedland and Darwin.

122°E 123°E 124°E 125°E 126°E 127°E 128°E

11°S
12°S
13°S
14°S
15°S

Big Bank Shoal
Dillon Shoal
Sahul Bank Shoals
Barton Shoal
Sahul Bank Shoals
Sahul Bank Shoals
Fantome Shoal
Mangola Shoal
Pee Shoalabiru Shoals
Vee Shoal
Hibernia Reef
Ashmore Reef
Johnson Bank
Woodbine Bank
Barracouta Shoal
Shoal 25
Cartier Island
Vulcan Shoal
Goeree Shoal
Eugene McDermott Shoal
Gale Bank
Favell Bank
Van Cloon Shoal
Baldwin Bank
Penguin Shoal
Bassett-Smith Shoal
Heywood Shoal
Seringapatam Reef
Echuca Shoal
BROWSE ISLAND
Scott Reef
KALUMBURU
WA

Legend

- Operational Area
- Acquisition Area
- 1997 Perth Treaty Seabed Boundary with Indonesia
- Exclusive Economic Zone Limit
- Coastal Waters (State Jurisdiction)
- Cable Route
- Contours (200m)

Data source:
Cygnus MC3D Survey and Planned Survey Area - Client Provided 10 May 2017
EEZ, Treaty Boundary, Coastal Waters - Geoscience Australia 2017

North West Cable System Route

3.8

Drawing No:	0402889b_Phase3EP_G011_R0.mxd		**Polarcus Cygnus 3D MSS Phase 3 Environment Plan**
Date:	04/10/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: JE	Client: Polarcus Seismic Limited

Coordinate System: GCS GDA 1994

0 25 50km

N

ERM

4 STAKEHOLDER CONSULTATION

4.1 RELEVANT STAKEHOLDERS

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 Western Australia 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 Polarcus consider relevant.

The stakeholders identified and contacted since the original Cygnus 3D MSS in 2015 are listed in *Table 4.1*.

Polarcus 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 4.1 Identified Relevant Stakeholders

Commonwealth Government	
Australian Fisheries Management Authority (AFMA)	Department of the Environment and Energy - Marine Reserves (DoEE)
AFMA - Traditional Fisheries MoU Management	National Native Title Tribunal (NNTT)
Australian Hydrographic Service (AHS)	Department of Agriculture and Water Resources
Australian Marine Safety Authority (AMSA)	Department of Foreign Affairs and Trade
Maritime Border Command (MBC) (*formerly Border Protection Command)*	Department of Immigration and Border Protection
Department of Communications and the Arts	Department of Industry, Innovation and Science.
Department of Defence	Federal Member for Durack
Western Australian Government	
Department of Mines, Industry Regulation and Safety *(formerly Department of Mines and Petroleum)*	Office of Environmental Protection Authority (OPEA)
Department of Water and Environmental Regulation	Member of Parliament for Kimberly
Department of Primary Industries and Regional Development - Fisheries*(formerly Department of*	Shire of Derby West Kimberley

Department of Fisheries)	
Department of Transport (DoT)	Shire of Wyndham East Kimberley
Department of Biodiversity, Conservation and Attractions (*formerly Department of Parks and Wildlife*)	
Commercial Fisheries & Associations	
North West Slope Trawl Fishery (Commonwealth)	Western Tuna and Billfish Fishery (Commonwealth)
Southern Bluefin Tuna Fishery (Commonwealth)	Western Skipjack Tuna Fishery (Commonwealth)
Northern Demersal Scalefish Fishery (State), including: • Old Brown Dog Fishing Co. • Northern Wildcatch Seafood Australia Pty Ltd	Mackerel Managed Fishery (State)
Kimberley Prawn Managed Fishery (State)	Marine Aquarium Managed Fishery (State)
West Coast Deep Sea Crustacean Managed Fishery (State)	Beche de Mer Fishery Managed Fishery (State)
Specimen Shell Managed Fishery (State)	Pearl Producers Association (PPA)
Western Australian Fishing Industry Council (WAFIC)	Australian Council of Prawn Fisheries
WA Seafood Exporters	Westmore Seafoods
Oil and Gas Industry	
Australian Marine Oil Spill Centre (AMOSC)	PTTEP AA Cash-Maple
Australian Petroleum Production and Exploration Association	Shell Development Australia - Prelude
Sinopec Oil and Gas Australia (Puffin) Pty Ltd	Conoco Phillips Greater - Poseidon
INPEX - Ichthys	Woodside - Browse FLNG
Land Councils	
Northern Land Council	Kimberley Land Council Aboriginal Corporation
Recreational Fishing, Marine Tourism Operators, Tourism	
Australian Recreational Fishing Foundation	Aviair
Recfishwest	Peregrine Bird Tours
One Tide Charters	Kimberley Bird Watching
Unreel Adventure Safaris	Kimberley Air Tours
KAS Helicopters	Kimberley Whale Watching
Kingfisher Tours	Kimberley Outback Tours
Environmental Non-Government Organisations	
The Wilderness Society	The Conservation Council of WA
World Wildlife Fund	Environs Kimberley
International Fund for Animal Welfare (IFAW)	Australian Conservation Foundation
Other relevant stakeholders	
Nextgen Networks	Broome Chamber of Commerce and Industry
Telstra	Port Hedland Chamber of Commerce
Port of Broome (Kimberley Port Authority)	

4.2 CONSULTATION RESULTS

A summary of the key issues and concerns raised by stakeholders during consultation, including an assessment of the merits of objections and claims, and full copies of the consultation records are included in *Annex A*.

4.3 ONGOING CONSULTATION

Polarcus will continue to engage with the applicable Commonwealth and Western Australian authorities and other relevant stakeholders (as identified during the course of the consultation described here) prior to and during the Cygnus 3D MSS, as appropriate. This includes ongoing engagement to inform stakeholders about key milestones and activities and any other relevant information or changes.

Ongoing stakeholder consultation commitments are outlined in *Table 4.2*.

Table 4.2 Ongoing Consultation Arrangements

Trigger / Event	Stakeholders	Timing	Method and Information
Prior to Survey Commencement			
Pre-planning	Other seismic operators with EPs accepted by NOPSEMA	Pre-planning	Phone/email to confirm potential location and timing of other seismic acquisition
Planned survey commencement date confirmed	All stakeholders.	To be sent at least 4 weeks prior to the scheduled acquisition commencement date.	Emails and/or letters to include: • Proposed commencement date; • Proposed duration and/or completion date; • Location and coordinates; • Details of communication (e.g. daily lookaheads) during the survey and details of how to register for updates.
During Survey			
Daily update	All stakeholders	Daily	Email detailing: • Location/survey lines planned for upcoming 48 hour period, including coordinates; • On-the-water interaction/ safety requirements or advice • Any other on-the-water progress updates (e.g. schedule delays).
N.B. On-the-water communication to vessels via radio will also be undertaken as required.			
Survey Completion			
Survey complete	All stakeholders	Within 2 weeks of completion and demobilisation from Operational Area.	Emails and/or letters to include: • Completion date; • If the survey vessel is planned to return and/or future survey phases under the EP.
Environment Plan and Activity Updates			
NOPSEMA acceptance of the EP	All stakeholders	To be sent within 1 week of the EP Summary being published.	Email or letter notification confirming date of acceptance and including URL to EP Summary on NOPSEMA website.
Significant modification of the Activity		As soon as identified	Email or letter notification followed by meetings, phone calls, email or other correspondence as required.

Trigger / Event	Stakeholders	Timing	Method and Information
New stage (increase in Acquisition Area, Operational Area or EP timeframe) Revision and resubmission of the accepted EP			Initial notification shall provide opportunity for stakeholders to comment. Stakeholders to be provided with sufficient information and time to review and respond to information and matters should be reasonably addressed prior to resubmission of the EP.

5 RISK ASSESSMENT METHOD

5.1 RISK ASSESSMENT APPROACH

The risk assessment was undertaken in accordance with the Polarcus Risk Assessment Procedure, Risk Management Procedure and the Polarcus Risk Matrix (*Figure 5.1*). The Polarcus Risk Assessment and Risk Management procedures are aligned with the *Australian Standard/New Zealand Standard (AS/NZS) ISO 31000:2009 Risk Management* and *Handbook 203:2012 Managing Environment-related Risk* (Standards Australia/Standards New Zealand 2009 and 2012, respectively).

The risk assessment process consisted of the following steps:

- Identification of potential environmental hazards associated with the seismic survey's planned activities and credible unplanned events;
- Identification of physical, biological, and socioeconomic receptors within the environment that may be affected by the activities (planned and unplanned), as well as identification of particular environmental values and sensitivities;
- Evaluation of the potential consequences of these hazards to the identified receptors with legal requirements and inherent design in place but without other controls, and determination of the 'inherent' risk;
- Identification of appropriate alternative, additional or improved controls (i.e. those in addition to legal requirements and inherent design) to reduce impacts and risks to levels that are demonstrably ALARP;
- Evaluation of the residual impacts and risks with the proposed controls in place;
- Evaluation of whether the impacts and risks are reduced to acceptable levels; and
- Development of environmental performance outcomes, performance standards, and measurement criteria.

A risk assessment was undertaken in August 2017, to identify and assess the risks associated with the survey.

The workshop was supported by background literature and discussions with relevant seismic operations personnel, vessel management personnel and environmental specialists. The identification of risks and the selection of appropriate controls for these risks were also informed by Polarcus experience in conducting other seismic surveys in Australia and elsewhere.

The risks were determined using the Polarcus Risk Matrix (*Figure 5.1*) and interpreted in accordance with *Table 5.1* (further descriptions of consequence) and *Table 5.2* (interpretation of risk). Where several potential impacts were identified for an activity, the consequence and likelihood categories were determined based on the worst credible potential impacts.

People	Environment	Property Value Technical	Reputation	Security	Severity	Never Heard Of "A"	Rarely Occurs "B"	Occasionally Occurs "C"	Regularly Occurs "D"	Occurs All the Time "E"
No health effect. No Injury	No Discharge	Less than $ 5K	No Impact	No Harm	0					
Slight work related illness FAC	Slight Discharge <5 liters	Less than $ 50K.	Slight Impact	Slight Breach Handled Internally	1					
Minor work related illness RWC or MTC	Minor Discharge >5 liters - <100	Less than $500K	Minor Impact Limited Exposure	Minor breach Local Authorities	2					
Extensive work related illness. LTI	Extensive Discharge >100 liters - <1m³	Less than $5M.	Extensive Impact National Exposure	Extensive Breach Threat to Operations	3					
Fatality or Major illness	Major Discharge >1m³ - <10m³	Less than $10M	Major Impact Regional Exposure	Major Breach Loss of Operations	4					
Fatalities or Major Illnesses (multiples)	Massive Discharge >10m³	Exceeding $10M.	Massive Impact International Exposure	Massive Breaches Company Lockdown	5					

Manage for Continuous Improvement	Incorporate Risk Reduction Measures	Intolerable Risk – All Stop

Figure 5.1 Polarcus Risk Matrix

Table 5.1 Further Descriptions of Environmental Consequences

Severity Ranking	Severity Label	Description
0	None	No environmental consequences
1	Slight	Slight environmental damage where restoration can be handled internally and no breaches of legislative requirements have been made
2	Minor	Large-scale damage to the environment with no lasting effects, restoration can be handled internally and a single breach of legislative requirements
3	Extensive	Environmental damage requiring external resources for restoration and involving many breaches of legislative requirements
4	Major	Severe environmental damage requiring extensive measures for restoration and involving widespread breaches of legislative requirements
5	Massive	Persistent severe environmental damage resulting in ongoing breaches of legislative requirements and major financial consequences

Table 5.2 Interpretation of Risk

Risk Ranking	Interpretation
LOW RISK	No additional controls are required if ALARP. Consideration may be given to effective solutions or improvements that impose no significant cost burden. Monitoring is required to ensure that the controls are maintained.
MEDIUM RISK	Efforts should be made to reduce the risk, but the cost of prevention should be measured and limited. Risk reduction methods should be implemented within a defined time period.
HIGH RISK	Work should not be started or continued until the risk has been reduced to an acceptable level. If it is not possible to reduce the risk even with unlimited resources, work has to remain prohibited.

5.2 IDENTIFICATION OF CONTROLS AND DEMONSTRATION OF ALARP

For those hazards for which the inherent risk was not deemed low, further controls were developed to reduce the likelihood of the impact occurring (i.e. preventative) and/or reduce the consequence of the impact (i.e. mitigation) to in turn reduce the risk to ALARP.

In accordance with the Polarcus Risk Management Procedure, the following hierarchy of controls was applied:

- **Eliminate:** Redesign the activity or substitute a substance so the hazard is removed or eliminated;
- **Reduce:** Replace the material or process with a less hazardous one and one which does not introduce another hazard;
- **Isolate:** Measures to prevent the hazard escalating;
- **Control:** Identifying and implementing procedures, administrative controls, competency and training;

- **Discipline:** Ensuring that all controls are monitored, reviewed and enforced.

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.

5.3 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 (*Table 5.2*);

- 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.

6 ENVIRONMENTAL RISKS AND MANAGEMENT – PLANNED ACTIVITIES

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

- Physical presence;
- Underwater sound emissions;
- Liquid discharges;
- Solid waste management;
- Artificial light emissions;
- Atmospheric emissions; and
- Introduction of invasive marine species (IMS).

6.1 PHYSICAL PRESENCE

6.1.1 Entanglement / Collision with Marine Fauna

Details of Impacts and Risks and Control Measures

Hazard/Threat:
The physical presence of vessels and towed equipment has the potential to result in collision or entanglement with marine fauna.
Receptors:
EPBC listed species, including threatened and migratory cetaceans, marine turtles, whale sharks and dugongs.
Adopted Control Measures:
Seismic vessels and support vessels (taking into account the limited manoeuvrability of the former) will comply with relevant requirements of EPBC Regulations 2000 - Part 8 Division 8.1, including: • taking action to avoid approaching or drifting closer than 50 m to a dolphin or 100 m to a whale; and • not exceeding a speed of 6 knots within the caution zone of a cetacean (300 m).
Consistent with the requirements of the EPBC Regulations 2000 - Part 8 Division 8.1 for cetaceans, seismic vessels and support vessels (taking into account the limited manoeuvrability of the former) will also take action to avoid approaching or drifting closer than 50 m to a turtle or dugong.
Seismic vessels and support vessels (taking into account the limited manoeuvrability of the former) will also adopt measures consistent with the DPaW Whale Shark Management Programme (2013), including: • taking action to avoid approaching or drifting closer than 30 m of a whale shark; and • not exceeding 8 knots within 250 m of a whale shark.
Two MFOs will be present on the seismic vessel and supported by trained crew.
If safe and practicable to do so, fauna found to be entangled in wet equipment shall be returned to the ocean.
Turtle guards will be fitted on tail buoys or tail buoy design will be designed to prevent turtles becoming trapped.
All collisions with cetaceans in Commonwealth waters will be reported to the National Ship Strike Database.
Vessels will not enter the Cartier Island or Ashmore Reef CMR Sanctuary Zones.
Vessels will not operate within a 30 km radius of Cartier Island during the green and hawksbill turtle peak nesting period (October-February).

Details of Residual Impacts and Risks:
The potential impact associated with the physical presence of vessels and towed equipment is the risk of collision or entanglement with marine fauna resulting in injury or mortality, including foraging whale sharks, migratory pygmy blue whales and marine turtles. Research shows that faster vessels have a greater risk of collision with marine fauna than slower-moving vessels. There have been no reported cases of marine fauna becoming entangled in seismic equipment in Australian waters. Given the proposed controls and the fact that the seismic survey vessel will be moving at 4.5 knots during seismic data acquisition, the risk is limited. Close-range encounters with marine fauna are expected to be infrequent and limited to isolated individuals in the immediate vicinity of the operating vessels and survey array. As a result, marine fauna injury or mortality as a result of collision or entanglement is highly unlikely and there is no risk of population-level impacts or threats of serious / irreversible environmental damage. The residual impacts and risks have therefore been assessed as Low.

Risk Ranking:	Consequence	Likelihood	Risk Ranking
Inherent Risk:	Extensive (3)	Rare (B)	**Low**
Residual Risk:	Extensive (3)	Rare (B)	**Low**

6.1.2 Disruption/Interference with Other Marine Users

Details of Impacts and Risks and Control Measures

Hazard/Threat:
The potential hazard associated with the physical presence of vessels and equipment in the Operational Area is disruption/interference with other users.
Receptors:
• Commercial fishing (Australian and Indonesian) • Indonesian traditional fishing • Commercial shipping • Defence activities at Cartier Island • Petroleum exploration and production operations; and • Nextgen Network's North West Cable System at the southern Margin of the Operational Area
Adopted Control Measures:
Notice to Mariners issued prior to commencement of survey activities.
Daily reporting to AMSA JRCC.
Notification will be provided to fisheries stakeholders, 4 weeks prior to commencement of each survey phase, indicating location and expected timing. Notification will also be provided to fisheries stakeholders within 2 weeks of completion of each survey phase.
Daily lookahead reports detailing the upcoming 48 hours survey events will be provided via email to stakeholders who register for the service.
A 3 month notification period with Indonesian authorities is triggered as part of the SPA/AA application process to NOPTA, as facilitated by the Department of Innovation, industry and Science and Department of Foreign Affairs and Trade.
Prior to commencement of any survey phase that overlaps the Australia-Indonesia MOU Box, Polarcus will provide an information sheet about the survey (translated into Bahasa Indonesian) to AFMA's MOU Box Manager, for dissemination to relevant port authorities in Indonesia for their subsequent distribution to Indonesian traditional fishermen.
The vessels will carry translation cards (translated into Bahasa Indonesian) for communicating warning messages to Indonesian fishermen in the Perth Treaty Area and MoU Box.
Polarcus will observe petroleum safety zones, which typically apply up to 500 m from the outermost point of petroleum production facilities. Vessels will only operate within these zones with facility titleholder or operator approval, and in accordance with close-pass procedures.
Adherence with requirements of the International Regulations for Preventing Collisions as Sea 1972 (COLREGS) and Chapter 5 of Safety of Life at Sea as implemented in Commonwealth Waters through the

Navigation Act 2012 and associated Marine Orders Parts 21, 30, 59 - navigation, collision, support vessels, including: • Appropriate lighting, navigation and communication to inform other users. • Use of radar and 24/7 watch.			
Minimum 40 km separation between the Cygnus 3D MSS seismic vessel and other operating seismic vessels of potential concurrent seismic surveys in the region of the Operational Area during data acquisition activities.			
At least one support vessel will accompany each seismic vessel when the seismic vessel is in operation and when safe to do so (e.g. outside of inclement weather periods). The support vessel will conduct advanced scouting to ensure that fishing vessels or other activities in the area are provided with advance notice to move away from the path of the survey vessel.			
Streamers marked with tail buoys.			
No activity (including vessel/equipment presence or anchoring) within the Cartier Island Defence Practice Area (10 km radius from the island).			
Details of Residual Impacts and Risks:			
The seismic vessel will typically move along planned seismic lines at a constant speed of approximately 4.5 knots and will proactively and collaboratively manage operational information between Polarcus, other seismic operators in the area and fishers active in the Operational Area. The limited manoeuvrability of the seismic vessel means that fishers may be asked to take measures to avoid the seismic vessel and towed equipment or remove fishing gear such as traps and lines to avoid interaction. Some commercial shipping may also be asked to deviate from their intended routes to avoid the seismic vessel and towed array, but given the inherent controls identified above, no significant navigational implications or changes in shipping traffic patterns are expected. The residual impacts and risks have therefore been assessed as Low.			
Risk Ranking:	**Consequence**	**Likelihood**	**Risk Ranking**
Inherent Risk:	Minor (2)	Occasional (C)	**Low**
Residual Risk:	Minor (2)	Occasional (C)	**Low**

6.2 UNDERWATER SOUND EMISSIONS

Underwater sound will be generated by the seismic source, general vessel activities (including engine sound and operation of thrusters) and helicopter movements during crew transfers.

Seismic sound is characterised by high energy pulses of low frequency sound. The frequency of the sound produced from each seismic pulse is primarily less than 2 kHz, with the highest levels at frequencies in the range of 10-500 Hz (McCauley 1994). The rate of sound attenuation from the seismic source is dependent on local sound propagation characteristics, including seawater temperature and salinity profiles, water depth, bathymetry and the geoacoustic properties of the seabed (McCauley 1994). While the seismic pulses are directed downwards, horizontal propagation may be detected over long distances due to the high intensity and low frequency properties of the sound source.

The area over which seismic sound may adversely impact marine species depends upon multiple factors including the extent of sound propagation relative to the location of receptors, and the sensitivity and range of spectral hearing of different species (Slabbekoorn et al. 2010; Popper and Hawkins 2012).

The potential impacts and risks have been assessed for the following receptor categories, with controls proposed to reduce the impacts and risks to ALARP and acceptable levels:

- Marine mammals
- Marine turtles
- Sharks and rays
- Birds
- Site-attached fish assemblages
- Other demersal and pelagic fish assemblages
- Fish spawning
- Plankton, fish eggs and larvae
- Benthic invertebrates
- Commercial fisheries

Potential cumulative impacts and risks from multiple seismic surveys operating in the region, and the potential impacts and risks from vessel and helicopter noise have also been assessed.

6.2.1 Marine Mammals

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Without adequate control measures in place, high intensity impulsive sound emitted from the seismic source has the potential to impact marine mammals in the following ways: • Changes to hearing as a result of high sound levels at close range to the seismic source, including: o permanent threshold shift (PTS); or o temporary threshold shift (TTS); • Behavioural disturbance impacts.
Receptors:
EPBC listed cetacean species, including: • Pygmy blue whales – the pygmy blue whale migration and distribution BIAs are located to the north of the Operational Area; and • Other transient cetacean species, such as occasional sperm whales and humpback whales.
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
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
- Soft-start Procedures
- Start-up Delay Procedures
- Operational Shut-down and Low-power Procedures
- Night-time and Low Visibility Procedures
- Sighting Reports

Two MFOs will be available on board the seismic vessel to manage shift duties during daylight hours during the survey.

Adaptive management measures for cetaceans:

If three cetacean-instigated power-down or shut-down situations occur during a 24 hour period (commencing from the time of the first whale instigated shut-down), the seismic vessel will relocate to an alternative survey line (taking into account the whale's travel direction and speed) and will not return within 24 hours.

A 500 m shut-down zone from the operating source, as per the shut-down zone for whales in EPBC Act Policy Statement 2.1, will also be applied to dugongs.

Crew, survey personnel and MFOs will be briefed in the marine fauna observation, separation distance estimation, controls and reporting requirements relevant to this EP, including adaptive management measures.

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 occasional dugongs, are primarily expected to be localised behavioural avoidance impacts with no long term ecological implications for the pygmy blue whale migration. The range to behavioural response thresholds is 5.25 km in shallow waters (<100 m), and up to 17 km where sound propagates down slope into deeper waters. PTS and TTS impacts are unlikely given the proposed control measures and the fact that there are no aggregation areas within or adjacent to the Operational Area. However, should such impacts occur, the potential consequence of PTS /TTS impacts to a small number of individuals is considered Extensive (3).

Given the location of the Operational Area, the absence of critical habitats (feeding, breeding, calving, resting or confined migratory routes), relatively low numbers of marine mammals expected to be encountered in the Operational Area and the control measures proposed, the likelihood of such consequences occurring is Rare (B).

The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Extensive (3)	Occasional (C)	**Moderate**
Residual Risk:	Extensive (3)	Rare (B)	**Low**

6.2.2 *Marine Reptiles*

Details of Impacts and Risks and Control Measures

Hazard/Threat:
High intensity impulsive sound emitted from seismic sources has the potential to impact marine reptiles in the following ways: • Mortal injury or recoverable injury (including PTS) to marine turtles at very close range to the seismic source. • Temporary changes in hearing (TTS). • Behavioural disturbance impacts.
Receptors:
• Nesting and internesting green turtle and hawksbill turtle populations associated with Ashmore Reef and Cartier Island (October to February) • Foraging and transient marine turtles • Sea snakes (at Ashmore and Cartier Reef)
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
Soft-start procedures to provide receptors with advanced opportunity to move away from the source, if able.
A 500 m shut-down zone from the operating source, as per the shut-down zone for whales in EPBC Act Policy Statement 2.1, will also be applied to turtles.
The seismic source will not be operated within a 10 km radius of Cartier Island turtle internesting BIA during the green and hawksbill turtle peak nesting period (October-February).
Details of Residual Impacts and Risks:
Based on acoustic modelling and with the proposed controls in place, impacts to marine turtles are expected to be behavioural. The potential for injury is limited to less than 200 m from the seismic source, which can be effectively mitigated through the implementation of a 500 shut-down zone. Avoidance of the Ashmore Reef and Cartier Island internesting BIAs and CMR Sanctuary Zones will ensure the turtle and sea snake populations in these locations are not disturbed. The potential consequence of injury to turtles is considered Extensive (3), but the likelihood of such consequences occurring is Rare (B). The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Extensive (3)	Occasional (C)	**Moderate**
Residual Risk:	Extensive (3)	Rare (B)	**Low**

6.2.3 *Sharks and Rays*

Details of Impacts and Risks and Control Measures

Hazard/Threat:
High intensity impulsive sound emitted from seismic sources has the potential to impact sharks and rays in the following ways: • Physiological injury at very close range to the seismic source. • Behavioural avoidance impacts.
Receptors:
Foraging whale sharks within the BIA.
Adopted Control Measures:

Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
Soft-start procedures to provide receptors with advanced opportunity to move away from the source, if able.
A 500 m shut-down zone from the operating source, as per the shut-down zone for whales in EPBC Act Policy Statement 2.1, will also be applied to whale sharks.
Details of Residual Impacts and Risks:
The Operational Area overlaps the foraging BIA for whale sharks, which are most likely to be in the region between September and November. Sharks and rays are regarded as being less sensitive to sound pressure than bony fish but they are likely to be responsive to low frequency sounds. Given the protected status of the whale shark and the tendency for individuals to be present in surface waters where they may be detected through visual observation, a 500 m shut-down zone will be implemented for whale sharks as per the shut-down zone for whales required under EPBC Act Policy Statement 2.1, thereby reducing the risk of this species being present in close proximity to the powered seismic source. Whale sharks may show avoidance behaviour to the seismic source and are unlikely to remain close enough to the source to suffer physical injury or changes in hearing. With the proposed controls in place, injury is highly unlikely and impacts are therefore predicted to be behavioural. The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Extensive (3)	Rare (B)	**Low**
Residual Risk:	Extensive (3)	Rare (B)	**Low**

6.2.4 Birds

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Seabirds and migratory shore birds diving or foraging near the seismic source may be exposed momentarily to seismic sound resulting in a startle response.
Receptors:
Seabirds and migratory shore birds at Ashmore Reef and Cartier Island
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
Details of Residual Impacts and Risks:
The Acquisition Area is located 45 km at its closest from Cartier Island and Ashmore Reef, which provide significant habitat for seabirds and migratory shorebirds. Based on the separation distance between the operating seismic source and these significant habitats, birds in the immediate surroundings of these locations are not expected to be impacted by sound from the seismic source. Only birds foraging in the vicinity of the Acquisition Area have the potential to be exposed to increased sound levels generated by the operating seismic source. Although birds at the surface of the water in proximity to the seismic vessel have limited potential to be affected by sound emissions underwater due to the limited transmission of sound energy between the water/air interface, birds displaying underwater foraging behaviours such as diving may be exposed to underwater sound if they dive near the seismic vessel when the seismic source is in operation. However, given the likely avoidance response from fish, birds are unlikely to forage near the operating seismic source and this is likely to only affect individual birds, resulting in a startle response with affected birds expected to move away from the area of the active source as a result. Impacts to bird populations associated with the significant habitats of Cartier Island and Ashmore Reef from sound emissions resulting from the Cygnus 3D MSS are therefore not expected. The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Slight (1)	Rare (B)	**Low**
Residual Risk:	Slight (1)	Rare (B)	**Low**

6.2.5 Site-Attached Fish Assemblages

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Without adequate control measures in place, high intensity impulsive sound emitted from the seismic source has the potential to impact site-attached 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. • Behavioural impacts resulting from disturbance, or masking or interfering with biologically important sounds. Potential impacts to other demersal and pelagic fish (those that aren't considered to be site-attached) are assessed separately in *Section 6.2.6*. Potential impacts to fish spawning are addressed separately in *Section 6.2.7*. Potential impacts to fish eggs and larvae are addressed separately in *Section 6.2.8.*
Receptors:
Site-attached fish assemblages associated with shallow benthic features such as banks and shoals.
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
Soft-start procedures to provide receptors with advanced opportunity to move away from the source, if able.
The seismic source will not be operated within 500 m horizontal distance from the 20 m depth contour (Polarcus operational exclusion zone).
The seismic source will not be operated within 200 m horizontal distance from the 60 m depth contour around shoals.
The operating seismic source will not return to survey an adjacent line within 1.4 km of the 60 m depth contour of a bank or shoal within 24 hours to allow for recovery and limit the potential effects of cumulative exposures.
The seismic source will not be operated within 200 m horizontal distance from the 45 m depth contour in the defined 'unnamed shallow areas'.
In the defined 'unnamed shallow areas' the seismic source volume will be reduced to 1,965 cui in water depths less than 60 m to minimise the potential for injury or TTS in fish that may be present in areas of shallow contiguous habitat.
Details of Residual Impacts and Risks:
Site-attached fish have limited ranges and are therefore more sensitive to the effects of high sound levels from the seismic source. Potential impacts have been assessed based on an analysis of depth contours corresponding with the distribution of benthic habitats and fish assemblages, as reported during field surveys of the banks, shoals and other representative areas of seabed within the region (Heyward *et al.* 2011a; ERM 2012; Heyward *et al.* 2013). Such studies indicate that site-attached fish species are abundant in shallow reef areas of shoals (less than 30 m), but decreased significantly in depths of 40-50 m. Fish species in water depths greater than 60 m are expected to be larger and more free-ranging and are therefore considered less sensitive to the effects of seismic sound as they would be expected to display avoidance behaviours and return to the area once the seismic source has passed. Based on acoustic modelling, a 200 m horizontal exclusion zone is proposed from the 60 m depth contour of banks and shoals to prevent injury occurring to site-attached fish. With the proposed controls in place, impacts to site-attached fish are expected to be temporary, potentially involving

behavioural avoidance reactions with the potential for TTS to occur in some fishes exposed on the slopes of banks and shoals for short periods (approximately 20 minutes) near the closest point of approach of the seismic source as it passes. Such impacts are expected to be temporary, recoverable and are not expected to result in any lasting population level impacts or longer ecological implications for the fish assemblages inhabiting these individual bank and shoal features. The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

	Consequence	Likelihood	Risk Ranking
Inherent Risk:	Major (4)	Occasional (C)	**Moderate**
Residual Risk:	Minor (2)	Occasional (C)	**Low**

6.2.6 Other Demersal and Pelagic Fish Assemblages

Details of Impacts and Risks and Control Measures

Hazard/Threat:

Without adequate control measures in place, high intensity impulsive sound emitted from the seismic 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.
- Behavioural impacts resulting from disturbance, or masking or interfering with biologically important sounds.

Potential impacts to site-attached fish assemblages associated with shallow banks and shoals are assessed separately in *Section 6.2.5*.

Potential impacts to spawning are addressed separately in *Section 6.2.7*.

Potential impacts to fish eggs and larvae are addressed separately in *Section 6.2.8.*

Receptors:

- Demersal and pelagic fish species including key commercial species.
- Continental slope demersal fish communities KEF

Adopted Control Measures:

Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.

Soft-start procedures to provide receptors with advanced opportunity to move away from the source, if able.

Details of Residual Impacts and Risks:

Demersal and pelagic fish within the open waters of the Operational Area are generally expected to include numerous free-roaming species, with naturally large ranges in the order of several kilometres or even hundreds to thousands of kilometres.

Fish are expected to exhibit a range of temporary behavioural changes, in response to the approaching seismic source. Based on a comprehensive review of studies, behavioural responses may include changes in orientation, swim speed, tightening of school structure and change in position in the water column within several kilometres from the source, and at closer ranges may include stronger startle and flee responses with fish returning to normal behaviours shortly after the seismic source has passed (e.g. within an hour) (Pearson et al. 1992; Santulli et al. 1999; McCauley et al. 2000; Simmonds and MacLennan 2005; Fewtrell and McCauley 2012; Peña et al. 2013; Popper et al. 2014 [and references therein]; Carroll et al. 2017 [and references therein]). Also, the implementation of soft-start procedures (as recommended in the Department of Fisheries (2013) guidance statement on undertaking seismic surveys in Western Australian waters) will provide fish with advanced opportunity to move away from the source, and so injury and TTS impacts are not expected.

In addition to short-term behaviours, some studies have noted that avoidance behaviours led to changes in local abundance and distribution, with fish potentially moving from less than 5 km to over 30 km from survey lines, with local abundance and distribution returning to normal within three to five days, indicating that the effects are temporary (Engas *et al*. 1996; Slotte *et al*. 2004). It could not be confirmed how much changes in local abundance and distribution in these studies could be attributed to the seismic survey or if natural large scale feeding migrations occurring at the time of the experiments

or other natural factors also contributed.

Therefore, impacts are expected to include localised and temporary changes in behaviour, local abundance and distribution. The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Slight (1)	Regular (D)	**Low**
Residual Risk:	Slight (1)	Regular (D)	**Low**

6.2.7 Fish Spawning

Details of Impacts and Risks and Control Measures

Hazard/Threat:

Without adequate control measures in place, high intensity impulsive sound emitted from the seismic source has the potential to result in behavioural changes in fish or masking of fish vocalisations, which may temporarily divert efforts away from spawning aggregations, egg production and recruitment success (Hawkins and Popper 2017).

Potential impacts to fish eggs and larvae are addressed separately in *Section 6.2.8.*

Receptors:

Fish spawning and recruitment, in particular key indicator commercial species:

- Goldband snapper
- Red emperor
- Southern bluefin tuna

Adopted Control Measures:

Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.

Soft-start procedures to provide receptors with advanced opportunity to move away from the source, if able.

During the peak goldband snapper spawning season (1st December to 31st March), acquisition will be limited to Phase 3 (North) and a maximum of 30 acquisition days. This control has been adopted following extensive consultation with fisheries stakeholders regarding spawning periods.

Details of Residual Impacts and Risks:

The potential impacts to fish spawning, principally the commercial indicator species, red emperor and goldband snapper have been assessed based on:

- The potential spatial overlap between the area affected by sound (fish behaviour and masking effects) with the area utilised by the stocks for spawning;
- The potential temporal overlap between the duration of planned acquisition phases and the duration of the available spawning periods and peak spawning periods;
- The likelihood of a phase of acquisition overlapping with a critical area for spawning aggregations;
- The likelihood of the activity reducing the available spawning biomass and stock recruitment success, taking into account natural variability.

Red emperor and goldband snapper are broadcast multiple batch spawners that spawn throughout their range and release millions of eggs throughout their spawning periods. Red emperor spawn between October and March, with a peak in October, and occur in water depths up to 180 m. Polarcus has been advised by DoF that goldband snapper spawn between September and May with a peak spawning period between December and March. Goldband snapper generally occur between 50 m and 200 m water depth, and are typically more concentrated between the 80 m and 140 m depth contours. Specific areas of aggregation are not known. Cues for spawning may include environmental cues such as water temperature and the moon cycle.

Red emperor stocks occur across northern Australia and biological connectivity and genetic homogeneity is maintained between the different stocks by dispersal of eggs and larvae throughout its range. Goldband snapper stocks, however, are found to be genetically distinct from other adjacent

stocks (e.g. Pilbara, Broome, Timor Sea, Arafura Sea stocks), which has implications for stock recruitment if the spawning biomass is impacted. There is also currently some uncertainty about the status and sustainability of the stock. Therefore, goldband snapper is considered to be potentially more sensitive.

To estimate the largest area where spawning behaviour may be influenced by sound from the Cygnus 3D MSS, the most extensive impacts and ranges identified in the scientific literature for changes in fish behaviour, abundance and distribution were used as a proxy and applied to the Phase 3 areas.

Recognising that there is some uncertainty about the status and sustainability of the stock, and some assumptions and uncertainty are attributed to this method of assessment, Polarcus has limited the temporal overlap with the peak goldband snapper spawning period (December to March) to a maximum of 30 days of acquisition to allow for Phase 3 (North) to be completed, while Phase 3 (South) and the infill lines will not occur during the peak spawning period. Accounting for both the spatial and temporal overlap, this equates to just 3% of the total suspected goldband snapper spawning area and peak spawning period. Although this is the percentage of goldband snapper spawning that may be overlapped or influenced, this is not necessarily proportionate to a potential decrease in the effective goldband snapper spawning biomass, as no actual fish are removed from the stock, thus there is no reduction in the spawning biomass; and it is possible that adult fish may be motivated to continue to spawn despite some disturbance; fish may simply aggregate and spawn further from the seismic source. In addition, goldband snapper are serial/multiple batch broadcast spawners, releasing multiple batches of eggs into the water column over a wide area, and spawn multiple times throughout the spawning period. They do not spawn continuously. Therefore, the temporal overlap may also over-represent what may, in reality, be a disturbance to one or two out of many spawning events for such a small proportion of fish effected during the season.

Given the connectivity of red emperor stocks, the impacts to red emperor spawning are predicted to be negligible. Southern bluefin tuna spawning occurs over 125 km to the west of the Operational Area and so no impacts are expected. Other species in the region are also understood to spawn over wide areas and/or in coastal waters and, therefore, impacts to spawning are expected to be limited. Also of note is the single known spawning ground for southern bluefin tuna in the Indian Ocean. However, this spawning area is broadly understood to be over 125 km to the west of the Operational Area and so no impacts are expected.

The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Major (4)	Occasional (C)	**Moderate**
Residual Risk:	Minor (2)	Occasional (C)	**Low**

6.2.8 Plankton, Fish Eggs and Fish Larvae

Details of Impacts and Risks and Control Measures

Hazard/Threat:
High intensity impulsive sound emitted from the seismic source has the potential to result in the mortality or physical impairment of plankton, with potential secondary impacts to the food source of other organisms, and/or potential impacts to eggs and larvae biomass which could in turn impact recruitment.
Receptors:
• Phytoplankton and zooplankton (primary productivity and food source) • Fish eggs and larvae (spawning and recruitment)
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
Details of Residual Impacts and Risks:
Potential impacts and risks to plankton have previously been understood to be highly limited and localised. Considering the impact thresholds proposed by Popper et al. (2014), the acoustic modelling undertaken by McPherson and Wood (2017) indicates that potential for mortality to eggs and larvae could occur within approximately 165-190 m from the source. However, recent research by McCauley

et al. (2017) may indicate that the extent of impacts to plankton, eggs and larvae could be greater (potential mortality to 178 dB re 1 µPa (Pk-Pk pressure) and therefore up to 5 km from the seismic source.

The potential impacts have been assessed based on modelling completed by Richardson *et al.* (2017), which adopts the impact thresholds suggested in McCauley et al. (2017). As the vessel and seismic source will be constantly moving and zooplankton populations are constantly being replenished by currents from non-impacted areas, the modelling demonstrated that zooplankton mortality rates are potentially detectable above natural levels in close proximity to the survey area, but are not likely to be discernible at the regional and subregional scale (150 km distance). Zooplankton biomass generally showed a decline until Day 22 of the Richardson *et al.* (2017) simulations, and then biomass increased relatively until the end of the simulated survey; this reflects the movement of water through the Operational Area and the recovery of the zooplankton biomass as it moves into non-impacted areas, which indicates that beyond a certain duration (i.e. ~22 days) the seismic Acquisition Area and duration contributes less to changes in overall biomass in the region relative to natural mortality rates and rates of recovery. Zooplankton biomass also returned to normal levels within the survey area within 3 days (Richardson *et al.* 2017).

Natural zooplankton mortality rates can vary considerably spatially and temporally and can be as high as ~60% (or even 100% in some cases), approximately 25% to 33% of which may be caused by non-predatory factors, indicating how difficult it would be to detect the impacts of seismic pulses on plankton above natural levels. At the scales considered, the potential impacts and risks to eggs and larvae in the water column is considered to be localised and temporary and the risk is considered to be low.

Non-predatory zooplankton mortalities also leave nutrient- and carbon-rich carcasses behind to be scavenged in the water column and on the seafloor by opportunistic feeders for several days (during which time, the live zooplankton biomass in any given location is also likely to have been largely replenished via currents from non-impacted areas) and therefore the loss of zooplankton is not expected to make a discernible impact on food resources.

The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Slight (1)	Occasional (C)	**Low**
Residual Risk:	Slight (1)	Occasional (C)	**Low**

6.2.9 Benthic Invertebrate Communities

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Underwater sound associated with the operation of the seismic source has the potential to cause physiological impacts to benthic invertebrates.
Receptors:
Benthic macro-invertebrate communities, including: • Sessile benthic invertebrates (e.g. molluscs) • Mobile benthic invertebrates (e.g. crustaceans, cephalopods) • Corals, sponges and soft filter feeders
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
Soft-start procedures to provide receptors with advanced opportunity to move away from the source, if able.
Details of Residual Impacts and Risks:
There is a general lack of convergence on the magnitude and extent of impacts reported in the scientific literature and thresholds are not defined. However, benthic invertebrates lack a gas-filled bladder and do not hear sound like fish, or mammals do. Invertebrates are therefore regarded as being less sensitive to sound than fish. They do however detect the particle acceleration component of a sound wave. In

many studies, benthic invertebrates show no evidence of significant impacts. Based on the worst-case impacts reported in studies, impacts to benthic invertebrates may include:

- Sub-lethal impacts to crustaceans, such as statocyst impairment and reduced immune response function, although no long term ecological implications on survival are expected.
- Potential sub-lethal impacts to sessile molluscs and infauna such as impaired reflexes, and potentially some chronic effects that lead to mortality of a very small proportion of bivalves at close range, over and above natural mortality rates.
- Increased movement and behavioural avoidance of waters beneath the source by mobile invertebrates such as cephalopods.

The above impacts are expected to be localised and limited to invertebrates directly beneath the seismic source or, based on the levels reported in Day *et al*. (2016a, 2016b), within approximately 100 m range of the seismic source.

Given the proposed 200 m exclusion zones around banks and shoals (see *Section 6.2.5*), the more diverse benthic communities of these shallow features are not expected to be affected.

Therefore, some macro-invertebrates may experience some sub-lethal affects or a small increase in mortality rates of a small proportion of invertebrates as a result of chronic effects of exposure at close range. However, the ecological implications of these impacts on benthic communities are not expected to be significant or long term in the context of the natural spatial and temporal variability observed in the benthic communities in this region. Given that macro-invertebrate infauna and epifauna occur relatively sparsely across the majority of the Operational Area, the localised horizontal extent of potentially significant impacts, and the potential for subsequent recruitment and recovery (over weeks or months at most), no long-term population and community level impacts are expected and there is no threat of serious or irreversible environmental damage.

The residual impacts and risks, with the control measures in place, have therefore been assessed as Low. Further detail is provided in the evaluation of impacts and risks below.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Slight (1)	Regular (D)	**Low**
Residual Risk:	Slight (1)	Regular (D)	**Low**

6.2.10 Commercial Fisheries

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Increased sound levels associated with seismic acquisition may modify the behaviour, local abundance and distribution of commercially targeted fish species in proximity to the Operational Area which could affect commercial catch rates.
Receptors:
• Commonwealth and WA-managed fisheries that potentially operate in or near the Operational Area: o Northern Demersal Scalefish Fishery (primarily trap with some line fishing); o Mackerel Managed Fishery (trolling or handline); o Kimberley Prawn (trawl) (although expected to operate in more coastal waters); o North West Slope Trawl (trawl) o Northern Shark Fishery (Joint Authority Shark Fishery and Western Australia North Coast Shark Fishery) (line fishing) in low numbers should fishing recommence in 2017/18; • Indonesian commercial fishing vessels (in the Perth Treaty Area) • Traditional Indonesian vessels (primarily within the Australia-Indonesia MOU Box)
Adopted Control Measures:
Minimum source size selected (3,090 cui) to acquire survey data and meet the geophysical objectives of the survey.
A Notice to Mariners will be issued prior to each survey phase mobilisation and following demobilisation.
Notification will be provided to fisheries stakeholders, 4 weeks prior to commencement of each survey phase, indicating location and expected timing. Notification will also be provided to fisheries

stakeholders within 2 weeks of completion of each survey phase.
Daily lookahead reports detailing the upcoming 48 hours survey events will be provided via email to stakeholders who register for the service
A 3 month notification period with Indonesian authorities is triggered as part of the SPA/AA application process to NOPTA, as facilitated by the Department of Innovation, industry and Science and Department of Foreign Affairs and Trade.
Prior to commencement of any survey phase that overlaps the Australia-Indonesia MOU Box, Polarcus will provide an information sheet about the survey (translated into Bahasa Indonesian) to AFMA's MOU Box Manager, for dissemination to relevant port authorities in Indonesia for their subsequent distribution to Indonesian traditional fishermen.
The vessels will carry translation cards (translated into Bahasa Indonesian) for communicating warning messages to Indonesian fishermen in the Perth Treaty Area and MOU Box.
Details of Residual Impacts and Risks:
Based on available research, the potential impacts to fish catches may vary. As a worst case, reduced local abundance and catch rates may occur within the area being surveyed and to ranges of up to a few tens of kilometres. Such impacts typically last only for the duration of the sound exposure (hours) or for up to approximately five days following cessation of the survey. The fisheries that overlap the Operational Area operate over wider areas than will be exposed to the seismic sound during the survey. Given the spatial extents of the fisheries, only a portion of the area and fish targeted by fisheries may be affected by the survey and fish catches are expected to be available in other areas. The Northern Demersal Scalefish Fishery is understood to be the fishery most likely to operate near the Operational Area, though other fisheries may also occur. Communication with fishery licence holders and the relevant agencies is a critical component of the proposed mitigation and to better enable resource sharing and transparency. The residual impacts and risks, with the proposed control measures in place, have therefore been assessed as Low. Further detail is provided in the evaluation of impacts and risks below.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Minor (2)	Occasional (C)	**Low**
Residual Risk:	Minor (2)	Occasional (C)	**Low**

6.2.11 Cumulative Seismic Sound Impacts

Cumulative impacts from seismic sound can potentially occur when:

- Multiple seismic surveys occur in a region at the same time, leading to an increase in sound exposure to the same receptors; or
- Seismic surveys occur one after the other in the same area over time.

A review of seismic survey activities published on the NOPSEMA website and information gathered during stakeholder consultation has been undertaken to identify other marine seismic surveys that have been completed or are planned in the same area as the Cygnus 3D MSS.

It is noted that multi-client data is acquired and sold to multiple petroleum block titleholders. Like Polarcus, other seismic operators will have sought commercial undertakings with petroleum block titleholders for the 3D data they acquire. For commercial reasons, it is very unlikely that a petroleum block titleholder would purchase data from more than one multi-client seismic operator and as such, it is likely that not all multi-client surveys in a particular area (and possibly only one) will actually proceed. By the nature of multi-client seismic acquisition, the potential for

multiple proprietary seismic surveys over the same area by individual petroleum block titleholders is generally avoided.

Details of Potential Cumulative Impacts from Previous Seismic Surveys

Cumulative impacts from successive surveys in the same area can occur when the timing between surveys is less than the recovery rate of any potential impacts to receptors. *Table 6.1* presents a summary of the marine seismic surveys that have been undertaken in the last 5 years within approximately 150 km of the Cygnus 3D MSS Acquisition Area. The footprint of impacts resulting from the Cygnus 3D MSS have been assessed as being more localised, but 150 km was selected as a conservative search criteria. In some instances it has not been possible to confirm whether surveys have been undertaken or not, the dates surveys were acquired, or the final areas that were acquired and any overlap with the Cygnus 3D MSS Acquisition Area. Therefore, for the purposes of the assessment, it has been conservatively assumed that surveys have gone ahead within the areas and timescales proposed in their respective EPs.

No direct cumulative impacts are expected to have occurred between Phase 1 and Phase 2 of the Cygnus 3D MSS and other previous surveys in terms of injury, hearing impairment, behavioural impacts or changes in community structure, given that there has been no spatial overlap between surveys and their potential impact and/or the timing between surveys has not been less than the recovery rate of any potential impacts to receptors (i.e. hours to days for marine fauna and fish, or weeks or months at most for benthic invertebrate communities. Equally, as no cumulative impacts are expected between these previous surveys and Phases 1 and 2, no cumulative impacts with the proposed Phase 3 of the Cygnus 3D MSS are expected either.

Table 6.1 Other marine seismic surveys completed within 100 km of the Cygnus 3D MSS in the last 5 Years

Year	Company	Survey Title	Survey Location	Survey Status and Timing	Comments
2012 – 2013	Fugro Multi Client Services Pty Ltd	Schild Multi Client 3D Marine Seismic Survey	Maximum 2,717 km^2 of 3D seismic acquisition in exploration permits WA-411-P, WA-274-P, WA-281-P and adjacent open acreage. Located ~100 km to the south-west of the Cygnus 3D MSS Acquisition Area.	Status of the survey is unknown. For the purposes of the assessment, it is assumed the survey may have been completed during the timeframe specified in the EP (~90 days duration between November 2012 and May 2013).	There is no spatial overlap. The survey, if it was undertaken, was completed 2.5 years prior to the first phase of the Cygnus 3D MSS and recovery of all impacts are expected to have occurred well before commencement of the Cygnus 3D MSS. Therefore, no cumulative impacts with Phases 1, 2 or 3 of the Cygnus 3D MSS are expected.
2013 – 2014	PGS Australia Pty Ltd	Caswell Multi Client 3D MSS	The Caswell Area of Acquisition extends approximately 65 km into the south-west portion of the Cygnus 3D MSS Acquisition Area and includes area up to and adjacent to Cygnus 3D MSS Phase 1.	Completed but exact acquisition dates are unknown. The EP states that the survey was planned to occur for 9-11 months between May 2013 and April 2014.	There is no spatial overlap. The survey was completed at least 18 months prior to the first phase of the Cygnus 3D MSS and recovery of all impacts are expected to have occurred well before commencement of the Cygnus 3D MSS. Therefore, no cumulative impacts with Phases 1, 2 or 3 of the Cygnus 3D MSS are expected.
2014	GX Technology Australia Pty Ltd	Westralia SPAN Marine Seismic Survey	Large multi-basin SPAN survey. Four individual 2D survey lines (AUI – 4500, AUI-4800, AUI-7000, AUI-7500) occur within the Cygnus 3D MSS Acquisition Area.	Completed prior to the end of Q2 2014.	It could not be confirmed if or when the proposed lines overlapping the Cygnus 3D MSS Operational Area were acquired, but the SPAN survey was completed at least 18 months prior to the first phase of the Cygnus 3D MSS and recovery of all impacts are expected to have occurred well before commencement of the Cygnus 3D MSS. Therefore, no cumulative impacts with Phases 1, 2 or 3 of the Cygnus 3D MSS are possible.
2014 – 2016	IPB Operations Pty Ltd	IPB Petroleum Limited 3D Marine Seismic Survey	Targeted 2,780 km^2 survey in exploration permits WA-471-P and WA-485-P. Located over 75 km to the south of the Cygnus 3D MSS Acquisition Area and over 75 km from Phase 1 of the Cygnus 3D MSS at the closest point.	Status of the survey is unknown. For the purposes of the assessment, it is assumed the survey may have been completed during the timeframe specified in the EP (30 to 50 days duration between November 2014 and	Given that the IPB Petroleum Limited 3D Marine Seismic Survey is located over 75 km from the Acquisition Area at the closest point, it is highly unlikely that any cumulative impacts would have occurred, even if data was acquired at the closest

Year	Company	Survey Title	Survey Location	Survey Status and Timing	Comments
				June 2016).	points of each survey concurrently. There is no spatial overlap in impacts and the area is of limited significance for goldband snapper spawning. Therefore, cumulative impacts are not expected.
2015	CGG Services (Australia) Pty Ltd	Gravis Multi Client 3D Marine Seismic Survey	Overlaps central portion of Operational Area.	The survey has not been undertaken and is not planned to occur in 2017. The timeframe of the accepted EP indicates 2015-2017.	Given that the survey has not been undertaken and is not planned to occur, no cumulative impacts with the Cygnus 3D MSS are possible.
2015	Searcher Seismic Pty Ltd	Quoll 3D Marine Seismic Survey	Targeted area of 419 km^2 located entirely within permit area AC/P 55. Overlaps central / western portion of the Operational Area. The Quoll acquisition area is located to the north west of the acquired Phase 2 area of the Cygnus 3D MSS.	Confirmed completed July – August 2015	No spatial or temporal overlap and recovery of all impacts are expected to have occurred well before commencement of the Cygnus 3D MSS. Therefore, no cumulative impacts with Phases 1, 2 or 3 of the Cygnus 3D MSS are expected.
2015 – 2016	Polarcus Seismic Ltd	Cygnus 3D MSS (Phases 1&2)	Phase 1 and Phase 2 are located in the central and south-west parts of the Cygnus 3D MSS Operational Area (see *Figure 1.1*).	Completed between December 2015 and March 2016.	There is no spatial or temporal overlap of direct impacts from Phase 1 or 2, taking into account recovery times. Potential impacts to spawning from these previous phases are assessed to be negligible and recent goldband snapper stock assessments (Martin *et al.* 2016) predict that the stock is sustainable and unlikely to be recruitment constrained. Therefore, no cumulative impacts between phases 1, 2 and 3 of the Cygnus 3D MSS are expected.
2016	PGS Australia Pty Ltd	Forge Multi-Client 3D Marine Seismic Survey	The northern portion of the Forge acquisition area overlaps southern and central parts of the Cygnus 3D MSS Operational Area.	The survey was not undertaken and the EP is no longer current.	Given that the survey has not been undertaken and is not planned to occur, no cumulative impacts with the Cygnus 3D MSS are possible.

Details of Potential Cumulative Impacts from Concurrent Seismic Surveys

Over the scheduled period of the Cygnus 3D MSS other seismic surveys are also planned to occur in the region. However, for commercial reasons, it is likely that not all of the proposed surveys will actually proceed. Polarcus will endeavour to minimise the potential for interaction between simultaneous seismic surveys (should they occur at the same time) to minimise both potential disruptions to operations as well as potential cumulative sound impacts to the environment and other marine users.

For operational reasons (to prevent acoustic interference and preserve seismic data integrity) a minimum separation distance of at least 40 km will be maintained between the Cygnus 3D MSS seismic source and any other concurrently operating seismic sources during data acquisition activities. Given this separation distance, underwater sound from the seismic sources is not anticipated to combine to significantly raise the sound pressure levels to which receptors may be exposed to harmful levels.

While overall sound levels are not expected to be significantly elevated, it is acknowledged that the result of multiple seismic vessels operating concurrently will represent a wider spatial area of potential exposure to seismic sound for receptors.

To understand what other known potential seismic surveys may occur near the Cygnus 3D MSS Acquisition Area, *Table 6.2* presents the seismic surveys that:

- may occur within 150 km of the Cygnus 3D MSS Acquisition Area;
- may occur within the same EP timeframes; and
- either have an EP accepted by NOPSEMA or have submitted an EP to NOPSEMA and is currently under assessment.

These seismic surveys have been considered for their potential cumulative impacts with future phases of the Cygnus 3D MSS.

This section does not assess cumulative impacts from seismic surveys within the area that occur after the Cygnus 3D MSS as it is the responsibility of that titleholder to assess the cumulative impacts.

Table 6.2 Other proposed marine seismic surveys that have the potential to be undertaken within 150 km of the Cygnus 3D MSS

Company	Survey Title	Survey Location	EP Status and Survey Timing
Spectrum Geo Pty Ltd	Cygnus Southwest Marine Seismic Survey	The Spectrum Geo Cygnus SW acquisition area primarily covers open acreage blocks AC17-4, AC-17-5 and W17-3 in the 2017 Offshore Petroleum Exploration Acreage Release. It lies adjacent to the already acquired Cygnus 3D MSS Phase 1 area. The Spectrum Geo Cygnus SW acquisition area is approximately 50 km south-west of the planned Cygnus 3D MSS Phase 3 South area.	The EP was accepted by NOPSEMA on 04/05/2017. The survey was proposed to take up to 3 months and be undertaken sometime between May 2017 and December 2019. However, in communication with Spectrum Geo, Polarcus understands that the survey is unlikely to proceed within the same timeframe as Phase 3 (North) of the Cygnus 3D MSS.
PGS Australia Pty Ltd	Rollo Multi-client Marine Seismic and CSEM Surveys	The (multi-basin) Rollo Multi-client Marine Seismic and CSEM Survey Area includes an area extending from waters offshore from Shark Bay in W.A. to waters offshore from the Northern Territory to allow for flexibility in acquisition. Part of this extensive survey area overlaps the Cygnus 3D MSS Acquisition Area. However, it is unclear if data would ever be acquired in the same area.	EP submitted to NOPSEMA on 21/10/2016 but has not yet been accepted. The timing of the Rollo Multi-client Marine Seismic and CSEM Surveys are not yet confirmed but, if the EP is accepted, will take place over a period of up to 5 years from acceptance of the EP.
TGS-NOPEC Geophysical Company Pty Ltd	North West Shelf Renaissance North Multi Client Marine Seismic Surveys	The (multi-basin) North West Shelf Renaissance North Multi Client Marine Seismic Survey Area includes an area extending from waters near the Rowley Shoals on the NW Shelf to waters offshore from the Northern Territory to allow for flexibility in acquisition. Part of this extensive survey area overlaps the Cygnus 3D MSS Acquisition Area. However, it is unclear if data would ever be acquired in the same area.	EP submitted to NOPSEMA on 11/01/2016 but has not yet been accepted. The timing of the North West Shelf Renaissance North Multi Client Marine Seismic Surveys are not yet confirmed but, if the EP is accepted, will take place over a period of up to 5 years from acceptance of the EP.

The following provides a summary of the potential cumulative impacts that are predicted to occur from the Cygnus 3D MSS and the surveys identified in *Table 6.2.*

Marine Fauna (mammals, reptiles, sharks)

Short-term behavioural impacts are predicted to occur up to a maximum of between approximately 5 km and 17 km for the most sensitive species of cetacean (depending upon location and water depth) and at lesser distances for other marina fauna (see *Sections 6.2.1* to *6.2.4*). Species are expected to be transient and no changes to migration or other important life stages are expected.

The Spectrum Geo Cygnus SW acquisition area is approximately 50 km south-west of the planned Cygnus 3D MSS Phase 3 area. No significant discernible cumulative impacts to marine fauna are expected. The cumulative risk is therefore considered to be Low and Acceptable given that there is no threat of serious or irreversible environmental damage.

Fish

Behavioural impacts in fish are expected to be most apparent in fish between several hundred metres and several kilometres from the Cygnus 3D MSS survey lines, returning to normal within as little as an hour. It is acknowledged that, based on the available scientific literature, some changes in abundance and distribution of fish may be apparent in the vicinity of the Acquisition Area for up to approximately 5 days, as well as some less significant and shorter term changes in abundance and distribution possible out to approximately 37 km.

Taking the proposed 40 km minimum separation into consideration, no cumulative overlap of strong behavioural responses is expected. Some mild changes in fish abundance and distribution could occur as a result of exposure from the two operating seismic surveys, but such changes are expected to return to normal within a few hours or days. The cumulative risk is therefore considered to be Low and Acceptable given that there is no threat of serious or irreversible environmental damage.

Fish Spawning

The Cygnus 3D MSS may partially overlap with the peak goldband snapper spawning period, but the risks are expected to be low (see *Section 6.2.7*).

Based on the very short remaining timeline to be able to acquire and process data to inform Titleholder decisions prior to bid closing, the Spectrum Geo Cygnus SW survey is considered highly unlikely to go ahead. If it does, it will be scheduled to avoid the period from 1st January to 30th April and so will also avoid the majority of the goldband snapper peak spawning period. Therefore, even if this survey were to proceed, there is expected to be limited temporal overlap between the survey, the Cygnus 3D MSS and the peak spawning period.

It is acknowledged that there is the potential for the proposed Polarcus Zénaïde 3D MSS to also occur within the region during the spawning period. The Polarcus Cygnus 3D MSS Acquisition Area is located approximately 200 km from the Zénaïde

Acquisition Area and the two surveys are not planned to occur concurrently. Should both surveys overlap with the goldband snapper spawning period to some degree, there would be no spatial overlap with the same areas of potential aggregation. The spatial and temporal overlap of the Zénaïde 3D MSS equates to approximately 2.5% of the principle 80-140 m depth range and peak December-March spawning period, although survey data indicates that the area does not include significant areas of the seabed topography and hard substrate type known to represent preferred spawning habitat goldband snapper. Therefore, no cumulative impacts are expected from the Cygnus and Zénaïde surveys.

The cumulative risk is therefore considered to be Low and Acceptable given that there is no threat of serious or irreversible environmental damage.

Plankton, Fish Eggs and Larvae

Based on the maximum worst case mortality exposure suggested by McCauley *et al.* (2017) and modelling completed by CSIRO (2017), impacts to zooplankton are only expected to be significant within a short range (e.g. 15 km) of seismic survey areas. Beyond 22 days of acquisition, CSIRO (2017) found that no further relative increase in zooplankton mortality occurs, due to recruitment of zooplankton via currents from adjacent areas, and conditions return to normal within a few days of a survey ceasing. At the regional scale, these impacts are not expected to be significant CSIRO (2017). Further, natural mortality rates can be as high as ~60%, and not entirely as a result of predation (see *Section 6.2.8*), therefore, limited impacts are expected relative to the natural variation in zooplankton concentrations and mortality rates. Taking the proposed 40 km separation into consideration, the cumulative impacts to plankton are expected to be negligible. The cumulative risk is therefore considered to be Low and Acceptable given that there is no threat of serious or irreversible environmental damage.

Benthic Invertebrates

The maximum worst case impacts reported for invertebrates include sub-lethal impacts such as statocyst impairment, temporary reduced immune response function, temporary impaired reflexes, and potentially some chronic effects that lead to mortality of a very small number of sessile benthic invertebrates over and above natural mortality rates. For the Cygnus 3D MSS, such impacts are expected to occur at close range to the seismic source (e.g. ~100 m) (see *Section 6.2.9*). In the context of natural mortality, recruitment and recovery rates, the impacts to overall benthic communities are expected to be negligible (see *Section 6.2.9*).

Currently, no other seismic surveys are planned to occur that overlap the planned Cygnus Phase 3 areas. Should there be some overlap in other future areas, cumulative impacts may only occur if more than one survey occurs within weeks of the preceding survey, which is unlikely to occur. The cumulative risk is therefore considered to be Low and Acceptable given that there is no threat of serious or irreversible environmental damage.

Commercial Fisheries

Cumulative impacts to commercial fisheries could occur if multiple seismic surveys occur concurrently or in quick succession within an area, resulting in increased avoidance by target fish species. As highlighted in *Section 6.2.10*, the expected range and duration of impacts to fish abundance, distribution and catch rates is relatively small compared to wider areas within which the fisheries operate. However, Polarcus recognises that clear and regular communication with fisheries stakeholders is required in order to provide timely information on the location and timing of different surveys in order to facilitate better planning and resource sharing. Therefore, Polarcus will notify stakeholders prior to the commencement of each survey phase and will provide regular updates to fishery licence holders during survey operations with the relevant stakeholders. The cumulative risk is therefore considered to be Low.

6.2.12 Vessel and Helicopter Noise

Details of Impacts and Risks and Control Measures

Hazard/Threat:
The potential hazard associated with vessel and helicopter noise is the potential to cause behavioural disturbance to marine fauna.
Receptors:
Marine fauna that may potentially be impacted by vessel and helicopter noise include: • Cetaceans • Marine turtles • Whale sharks • Dugongs • Birds
Adopted Control Measures:
Vessel activities will be undertaken in accordance with EPBC Regulations 2000 – Part 8 Division 8.1, including: • taking action to avoid approaching or drifting closer than 50 m to a dolphin or 100 m to a whale; and • not exceeding a speed of 6 knots within the caution zone of a cetacean (300 m).
Consistent with the requirements of the EPBC Regulations 2000 - Part 8 Division 8.1 for cetaceans, seismic vessels and support vessels (taking into account the limited manoeuvrability of the former) will also take action to avoid approaching or drifting closer than 50 m to a turtle or dugong.
Seismic vessels and support vessels (taking into account the limited manoeuvrability of the former) will also adopt measures consistent with the DPaW Whale Shark Management Programme (2013), including: • taking action to avoid approaching or drifting closer than 30 m of a whale shark; and • not exceeding 8 knots within 250 m of a whale shark.
Helicopter movements will be undertaken in accordance with EPBC Regulations 2000 – Part 8 Division 8.1, including: • helicopters not to operate at a height lower than 1650 feet within a horizontal radius of 500 metres of a cetacean • helicopters not to approach a cetacean from head on.
Details of Residual Impacts and Risks:
Given there are no high energy impulsive sound sources associated with the routine operation of helicopters and vessels, there may be some localised behavioural disturbance of marine fauna in the immediate vicinity of vessels during operations, but physiological effects on fauna are not anticipated.

Some transient marine fauna individuals may choose to avoid the immediate proximity of the vessel, but this is not expected to have any widespread or longer term impacts on their behaviour or populations. Seabirds are generally understood to be undeterred by vessel noise.

Some minor behavioural disturbance may occur for short periods if marine fauna are present near the surface in the vicinity of landing helicopters. This would be limited to a temporary change in behaviour due to avoidance of the area, but is not expected to have any longer term impacts. Seabirds are expected to avoid the immediate vicinity of a helicopter, but again no long term impacts are anticipated.

The residual impacts and risks, with the control measures in place, have therefore been assessed as Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Slight (1)	Occasional (C)	**Low**
Residual Risk:	Slight (1)	Occasional (C)	**Low**

6.3 LIQUID AND SOLID WASTE DISPOSAL

6.3.1 Liquid Waste Discharges from Vessels

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Without adequate control measures in place, the potential hazards associated with liquid waste discharge into the Operational Area are: • Temporary and localised reduction in water quality; and • Minor and temporary toxicity on marine biota
Receptors:
Water quality and marine biota
Adopted Control Measures:
Sewage will be managed in accordance with MARPOL Annex IV and AMSA Marine Order 96, using an IMO-approved sewage treatment plant, a sewage comminuting and disinfecting system or a sewage holding tank as applicable depending on vessel gross tonnage or people capacity (as evidenced by a current International Sewage Pollution Prevention (ISPP) Certificate).
In accordance with MARPOL Annex IV and AMSA Marine Order 96: • Sewage will only be discharged via an IMO-approved Sewage Treatment Plant; or • Comminuted/disinfected sewage via an IMO-approved system will only be discharged when ≥3 Nm from land and when the vessel is moving at ≥4 knots; or • Sewage that has not been comminuted/ disinfected via an IMO-approved system will only be discharged when ≥12 Nm from land and when the vessel is moving at ≥4 knots.
Vessels will have facilities on board of a standard capable of macerating or grinding putrescible wastes and screening to less than 25 mm in diameter, prior to discharge while the vessel is moving and ≥3 Nm from land.
Vessels > 400 gross tonnes will have an oil discharge monitoring and control system and oil filtering equipment on board, hold a current IOPP Certificate and maintain an oil usage management log book, in accordance with MARPOL 73/78.
Treated bilge water will be discharged only when the vessel is moving and the oil discharge monitoring and control system and oil filtering equipment is operating. If oil discharge monitoring and control system and oil filtering equipment are unavailable, bilge water mixtures will be retained on board for on shore disposal.
Oil discharge monitoring and control systems on board the survey vessels will be maintained and calibrated to ensure monitoring readings are accurate.
Details of Residual Impacts and Risks:
Impacts resulting from the discharge of domestic liquid wastes are expected to be negligible, as treated discharges would rapidly disperse in close proximity to the release location given surface currents and

the assimilative capacity of the open ocean environment. Planned/routine discharge of domestic wastes has the potential to temporarily create a localised increase in nutrient levels resulting in minor and temporary ecological impacts (e.g. changes in the availability of light, certain nutrients and/or dissolved oxygen).

Modelling of domestic waste discharges (10 m^3/day) undertaken by Woodside (2014) indicated that discharges were rapidly diluted in the upper water column (less than 10 m depth) with no significant lasting elevations in water quality parameters (e.g. total nitrogen, total phosphorous, and selected metals) above background levels 50 m from the source. Therefore, the extent of impacts is expected to be highly localised to the discharge location.

With the proposed management and discharge controls in place, discernible impacts to water quality and marine biota are not expected in the open water location of the Cygnus 3D MSS. The consequence of reduction in water quality and impacts to marine biota is therefore slight given the nature and scale of the impact, though any changes would rarely be discernible.

The residual risk associated with the management and disposal of liquid waste discharges has been determined to be low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Slight (1)	Rare (B)	**Low**
Residual Risk:	Slight (1)	Rare (B)	**Low**

6.3.2 Solid Waste Management on Vessels

Details of Impacts and Risks and Control Measures

Hazard/Threat:
If solid wastes on board vessels are not managed or disposed of appropriately, small quantities of solid waste (e.g. packaging and other domestic waste products) may be released with the potential to impact the environment. The potential hazards associated with the discharge of solid wastes in the Operational Area are: • Temporary and localised reduction in water quality; and • Interactions with marine biota (e.g. contact, entanglement, ingestion).
Receptors:
Water quality and marine biota
Adopted Control Measures:
In accordance with MARPOL Annex V and Marine Order 95: • Vessels > 100 t (or certified for >15 persons on board) will have a Waste Management Plan • Vessels >400 T (or certified for >15 persons on board) will have a waste management log book
Bins available for the segregation of waste in accordance with the vessel Waste Management Plan, and bins are fitted with lids/cargo nets for waste with potential to be wind-blown (e.g. paper, cardboard).
Solid hazardous and non-hazardous wastes generated during the survey are segregated on board the vessels and are either incinerated (using an IMO-approved incinerator, on seismic vessel only) or appropriately disposed of at a licensed onshore facility in accordance with the Vessel Waste Management Plan.
Food waste will be macerated to <25 mm diameter and then only discharged when the vessel is moving and is more than 3 NM from the nearest land.
Non-hazardous waste generated on board the vessel will be recycled or re-used where practical and possible.
Solid waste generated during the survey on board the vessel will be minimised where practical, as identified during the pre-survey environmental checklist.
Details of Residual Impacts and Risks:
Impacts resulting from the routine management of sold hazardous and non-hazardous wastes are

expected to be negligible, as there will be no planned discharge of solid wastes to the marine environment. Discharge of solid wastes has the potential to temporarily create a localised change in water quality and temporary ecological impacts. Solid wastes may also be blown off the vessel, which could have the potential to result in fauna mortality or injury through ingestion or entanglement. Windblown waste would be rare as wastes will be stored in closed containers.

With the proposed management and discharge controls in place, discernible impacts to water quality and marine biota are not expected in the open water location of the Cygnus 3D MSS. The consequence of reduction in water quality and impacts to marine biota is therefore slight given the nature and scale of the impact, though any changes would rarely be discernible. The residual impacts and risks, with the control measures in place, have therefore been assessed as low.

Residual Risk Ranking:	**Consequence**	**Likelihood**	**Risk**
	Slight (1)	Rare (B)	**Low**
	Slight (1)	Rare (B)	**Low**

6.4 ATMOSPHERIC EMISSIONS

Details of Impacts and Risk Control Measures

Hazard/Threat:
Atmospheric emissions have the potential to result in a localised reduction in air quality in the immediate vicinity of the vessel exhaust and to contribute to greenhouse gases (GHG) in the atmosphere.
Receptors:
Air quality in the immediate vicinity of the vessel exhaust and global levels of GHG in the atmosphere.
Adopted Control Measures:
In accordance with MARPOL 73/78 Annex VI (Prevention of Air Pollution) and Marine Orders 97: • Vessels to have a valid IAPP Certificate (International air pollution prevention certificate) • Incinerator will be certified to meet prescribed emissions standards • Diesel engines >130kW certified to meet prescribed emission standards
Vessels will use MGO grade fuel during the survey, which will have low sulphur content of ≤3.5% by mass.
Vessel engines and incinerators maintained according to manufacturer's specification
Fuel usage for the survey will be recorded
Details of Residual Impacts and Risks:
Impacts resulting from atmospheric emissions are expected to be negligible, as emissions would rapidly disperse in close proximity to the release location. Atmospheric emissions have the potential to result in a localised reduction in air quality in the immediate vicinity of the vessel exhaust and to contribute to Australian and global levels of greenhouse gases in the atmosphere. Due to the low emission levels and very low background levels of pollutants, it is anticipated that emissions resulting from the survey will only result in a short term and localised reduction in air quality, with emissions quickly dispersing back to within background levels. No lasting effect on sensitive receptors is likely. Given the low level of emissions anticipated, survey emissions only represent a small contribution to overall Australian and global GHG emissions to the atmosphere. With the proposed management and controls in place, discernible impacts to air quality are not expected in the vicinity of the Cygnus 3D MSS. The consequence of reduction in air quality is therefore low given the nature and scale of the impact, though any changes would rarely be discernible. The residual impacts and risks have therefore been assessed as low.

Risk Ranking:	**Consequence**	**Likelihood**	**Risk**
Inherent Risk	Slight (1)	Regular (D)	**Low**
Residual Risk	Slight (1)	Regular (C)	**Low**

6.5 ARTIFICIAL LIGHT EMISSIONS

Details of Impacts and Control Measures

Hazard/Threat:
Artificial light resulting from navigational and safety lighting for seismic survey/support vessels may disrupt marine fauna behaviour.
Receptors:
Marine fauna sensitive to artificial lighting (i.e. turtles, fish and seabirds).
Adopted Control Measures:
Reduce lighting as far as practicable, whilst not jeopardising safety (e.g. non-essential lighting to be turned off when not in use).
Identify opportunities to further reduce lighting during pre-survey environmental checklist.
Crew instructed/briefed to minimise unnecessary external lighting where practicable.
Details of Residual Impacts and Risks:
Impacts resulting from artificial lighting during the survey are expected to be negligible. Due to the size of the vessel and the height above sea level where lights will be positioned, it is expected that light emissions will be limited to localised offshore attraction/repulsion of marine fauna species, including marine turtles, fish and seabirds. Artificial lighting has the potential to temporarily create an attraction/repulsion of marine fauna species, including marine turtles, fish and seabirds. The transient nature of the survey, the predominantly open oceanic location of the Operational Area, and the minimum distance to known turtle nesting and bird breeding colonies (Ashmore Reef (85 km), Cartier Island (30 km) and the Kimberley coast (130 km)) means that these are unlikely to be impacted. In addition, during acquisition, sound emissions from the seismic vessels are expected to act as a localised and temporary deterrent to approaching marine fauna. The survey is unlikely to generate light levels sufficient to disrupt natural behavioural patterns on a long term basis that could result in significant effects to the marine fauna populations in the region. With the proposed management controls in place, discernible impacts to marine fauna are not expected in the location of the Cygnus 3D MSS from artificial light. The consequence of disrupting some marine fauna behaviours is slight given the nature and scale of the impact, though any changes would rarely be discernible. The residual impacts and risks have therefore been assessed as low.

Risk Ranking:	Consequence	Likelihood	Risk
Inherent Risk	Slight (1)	Occasional (C)	**Low**
Residual Risk	Slight (1)	Rare (B)	**Low**

6.6 INTRODUCTION OF INVASIVE MARINE SPECIES

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Introduction of invasive marine species (IMS) to the Operational Area has the potential to occur through: • biofouling of vessel hull; • exchange of ballast waters; and • biofouling of in-water survey equipment. If successfully established, IMS may result in: • Competition, predation or displacement of native species. • Alteration of natural ecological processes. • Introduction of pathogens with the potential to impact on ecological health.
Receptors:
Marine ecological communities (alterations to local ecosystems)

Adopted Control Measures:
Vessel hull and niches confirmed to be free of IMS prior to mobilisation into Australian waters.
Survey and support vessels will have all necessary Department of Agriculture and Water Resources biosecurity approvals prior to mobilisation, including Pre-Arrival Report clearance for vessels entering Australian territorial waters.
All vessels will comply with the requirements of the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009) of which key requirements are: • Maintenance of biofouling electronic records outlining marine fouling management actions • Completion of an IMS risk assessment prior to vessel entry into Australian waters which concludes a low risk of IMS presence • In-water equipment free of marine fouling prior to the commencement of the survey
All vessels will maintain a current anti-fouling coating that complies with the requirements of Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships and the requirements of the *Protection of the Sea (Harmful Antifouling Systems) Act 2006*.
Streamers will be inspected, maintained and cleaned during retrieval (e.g. due to transit, crew change, inclement weather) to reduce biofouling.
Exchange of ballast water will only occur >12 nm from land and in water depths of >50 m in accordance with the Australian Ballast Water Management Requirements (Department of Agriculture and Water Resources 2017).
BWM-T class (IMO approved) ballast water management system on board the seismic vessel treats water to reduce the risk of any living organisms being present prior to discharge.
Survey and support vessels will have a Ballast Water Management Plan and a ballast water record system/book, consistent with the Australian Ballast Water Management Requirements (Department of Agriculture and Water Resources 2017).
Details of Residual Impacts and Risks:
Impacts resulting from the introduction of marine species from ballast water and biofouling (submersible equipment and seismic/support vessels) are expected to be negligible. IMS once introduced are irreversible and can have significant impacts on the marine ecosystem as they are likely to have little or no natural competition or predation, resulting in IMS outcompeting native species for food or space, preying on native species or changing the nature of the environment. This will result in an alteration of natural ecological processes and the potential to introduce pathogens. Vessels operating in offshore environments are less likely to accumulate or translocate marine pests than vessels that spend prolonged periods in shallow port or coastal waters (Commonwealth of Australia 2009; Wells *et al*. 2009). Therefore, highly disturbed, shallow water environments such as ports and marinas are more susceptible to colonisation than open-water environments, such as the Operational Area, where the rate of dilution and the degree of dispersal are high. With the proposed management controls in place, discernible impacts to ecological marine communities are not expected in the open water location of the Cygnus 3D MSS. The consequence to marine biota is extensive given the nature and scale of the impact, though any changes would rarely be discernible. The likelihood of IMS establishment in the Operational Area is further reduced with the controls in place, but remains Rare (B).The residual impacts and risks have therefore been assessed as low.

Risk Ranking:	Consequence	Likelihood	Risk
Inherent Risk	Extensive (3)	Rare (B)	**Low**
Residual Risk	Extensive (3)	Rare (B)	**Low**

7 ENVIRONMENTAL RISKS AND MANAGEMENT - UNPLANNED EVENTS

This section describes and assesses the potential environmental impacts associated with credible unplanned events that could occur during the Cygnus 3D MSS. Based on the risk assessment method undertaken for this EP (*Section 5*), the impacts and risks associated with the following unplanned events are described in the subsections below:

- hydrocarbon and chemical spills; and
- loss of equipment

7.1 HYDROCARBON AND CHEMICAL SPILLS

7.1.1 Vessel Fuel Tank Rupture

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Surface hydrocarbon exposures resulting from an accidental Marine gas Oil (MGO) spill from a vessel fuel tank rupture (280 m^3) have the potential to result in the following adverse effects on the environment: • Toxic effects on marine fauna that come into contact with surface hydrocarbons; • Disruption to other marine users from the presence of the slick. Entrained hydrocarbon exposures within the top 10 m of the water column have the potential to result in the following adverse effects on the environment: • Toxic effects to fish ingesting or contacting entrained hydrocarbons; • Toxic effects on plankton, juvenile fish, eggs and larvae that may become entrained with hydrocarbon droplets; and Shoreline exposures have the potential to result in the following adverse effects on the environment: • Toxic effects to shoreline and intertidal habitats and communities (e.g. fringing coral reefs) where oil becomes stranded; • Toxic effects to shore birds and nesting marine turtles.
Receptors:
• Marine fauna, including EPBC Act listed species such as turtles, cetaceans, dugongs, whale sharks and birds • Fish, eggs and larvae • Other marine users, including fisheries and commercial shipping • Shoreline and intertidal habitats and communities
Adopted Control Measures:
Vessels utilise MGO which is stored in multiple fuel tanks on board. Fuel tanks can be isolated and contents transferred between them.
Seismic vessels have a double hull design making a rupture highly unlikely, even in a collision situation.
Radar on board each seismic vessel is fitted with a collision alarm, and seismic vessels have DNVGL NAUT-AW class notation for enhanced nautical safety, incorporating a grounding avoidance system.
Vessels will maintain appropriate lighting, shapes, navigation and communication at all times to inform other users of the position and intentions of the vessel, in compliance with the Navigation Act 2012 and associated Marine Orders.
A 24 hour visual, radio and radar watch will be maintained for vessels in the vicinity of the Operational Area.
Other users who may be present in the Operational Area will be advised of survey activities through:

- Pre-mobilisation consultation;
- Notice to Mariners issued by the AHS prior to survey mobilisation and following demobilisation; and
- Daily reports provided to the AMSA JRCC.

All vessels over 400 t (MARPOL 73/78 Annex I) hold approved and tested SOPEPs and crew are trained in its implementation.

In the event of a spill to the marine environment, the Oil Pollution Emergency Plan (OPEP) will be followed.

Details of Residual Impacts and Risks:

Marine fauna (Surface Exposures)

Surface MGO exposures >10 g/m^2 are expected to be limited to several kilometres at any one time and fall below 10 g/m^2 within 24-48 hours of a spill occurring. Therefore, given the relatively short-term and localised exposure potential, sub-lethal impacts to transient marine fauna from inhalation, ingestion or skin contact are expected to be limited to individuals or groups of fauna that forage within the localised area of the slick during the first 24-48 hours. However, there is the potential for some less severe sub-lethal impacts to occur if patchy residues of the slick are inhaled or ingested beyond 48 hours of the spill occurring. It is highly unlikely that the number of animals that would be encountered and impacted by the slick would result in population and stock level impacts. The potential consequence to marine fauna is assessed to be Extensive (3).

Other marine users (Surface Exposures)

Considering the maximum predicted swept area of moderate surface hydrocarbon exposures (>10 g/m^2) is up to 36 km from a release site and the short-term presence of such exposures (approximately 24-48 hours), it is anticipated that the impacts on other activities would be relatively localised and short-term. Further, the maximum area of the slick at these exposures at any time is expected to cover only several kilometres. Therefore, the potential consequence on other marine users and activities is considered Minor (2).

Pelagic fish, eggs and larvae (Entrained Exposures)

The low probability (<5%) of low exposures of entrained hydrocarbon droplets in the water column has the potential to impact marine organisms such as juvenile fish, larvae and planktonic organisms that may become entrained with the hydrocarbon droplets and risk chronic exposure impacts, or if entrained hydrocarbons adhere to fishes' gills.

Given the low, patchy exposures that could potentially occur as a worst case, and that key fish species associated in the region are understood to be broadcast spawners, releasing large numbers of eggs in the region on multiple occasions during a season, the proportion of juveniles, eggs and larvae that may be affected during the short duration of the spill is expected to be negligible. Therefore, the potential consequence to pelagic fish, eggs and larvae is expected to be Slight (1).

Shoreline Habitats and Communities (Shoreline Accumulation)

Shoreline exposures, including contact with coral and algae could result in the death and impairment of some localised patches of coral along the shorelines of Cartier Island if stranding and direct contact at low tide occurs, with some lesser impacts to corals at Ashmore Reef, Hibernia Reef and Browse Island possible under different conditions. Once impacted, the affected patches of reef may not recover for months or years, although the overall status and ecological functioning of the broader area of coral reef communities at these locations is not expected to be significantly impacted. The potential consequence to intertidal corals and other shoreline habitats is assessed as Extensive (3) with the proposed controls, which include double lined, isolated tanks to limit the potential for a full fuel tank to be released and therefore limits the potential extent of shoreline impacts.

Nesting Turtles and Shore Birds (Shoreline Accumulation)

The potential for turtles and birds to be impacted at Ashmore and Hibernia Reefs is limited given the low probability of accumulation and the weathering that will have occurred to the MGO before it reaches these locations. Nesting turtles and birds may potentially be impacted by moderate accumulations >100 g/m^2 occurring at Cartier Island, although there is a low probability of these occurring from a spill in the Phase 3 Operational Area. The accumulated MGO may persist on the shoreline or within the intertidal zone for a couple of days and nights during which time it is expected to be sufficiently weathered or removed by tides and wave action. During this worst credible exposure window, several nesting adult turtles, turtle hatchlings or nesting birds could be exposed to lethal and sub-lethal impacts. Given the likely extent of weathering that will occur, impacts are more likely to be sub-lethal (e.g. skin and eye irritation). The consequence of this impact is considered to be Extensive (3).

With the proposed preventative and mitigative controls in place, the likelihood of a vessel incident occurring, and resulting in a fuel tank rupture and the loss of a full 280 m^3 tank volume, and resulting in

the impacts described above is considered to be Rare (B). The residual risks have been determined to be Low.			
Marine Fauna e.g. Turtles, Mammals, Birds (Surface Exposures)			
Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Extensive (3)	Rare (B)	**Low**
Residual Risk:	Extensive (3)	Rare (B)	**Low**
Other Marine Users – Commercial Fisheries and Shipping (Surface Exposures)			
Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Minor (2)	Rare (B)	**Low**
Residual Risk:	Minor (2)	Rare (B)	**Low**
Pelagic Fish, Eggs and Larvae (Entrained Exposures)			
Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Slight (1)	Rare (B)	**Low**
Residual Risk:	Slight (1)	Rare (B)	**Low**
Shoreline Habitats and Communities (Shoreline Accumulation)			
Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Major (4)	Rare (B)	**Moderate**
Residual Risk:	Extensive (3)	Rare (B)	**Low**
Nesting Turtles and Shore Birds (Shoreline Accumulation)			
Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Extensive (3)	Rare (B)	**Low**
Residual Risk:	Extensive (3)	Rare (B)	**Low**

7.1.2 Vessel Refuelling Failure

Details of Impacts and Risks and Control Measures

Hazard/Threat:
An accidental MGO spill during vessel refuelling (up to 25 m^3) has the potential to result in the following adverse effects on the environment: • Toxic effects on marine fauna that come into contact with surface hydrocarbons; • Toxic effects to juvenile fish, eggs and larvae from entrained hydrocarbon droplets.
Receptors:
• Marine fauna, including EPBC Act listed species such as turtles, cetaceans, dugongs, whale sharks and birds • Pelagic fish, eggs and larvae
Adopted Control Measures:
Bunkering contractor selection is made in accordance with the contractor selection procedure to ensure the contractor will use dry-break couplings.
Refuelling undertaken in accordance with Polarcus Bunkering Procedure including: • Refuelling will only be undertaken during daylight hours and in suitable weather conditions. • Completion of the Permit to Work Refuelling At Sea Checklist and Bunkering Checklist ensuring that anti-pollution equipment is ready and scuppers plugged before bunkering commences. • Spill kits are available on board the seismic vessel and crew are trained in their use.
All vessels over 400 t (MARPOL 73/78 Annex I) hold approved and tested SOPEPs and crew are trained in its implementation.

In the event of a spill to the marine environment, the Oil Pollution Emergency Plan (OPEP) will be followed.
Details of Residual Impacts and Risks:
A refuelling spill of up to 25 m^3 of MGO may result in localised exposure of receptors to localised surface and entrained hydrocarbons. Potential exposures to spilt surface oil >10 g/m^2, considered representative of potential lethal and sub-lethal impacts to marine fauna such as turtles, cetaceans and birds are expected to be limited to a localised area for a few hours or less than a day. Therefore, worst case impacts are expected to be limited to sub-lethal impacts or potential mortality to a small number of individuals Entrained exposures are also expected to be low, resulting in limited interactions with small numbers of fish, eggs and larvae in the upper water column that are largely incidental in nature. The localised and short term impacts that are predicted to occur to marina fauna and fish following weathering, dispersion and degradation in the open water environment of the Operational Area are therefore assessed to be Low.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Minor (2)	Occasional (C)	**Low**
Residual Risk:	Minor (2)	Rare (B)	**Low**

7.1.3 Single Point Failure

Details of Impacts and Risks and Control Measures

Hazard/Threat:
Accidental spills of up to 1 m^3 of hydraulic fluids or chemicals are expected to result in a localised and short term reduction in water quality with the potential to result in toxic effects on marine fauna.
Receptors:
• Marine fauna, including EPBC Act listed species such as turtles, cetaceans, dugongs, whale sharks and birds • Pelagic fish, eggs and larvae
Adopted Control Measures:
Hydraulic fluids and chemicals will be selected in accordance with the Polarcus Chemical Control Procedure and will be selected to have the lowest environmental toxicity possible whilst meeting operational performance requirements.
Storage, handling and use of hazardous substances (including hydraulic fluids and chemicals) shall be in accordance with the product's Safety Data Sheet (SDS)
Spill kits and scupper plugs are available on board the seismic vessel and crew are trained in their use.
All vessels over 400 t (MARPOL 73/78 Annex I) hold approved and tested SOPEPs and crew are trained in its implementation.
Spills will be reported through the Polarcus Incident Reporting Procedure and waste materials managed in accordance with the vessel Waste/Garbage Management Plan.
Details of Residual Impacts and Risks:
The accidental release of up to 1 m^3 of hydraulic fluids or chemicals to the marine environment may result in a localised reduction in water quality. Hydraulic fluids spilt overboard have the potential to result in toxicity effects to marine fauna and fish in the immediate vicinity of the spill release location, through direct contact or accidental ingestion. Given the open water dispersive location of the Operational Area, the extent and duration of potential exposures, impacts to marine fauna and fish is expected to be highly localised and short term, and limited to the vicinity of point of discharge. Therefore, impacts are considered to result in a minor consequence and the residual risk has been determined to be Low with the proposed preventative controls in place.

Risk Ranking	Consequence	Likelihood	Risk
Inherent Risk:	Minor (2)	Occasional (C)	**Low**
Residual Risk:	Minor (2)	Rare (B)	**Low**

7.1.4 Spill Response Options

Spill response mitigation measures 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 MGO, the following spill response options are considered applicable for potential MGO spills:

- Source control, which will include locating the source of the leakage and may also include isolating the tanks, transferring oil to slack or empty tanks, ceasing bunkering operations or using scupper plugs;
- Monitor and evaluate the trajectory and extent of the spill; and
- Assisted natural dispersion using propeller wash, if advised by the Control Agency, AMSA, and deemed safe.

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 6.1.2* for planned activities.

7.2 LOSS OF EQUIPMENT

Details of Impacts and Risks and Control Measures

Hazard/Threat:
The loss of equipment overboard has the potential to: • disrupt other users of the Operational Area; and • result in disturbance to the seabed.
Receptors:
• Other marine users (e.g. commercial fisheries and shipping) • Benthic habitats and communities
Adopted Control Measures:
Streamers will be deployed and retrieved in accordance with the Polarcus Deployment and Recovery of Streamers Procedure, of which key requirements include: • Ensuring weather conditions are appropriate for deployment and retrieval; • Ensuring tail buoy GPS is operational; • Monitoring deployment and retrieval closely; • Checking for physical damage; • Ensuring connection devices are in serviceable condition; • Storing all birds, floats, retrievers and acoustic racks immediately following recovery.
Streamers shall be fitted with redundant retainers, tail buoys and relative GPS.
Solid streamers shall be used for the survey.
All lifting gear used for deployment and retrieval of equipment over the vessel shall be load rated for the working load.
AMSA JRCC and relevant stakeholders known to be in the Operational Area will be notified in the event of equipment loss.
At least one support vessel will accompany the seismic vessel at all times and will, if necessary, assist in the recovery of lost equipment.

Details of Residual Impacts and Risks:			
In the event that equipment is lost, other users of the Operational Area may be required to make minor diversions to avoid the equipment, until it can be retrieved. The potential for such interactions will be limited to a short period of time while equipment is retrieved. Should disruption occur it is only expected to affect individual users and cause temporary disruption through avoidance of a highly localised area. Given the nature and size of the equipment to be used during the survey, lost equipment is not expected to result in a navigational hazard. Dropped equipment may also disturb benthic habitats. The majority of benthic habitats in the Operational Area comprise mostly sediments with sparse areas of sponges, soft corals and filter feeders. Occasional calcareous rock outcrops may occur in places such as in association with carbonate banks located around the Operational Area. Such habitats are well represented throughout the region. Given the size of equipment used for the survey, only a relatively small area of the seabed would be disturbed and lasting impacts are not expected. Therefore, impacts are considered to result in a minor consequence and the residual risk has been determined to be Low.			
Risk Ranking	**Consequence**	**Likelihood**	**Risk**
Inherent Risk:	Slight (1)	Occasional (C)	**Low**
Residual Risk:	Slight (1)	Rare (B)	**Low**

8 IMPLEMENTATION STRATEGY

The Implementation Strategy in the EP describes:

1. The Polarcus 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;
5. Preparedness for responding to oil pollution emergencies through an OPEP and appropriate arrangements for environmental monitoring;

The Polarcus Cygnus 3D MSS 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 Polarcus Environmental Management System.

8.1 COMPLIANCE ASSURANCE

Compliance with this EP will be assured and reviewed via daily on-board meetings, on-board HSE committee meetings, and via internal audit and monitoring programs described below.

8.1.1 Monitoring and Recording

Monitoring will be undertaken for the Cygnus 3D MSS, and records kept as detailed in *Table 8.1*.

Table 8.1 Monitoring and Recording Summary

Discharge/Incident	Parameters	Record	Responsibility
Atmospheric Emissions			
Engine emissions	Quantity of marine diesel used by the seismic vessel	Engineers log	Vessel Master
Discharges to Sea			
Oily water discharges	The volume of oily water discharge from the seismic vessel.	Oil usage management electronic records	Vessel Master
Food waste	The volume of food-scraps discharged from the seismic vessel	Waste management electronic records	Vessel Master
Sewage/Grey water discharge	The volume of sewage and grey water discharged from the seismic vessel	Engineers log	Vessel Master
Disposal of Wastes			
Hazardous wastes	Volume of hazardous wastes transferred onshore.	Waste management electronic records/oil usage management electronic records	Vessel Master

Discharge/Incident	Parameters	Record	Responsibility
Non-hazardous wastes	Volume of non-hazardous wastes transferred onshore	Waste management electronic records	Vessel Master
Marine Fauna Interaction			
Cetacean, whale shark, dugongs and turtle sightings	Details required on the Whale and Dolphin Sighting reports (DOEE)	Sighting records	MFO
Collisions with cetaceans in Commonwealth waters will be reported to the National Ship Strike Database.	Location, timing, species, vessel speed, what happened	National Ship Strike Database https://data.marinemammals.gov.au/report/shipstrike/new	MFO
Marine User Interaction			
Vessel Interaction/ Complaints	Communications with other vessels	Ships log	Vessel Master

8.1.2 Review and Reporting of Environmental Performance

Polarcus will undertake an internal review of the environmental performance of the Cygnus 3D MSS on completion of each survey phase. The outcomes of the review will be incorporated into environmental management measures applied to future activities to further improve Polarcus' environmental performance, and will be included in Environmental Performance Reports submitted to NOPSEMA within two months of completing the Cygnus 3D MSS.

8.1.3 Management of Change and New Information

In order to ensure that impacts and risks are continually reduced to the residual levels described and the requirements of legislation will continue to be met, Polarcus will undertake periodic verification of environmental inputs used to inform the evaluation of impacts and risks in the EP, including identifying updates to legislative requirements and environmental information.

Any new or increased impacts or risks that may arise from the verifications will be managed through the Polarcus Management of Change Procedure.

8.1.4 EP Review 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

8.1.5 Audits

Polarcus will maintain a compliance register that will serve as an audit tool during the Cygnus 3D MSS. Audits will be completed:

- Prior to the commencement of each survey phase
- A minimum one compliance audit per acquisition phase

8.1.6 Management of Non-conformance

Non-conformances and opportunities for improvement will be identified and corrective actions will be tracked to completion in accordance with the Polarcus Incident Reporting Procedure and Risk Management Procedure.

Polarcus will carry forward non-conformances identified during the Cygnus 3D MSS for consideration in future seismic surveys to assist with continuous improvement in environmental management controls and performance outcomes.

8.2 OIL POLLUTION EMERGENCY PLAN

In order to encompass the nature and scale of the survey and respond to the identified credible spill scenarios, the overall Oil Pollution Emergency Plan (OPEP) for the survey encompasses multiple levels of planning and response capability. The overall seismic survey OPEP is therefore represented by various levels of emergency plan, 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 Ashmore and Cartier Territory.

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

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Annex A

Stakeholder Consultation

Stakeholder log as of: 21/11/2017

STAKEHOLDER	Date of Correspondence	To / From Stakeholder	Summary of Contact / Correspondence	Summary of Objection / Claim / Query / Advice	Assessment of Merit of Objection or Claim / Comment	Statement of the Polarcus Response / Proposed Response
Commonwealth Government						
Australian Fisheries Management Authority (AFMA)	28/07/2015	To stakeholder	Email with Fisheries information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 with message left requesting call-back.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	04/08/2015	To stakeholder	Follow up email made on 4 August 2015.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 with Rebecca Gray who relayed that Paul Ryan is the AFMA Environment Section contact now and the information sheet is with him to review and respond if any feedback is warranted. He is currently on leave until next week and she will follow-up with him then to reply to Polarcus as soon as possible. She also relayed that AFMA typically replied promptly if an issue is identified in a consultation letter.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	16/03/2016	To stakeholder	March 2016 Email update sent 16/3/16. Resent to Paul Ryan 18/3/16 after first email undelivered.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
Australian Fisheries Management Authority (AFMA)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 with message left requesting call-back.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	13/08/2015	From stakeholder	Email from AFMA MOU Branch received on 13 August 2015 during which Jim Prescott relayed that since the Survey Area overlaps with a portion of the MOU and warns about the likelihood of encounters with Indonesian traditional fishermen. It would be possible for AFMA to assist Polarcus to pass any printed material to the fisheries authorities on Rote Island where nearly all the traditional vessels originate.	Advised or notifications to Indonesian traditional fishers in the event that the survey is undertaken in the MOU Box. AFMA can facilitate exchnage of information.	N/A - Advice / request for further information only. No objection or claim made. Information incorporated into EP.	Polarcus replied via email on 14 August 2015 confirming their agreement to prepare the translated information sheet to be distributed prior the start of survey acquisition in MOU Box.
AFMA - Traditional Fisheries MoU Management	14/08/2015	To stakeholder	Polarcus replied via email on 14 August 2015 confirming their agreement to prepare the translated information sheet to be distributed prior the start of the survey acquisition.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
AFMA - Traditional Fisheries MoU Management	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	29/07/2015	From stakeholder	Email from AHO on 29 July 2015 acknowledging information sheet and request for final details prior to commencement of survey.	N/A - AHS advise notice to be provide for NtM	N/A - Advice / request for further information only. No objection or claim made. Information incorporated into EP.	Requirement to notify AHS included in EP. Polarcus replied on 3 August 2015 to confirm such information will indeed be supplied as requested. AHS will be notified prior to commencmeent of the survey.
Australian Hydrographic Service (AHS)	03/08/2015	To stakeholder	Polarcus replied on 3 August 2015 to confirm such information will indeed be supplied as requested.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	27/10/2016	To stakeholder	Email sent 27/10/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 1st December 2016.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	16/11/2016	To stakeholder	Email sent 16/11/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 20th December 2016.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	02/06/2017	From stakeholder	Request from Glen Cook to be kept informed to allow any appropriate notice to mariners action to be completed	N/A - AHS advise notice to be provide for NtM	N/A - Advice / request for further information only. No objection or claim made. Information incorporated into EP.	Requirement to notify AHS included in EP. Polarcus replied on 12/06/2017 to confirm such information will indeed be supplied as requested. AHS will be notified prior to commencmeent of the survey.
Australian Hydrographic Service (AHS)	12/06/2017	To stakeholder	Response to Glen Cook acknowledging email	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Australian Hydrographic Service (AHS)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	28/07/2015	To stakeholder	Email with Fisheries information sheet and map sent on 28 July 2015	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	03/08/2015	From stakeholder	Email from AMSA on 3 August 2015 providing vessel traffic plot within the Survey Area and noting that extra caution must be taken where the Survey Area overlaps with the Osborne Passage and the charted Preferred Route. AMSA advised the survey to be conducted in accordance with exceptional communications and certain navigational controls (e.g. lights and streamers, reflective tail buoys, visual and radar watches, etc.). AMSA requested that AMSA's Joint Rescue Coordination Centre (JRCC) be contacted for Auscoast warning broadcasts before operations commence. Additionally, the Australian Hydrographic Service must be contacted no less than 4 working weeks for the promulgation of related Notices to Mariners. AMSA also requested notification of survey end. The Cygnus 3D MSS must be conducted in accordance with MARPOL Convention requirements regarding discharges and the Marine Order '90' series. Finally, AMSA assumed that the Department of Agriculture was being consulted.	AMSA advised of vessel traffic in Operational Area and requirements for shapes, lighting, markings, visual and radar watches, and notification of JRCC and AHS.	N/A - Advice / request for further information only. No objection or claim made. Information incorporated into EP.	Requirement acknowledged via email by Polarcus on 03/08/2015. JRCC and AHS will be notified prior to commencmeent of the survey.
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	03/08/2015	To stakeholder	Polarcus replied to AMSA on 3 August 2015 acknowledging receipt of their email and information (including the vessel traffic plot) for subsequent review and incorporation into this EP as relevant. The EP will include controls to minimise significant disruption or interference with other users of the Survey Area during the survey. Such controls include the navigational measures listed in AMSA's email as well as adherence with requirements of the International Regulations for Preventing Collisions as Sea 1972 (COLREGS), Chapter 5 of Safety of Life at Sea as implemented in Commonwealth Waters through the Navigation Act 2012 and associated Marine Orders Parts 21, 30, 59. Polarcus confirmed that the Cygnus 3D MSS will be conducted in compliance with MARPOL and the Marine Orders. The Department of Agriculture is being consulted regarding the Cygnus 3D MSS.	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	18/03/2016	From stakeholder	Email response received 18/3/16 including an updated vessel traffic plot of the Polarcus Cygnus 3D MSS proposed area with 6 months of AIS data noting a slight increase in vessel traffic. Note is also made that caution should be taken when operating in the area of the Osbourn Passes (a preferred shipping route) to minimise the potential for integration with shipping vessels. A request is also made for communications with AMSA following the survey to comment on the operations and the interaction with commercial shipping at the time of the survey.	AMSA advised of vessel traffic in Operational Area and requirements for shapes, lighting, markings, visual and radar watches, and notification of JRCC and AHS.	N/A - Advice / request for further information only. No objection or claim made. Information incorporated into EP.	Requirement acknowledged via email by Polarcus on 03/08/2015. JRCC and AHS will be notified prior to commencmeent of the survey.
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	27/10/2016	To stakeholder	Email sent 27/10/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 1st December 2016.	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	16/11/2016	To stakeholder	Email sent 16/11/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 20th December 2016.	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	05/06/2017	From stakeholder	Email from Luke Pugsley re updated traffic plot of survey area provided by stakeholder advising commercial shipping can expect to be encountered anywhere within extended Cygnus Survey area.	AMSA provided update on vessel traffic	N/A - Advice / request for further information only. No objection or claim made. Information incorporated into EP.	Email sent 12/06/17 to Luke Pugsley acknowledging comments
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	12/06/2017	To stakeholder	Email sent 12/06/17 to Luke Pugsley acknowledging comments	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
Australian Marine Safety Authority (AMSA) (Marine Operations Division and Emergency Response Division)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Maritime Border Command (MBC)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
Maritime Border Command (MBC)	29/07/2015	From stakeholder	MBC replied on 29 July 2015 stating they had no comment, but would appreciate being kept informed of any further developments.	N/A	N/A	N/A
Maritime Border Command (MBC)	03/08/2015	To stakeholder	Polarcus replied on 3 August 2015 to confirm that the MBC will be kept informed of the Cygnus 3D MSS.	N/A	N/A	N/A
Maritime Border Command (MBC)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
Maritime Border Command (MBC)	27/10/2016	To stakeholder	Email sent 27/10/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 1st December 2016.	N/A	N/A	N/A
Maritime Border Command (MBC)	16/11/2016	To stakeholder	Email sent 16/11/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 20th December 2016.	N/A	N/A	N/A
Maritime Border Command (MBC)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
Maritime Border Command (MBC)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
Maritime Border Command (MBC)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A

	Department of Agriculture (ABARES)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Agriculture (ABARES)	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Department of Agriculture (ABARES)	04/08/2015	From stakeholder	Email received on 4 August 2015 from ABARES relaying that they do not respond to queries relating to seismic testing and referred Polarcus to AFMA for further consultation.	N/A	N/A	N/A
	Department of Agriculture (ABARES)	04/08/2015	To stakeholder	Polarcus replied on 4 August 2015 thanking ABARES for their email and confirming that AFMA were being informed of Cygnus 3D MSS.	N/A	N/A	N/A
	Department of Agriculture (ABARES)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Agriculture (ABARES)	17/03/2016	From stakeholder	Email response received 17/3/16 stating that ABARES do not routinely receive, nor respond to, requests relating to seismic testing. However, ABARES are sometimes interested in obtaining bathymetric and other data for use in predictive habitat modelling and other applications, particularly in the Southern Indian Ocean.	N/A	N/A	N/A
	Department of Agriculture (ABARES)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016. Future email correspondence with Marine Pests branch.	N/A	N/A	N/A
	Department of Agriculture and Water Resources (Biosecurity) - Marine Pests Unit / Maritime National Coordination Centre (MNCC)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Agriculture and Water Resources (Biosecurity) - Marine Pests Unit / Maritime National Coordination Centre (MNCC)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Agriculture and Water Resources (Biosecurity) - Marine Pests Unit / Maritime National Coordination Centre (MNCC)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Agriculture and Water Resources (Biosecurity) - Marine Pests Unit / Maritime National Coordination Centre (MNCC)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Communications	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Communications	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Department of Communications	04/08/2015	To stakeholder	Follow-up call on 4 August 2015 during which the Sam Bruce-Smith relayed that they were drafting up a response and would be sending it through as soon as they heard back from the Australian Communications & Media Authority.	N/A	N/A	N/A
	Department of Communications	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 with message left requesting call back from Sam Bruce-Smith.	N/A	N/A	N/A
	Department of Communications	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Communications	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Communications	08/11/2016	From stakeholder	Email received from Emma Charge, Senior Policy Officer, on 8th November 2016 advising Polarcus of the potential presence of the Nextgen Northwest Cable System. Contact details provided for Greg Neylan at Nextgen.	Stakeholder advised of presence of new subsea cable near Survey Area and provided contact details for owning company.	N/A - Advice / request for further information only. No objection or claim made. Information incorporated in to the EP.	N/A
	Department of Communications	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Communications	15/06/2017	From stakeholder	Email received from Christiana Muratidi encouraging Polarcus to directly contact any submarine cable operators that may have cables in the vicinity of the study area, and DFAT and DoIIS.	Stakeholder advised to contact cable company as well as DFAT and DoIIS.	N/A - Advice / request for further information only. No objection or claim made.	Email to Christiana Muratidi on 20/06/2017 confirming and acknowledging her feedback and comments, and confirming these stakeholders have been contacted.
	Department of Communications	20/06/2017	To stakeholder	Email to Christiana Muratidi confirming and acknowledging her feedback and comments, and confirming these stakeholders have been contacted.	N/A	N/A	N/A
	Department of Communications	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Communications	10/10/2017	From stakeholder	Email from Department of Communications (subcables), informing ERM that the Department had provided comments in June 2017 and has no further comments on the update.	No further comments	N/A	N/A
	Department of Communications	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Communications	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Defence	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Defence	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Department of Defence	04/08/2015	To stakeholder	Follow-up call on 4 August 2015 during which the Department of Defence relayed that they did not have any comments at this time.	N/A	N/A	N/A
	Department of Defence	17/08/2015	From stakeholder	Email from the Department of Defence (Estate & Infrastructure Group) received on 17 August 2015. The attached letter relayed that the Department of Defence has no objection to the proposed activities and reminds Polarcus of the requirement for advanced notice to AHS.	No objection. Advised to notify AHS prior to commencment.	N/A - Advice / request for further information only. No objection or claim made.	Polarcus replied on 17 August 2015 noting no objection from the Department of Defence and confirming that advanced notice to AHS will be provided.
	Department of Defence	17/08/2015	To stakeholder	Polarcus replied on 17 August 2015 noting no objection from the Department of Defence and confirming that advanced notice to AHS will be completed for Cygnus 3D MSS.	N/A	N/A	N/A
	Department of Defence	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Defence	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Defence	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Defence	02/06/2017	From stakeholder	Request from Tracy Watson (tracy.watson@defence.gov.au) to be removed from this email distribution.	N/A	N/A - Advice / request for further information only. No objection or claim made.	Response to Tracy advising she has been removed from email distribution. Requested alternative contact if applicable.
	Department of Defence	12/06/2017	To stakeholder	Response to Tracy advising she has been removed from email distribution. Requested alternative contact if applicable.	N/A	N/A	N/A
	Department of Defence	12/06/2017	From stakeholder	Tracy advised no interested parties. All contacts except for general petroleum@defence email address removed from database.	N/A	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Department of Defence	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Defence	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Defence	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	17/08/2015	From stakeholder	Call from the DOE was received on 17 August 2015 during which the DOE relayed that they do not need to be consulted regarding EPs under the assessment of NOPSEMA.	Stakeholder advised they do not need to be consulted	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Department of Environment and Energy - Marine Reserves	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	27/04/2016	From stakeholder	Email received 27 April 2016 requesting: • a map of where the title boundaries lie in relation to Commonwealth Marine Reserves; • how IUCN categories in Commonwealth Marine Reserve may be impacted by the activity and any proposed measures to mitigate such impacts. • a due date for feedback. The email clarified that correspondence regarding consultation on offshore petroleum activities must be forwarded to marinereserves@environment.gov.au	Stakeholder requests: • a map of where the title boundaries lie in relation to Commonwealth Marine Reserves; • how IUCN categories in Commonwealth Marine Reserve may be impacted by the activity and any proposed measures to mitigate such impacts. • a due date for feedback.	N/A - Advice / request for further information only. No objection or claim made.	Polarcus replied via email on 15 July 2016, providing information to address all queries, including potential acoustic and spill impacts to marine reserves." Email acknowledgement received from the Department on 27 July 2015, and informed that management plans for all reserves currently under transitional management arrangements are expected to be in place within the next 12 months.
	Department of Environment and Energy - Marine Reserves	15/07/2016	To stakeholder	Polarcus replied via email on 15 July 2016, providing information to address all queries, including potential acoustic and spill impacts to marine reserves." Email acknowledgement received from the Department on 27 July 2015, and informed that management plans for all reserves currently under transitional management arrangements are expected to be in place within the next 12 months.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	01/06/2017	To stakeholder	Update sent regarding the rescheduling of the previous survey phase and the intent to resubmit the EP for an extended area and timeframe. Requested any updates in relation to changes to the Ashmore and Cartier marine reserves	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Environment and Energy - Marine Reserves	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Australian Marine Mammal Centre	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Australian Marine Mammal Centre	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Australian Marine Mammal Centre	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Australian Marine Mammal Centre	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Australian Marine Mammal Centre	01/12/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Marine Mammal Centre	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A

	Australian Marine Mammal Centre	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Australian Marine Mammal Centre	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Australian Marine Mammal Centre	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 during which the DFAT relayed that they will review the information sheet provided and respond should they have any feedback.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 during which Julian Parker requested that information sheet be resent directly to his email address and he will reply should DFAT have any feedback to provide. The information sheet was subsequently resent as requested immediately following the call.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	19/08/2015	From stakeholder	Email received from DFAT on 19 August 2015. DFAT (like DOIS previously) reminds Polarcus of the requirement to notify Indonesia of any activity within the Perth Treaty Area (of which the north-western portion of the Cygnus Greater Working Area overlaps) three months prior to the activity. In addition, DFAT (like AMSA previously) reminds Polarcus of the overlap of the Cygnus Greater Working Area with the Memorandum of Understanding (MOU) and thus cautions the likely encounter with traditional Indonesian fishermen.	Advised of the requirement to notify Indonesia of any activity within the Perth Treaty Area (of which the north-western portion of the Cygnus Greater Working Area overlaps) three months prior to the activity. In addition, DFAT (like AMSA previously) reminds Polarcus of the overlap of the Cygnus Greater Working Area with the Memorandum of Understanding (MOU) and thus cautions the likely encounter with traditional Indonesian fishermen.	N/A - Advice / request for further information only. No objection or claim made. Information included in the EP.	Polarcus replied via email on 19 August 2015. Polarcus notes the requirement to give Indonesia three months' notice of a proposed grant of exploration rights within the Perth Treaty Area. Polarcus will work with DFAT, DOIS and NOPTA for any Special Prospecting Authority (SPA) seismic survey activity located within the Perth Treaty Area. Polarcus also notes the overlap of the Cygnus Survey Area with the MOU. The Cygnus 3D MSS EP includes various controls for managing the interaction with Indonesian traditional fishermen. In addition, Polarcus will be working with the AFMA MOU Box Manager to pass translated printed material to the Indonesian fisheries authorities.
	Department of Foreign Affairs and Trade (DFAT)	19/08/2015	To stakeholder	Polarcus replied via email on 19 August 2015. Polarcus notes the requirement to give Indonesia three months' notice of a proposed grant of exploration rights within the Perth Treaty Area. Polarcus will work with DFAT, DOIS and NOPTA for any Special Prospecting Authority (SPA) seismic survey activity located within the Perth Treaty Area. Polarcus also notes the overlap of the Cygnus Survey Area with the MOU. The Cygnus 3D MSS EP includes various controls for managing the interaction with Indonesian traditional fishermen. In addition, Polarcus will be working with the AFMA MOU Box Manager to pass translated printed material to the Indonesian fisheries authorities.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Foreign Affairs and Trade (DFAT)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
		07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	04/08/2015	To stakeholder	Follow-up email and phone-call on 4 August 2015.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	04/08/2015	From stakeholder	Email received on 4 August 2015 from the DOIS in which they relayed that they had no feedback to make related to the survey's EP. The DOIS provided the background and steps for the Special Prospecting Authority application that will need to be made to the National Offshore Petroleum Titles Administrator (NOPTA), as well as notification requirements for any work to be conducted within the Perth Treaty Area.	The DOIS provided the background and steps for the Special Prospecting Authority application that will need to be made to the National Offshore Petroleum Titles Administrator (NOPTA), as well as notification requirements for any work to be conducted within the Perth Treaty Area.	N/A - Advice / request for further information only. No objection or claim made.	Polarcus thanked the department for the information provided and confirmed that the supplied information has been taken into consideration for survey planning.
	Department of Industry, Innovation and Science (DoIIS)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	23/05/2017	Meeting / phone call	Phone call between Marie Illman and Laura Finch at DoIIS, Daniel Rex at NOPTA, Polarcus and ERM to clarify boundary of Perth Treaty Area and understand process of notification to Indonesia through DoIIS / DFAT. Meeting followed up with email summary of meeting to attendees.	Clarification of the correct boundary of the Perth Treaty area.	N/A - Advice / request for further information only. No objection or claim made. Information included in the EP.	Meeting followed up with email summary of meeting to attendees.
	Department of Industry, Innovation and Science (DoIIS)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	07/06/2017	From stakeholder	Email from Marie Illman at DoIIS acknowledging email with notes on meeting from 23/05/2017 and confirming the boundaries appeared correct.	Boundaries confirmed to be correct.	N/A - Advice / request for further information only. No objection or claim made.	
	Department of Industry, Innovation and Science (DoIIS)	13/07/2017	To stakeholder	Email sent to Marie illman and Emma Reid at DoIIS asking what the notification requirement is if line turns overlap the Perth Treaty area, but acquisition does not. Polarcus have a survey phase that may go very close to the boundary.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	14/07/2017	From stakeholder	Email sent from Rhyann Gardner informing ERM they have followed up with DFAT in Marie's absence.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	17/07/2017	To stakeholder	Email sent to Rhyann Gardner informing the Department, approximately 20 line changes would occur and a total of approximately 56 hours within the area (maximum 4.5 hours per single line change. A map was provided with the Acquisition Area within Commonwealth waters. Further discussion on the matter to be had between DoIIS, DFAT and Polarcus directly and no longer a matter under the EP.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	17/07/2017	From stakeholder	Rhyann Gardner acknowledging receipt of information provided by ERM and will pass it on to the DFAT.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Industry, Innovation and Science (DoIIS)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	05/08/2015	To stakeholder	Follow-up phone call on 5 August 2015 and spoke to Nigel. He is aware of the email as there has been some discussion regarding it in the office. However, he stated that their main concern would be for ships entering Australian international borders, not those that are already within the borders. He stated that he would follow up with the managers but did not see any potential concerns.	N/A	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	05/08/2015	From stakeholder	Email received from Nigel on 5 August stating that the Australian Border Force has no input to offer in relation to the survey.	No objection or input	N/A	Polarcus replied confirming that vessels for the Cygnus 3D MSS will comply with applicable Australian border protection requirements."
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	05/08/2015	To stakeholder	Polarcus replied confirming that vessels for the Cygnus 3D MSS will comply with applicable Australian border protection requirements."	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	06/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	27/10/2016	To stakeholder	Email sent 27/10/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 1st December 2016.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	16/11/2016	To stakeholder	Email sent 16/11/2016 from Glenn Werth (Polarcus) advising commencement of survey on or about 20th December 2016.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Immigration and Border Protection formerly the Australian Customs and Border Protection Service	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	National Native Title Tribunal	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	National Native Title Tribunal	05/08/2015	To stakeholder	Follow-up phone call on 5 August 2015 and spoke to receptionist. She mentioned that they have not received the email and requested for the email to be sent to another email address. She stated that she would respond to our email to say that they received it. Email was re-sent on 5 August 2015.	N/A	N/A	N/A
	National Native Title Tribunal	06/08/2015	From stakeholder	Email received on 6 August 2015 stating that the Survey Area is currently not subject to a native title application. The Survey Area does appear to fall within the Representative Aboriginal Torres Strait Islander Body Area of the Northern Land Council and the NNTT recommended that Polarcus seek their feedback on the proposed survey.	Survey Area is currently not subject to a native title application. The Survey Area does appear to fall within the Representative Aboriginal Torres Strait Islander Body Area of the Northern Land Council and the NNTT recommended that Polarcus seek their feedback on the proposed survey.	N/A - Advice / request for further information only. No objection or claim made.	Polarcus replied on 6 August 2015 confirming Survey Area overlaps with areas of the Northern Land Council and the Kimberley Land Council Aboriginal Corporation. The two parties were added to the stakeholder list and consultation began on 7 August 2015 (per below).
	National Native Title Tribunal	06/08/2015	To stakeholder	Polarcus replied on 6 August 2015 confirming Survey Area overlaps with areas of the Northern Land Council and the Kimberley Land Council Aboriginal Corporation. The two parties were added to the stakeholder list and consultation began on 7 August 2015 (per below).	N/A	N/A	N/A
	National Native Title Tribunal	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	National Native Title Tribunal	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	National Native Title Tribunal	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	National Native Title Tribunal	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Federal Member for Durack	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Federal Member for Durack	05/08/2015	To stakeholder	Follow-up call on 5 August 2015. Spoke to Dianne who will get Ms Price to respond to email.	N/A	N/A	N/A
	Federal Member for Durack	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Federal Member for Durack	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Federal Member for Durack	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Federal Member for Durack	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Federal Member for Durack	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A

	Federal Member for Durack	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Federal Member for Durack	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
State Government							
	Department of Environmental Regulation (DER)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	05/08/2015	To stakeholder	Follow-up call on 5 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	13/08/2015	To stakeholder	Follow-up phone made on 13 August 2015 with message left with Rowan Swan requesting call-back.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Environmental Regulation (DER)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	05/08/2015	From stakeholder	Email received on 5 August advising that significant populations of loggerhead turtles may also occur in Ashmore/Cartier and recommending that the survey timing also account for Loggerhead turtle peak nesting periods (if different to green and hawksbill turtles). DMP requested pre-start notifications confirming the start date(s) for the survey approximately one week prior to commencement and cessation notifications to inform DMP upon completion of acquisition (i.e. for the year).	Advised of presence of loggerhead turtles and suggested EP account for Loggerhead turtle peak nesting periods. DMP requested pre-start notifications confirming the start date(s) for the survey approximately one week prior to commencement and cessation notifications to inform DMP upon completion of acquisition (i.e. for the year).	Reasonable advice given regarding loggerhead turtles. Impacts to turtles and associated controls included in the EP. Requirement for notification to be included in the EP.	Polarcus replied via email on 17 August 2015. The reply included a detailed description of the sporadic nesting of loggerhead turtles in the region of the Survey Area. Polarcus has committed to not acquiring seismic data within a 30 km radius of Cartier Island during the peak nesting periods for green and hawksbill turtles (October to February, which coincides with the peak nesting period of the loggerhead turtle, i.e. December). Polarcus' commitment to not operate the seismic vessel from October to February within the identified BIAs is anticipated to reduce interaction with nesting marine turtles. Polarcus also included the various management measures proposed to be implemented to reduce the number of encounters with foraging turtles (including loggerhead turtles). Such controls include the 500 m exclusion zone from the 19 water depth contour, the 500 m shutdown zone for turtles and the speed restriction within 300 m of a turtle. It is therefore anticipated that the risk of significant impacts from the Cygnus 3D MSS to breeding and foraging marine turtles, including loggerhead turtles, is low.
	Department of Mines and Petroleum (DMP)	17/08/2015	To stakeholder	Polarcus replied via email on 17 August 2015. The reply included a detailed description of the sporadic nesting of loggerhead turtles in the region of the Survey Area. Polarcus has committed to not acquiring seismic data within a 30 km radius of Cartier Island during the peak nesting periods for green and hawksbill turtles (October to February, which coincides with the peak nesting period of the loggerhead turtle, i.e. December). Polarcus' commitment to not operate the seismic vessel from October to February within the identified BIAs is anticipated to reduce interaction with nesting marine turtles. Polarcus also included the various management measures proposed to be implemented to reduce the number of encounters with foraging turtles (including loggerhead turtles). Such controls include the 500 m exclusion zone from the 19 water depth contour, the 500 m shutdown zone for turtles and the speed restriction within 300 m of a turtle. It is therefore anticipated that the risk of significant impacts from the Cygnus 3D MSS to breeding and foraging marine turtles, is low.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	27/06/2017	From stakeholder	Email from Lisa Dumbrell acknowledging receipt of the information and confirming DMP does not require any further information at this stage. Please provide DMP with a pre-start notification confirming the start date of the proposed activity and a cessation notification to inform DMP upon completion of the activity. Please review DMP's Consultation Guidance for information pertaining to the reporting of incidents to DMP that could potentially impact on any land or water under State jurisdiction. DMP notes that this activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).	DMP requested pre-start notifications confirming the start date(s) for the survey approximately one week prior to commencement and cessation notifications to inform DMP upon completion of acquisition (i.e. for the year).	Requirement for notification included in the EP.	Email acknowledgment sent, confirming that notification and reporting requirements will be incorporated into the EP.
	Department of Mines and Petroleum (DMP)	17/07/2017	To stakeholder	Email acknowledgment sent, confirming that notification and reporting requirements will be incorporated into the EP.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Mines and Petroleum (DMP)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	05/08/2015	To stakeholder	Follow-up phone call on 5 August 2015. Spoke to Shaun Meredith and they are drafting a response to our email which should come through soon.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	10/08/2015	From stakeholder	Email with attached letter received from the DOF on 10 August 2015. The DOF noted the potential to affect fish populations and the operations of fishers who harvest these resources. It was recommended that the Western Australian Fishing Industry Council (WAFIC), Recfishwest, the Pearl Producers Association and individual licensed fishers be consulted. The DOF requested that a full range of mitigation strategies be implemented, including using the minimum required acoustic capacity to achieve its objectives. The DOF noted that Polarcus identified a number of commercial fisheries in their consultation package, but that the Marine Aquarium Managed Fishery, Beche de Mer Fishery and the Specimen Shell Managed Fishery were not included in that list. The DOF requested that any potential impact to charter, recreational and/or customary fishing is specifically identified in the EP. The DOF requested that Polarcus specifically include strategies in the EP to minimise the impacts of survey activities on fish spawning (e.g. soft starts, sound and exposure time minimisation). Alternately, it is preferable if seismic activities do not occur during the times of the year that key fish species listed in the letter that may be spawning within the Survey Area. The DOF requested that Polarcus demonstrate it has taken reasonable measures to minimise the chance biosecurity impacts and included recommendations for such.	- Potential impacts to fish populations and the operations of fishers. - Recommendation to consult with Western Australian Fishing Industry Council (WAFIC), Recfishwest, the Pearl Producers Association and individual licensed fishers be consulted. The DOF noted that Polarcus identified a number of commercial fisheries in their consultation package, but that the Marine Aquarium Managed Fishery, Beche de Mer Fishery and the Specimen Shell Managed Fishery were not included in that list. - The DOF requested that any potential impact to charter, recreational and/or customary fishing is specifically identified in the EP. - The DOF requested that Polarcus specifically include strategies in the EP to minimise the impacts of survey activities on fish spawning (e.g. minimum required acoustic capacity to achieve objectives, soft starts, sound and exposure time minimisation). - Preferable if seismic activities do not occur during the times of the year that key fish species listed in the letter that may be spawning within the Survey Area. - Take reasonable measures to minimise the chance biosecurity impacts.	- EP will consider impacts to fish and commercial fisheries - Recommended stakeholders have been contacted. Marine Aquarium Managed Fishery, Beche de Mer Fishery and the Specimen Shell Managed Fishery to be added to stakeholder contact list and sent information, although due to distance offshore, no impacts are expected to coastal fisheries. - Request for potential impacts to charter, recreational and/or customary fishing to be specifically identified in the EP is a generic response from DOF and not considered relevant to the Cygnus 3D MSS due to distance offshore. - Soft-start, minimum source capacity will be implemented as standard. Timing of surveys will consider timing of receptors and implement controls if necessary to reduce impacts to ALARP and acceptable levels. - Fish species listed by DOF spawn throughout the year. It is therefore not possible to avoid all spawning periods. Fish listed are understood to spawn over broad areas in the region, near coastal reefs, bays and estuaries in the vicinity of nursery habitat and significant spawning habitat is not expected offshore. No significant impacts expected. Prevous engagement with DOF has confirmed that DOF do not have defined spawning or aggregation areas for the species listed. - Biosecurity (IMS) risks to be assessed in the EP and controls implemented for biofouling and ballast water, in accordance with Australian requirmeents as a minimum.	A reply letter to DOF was sent on 13 August 2015. Polarcus confirmed that the majority of the fisheries listed in the DOF's letter (as well as relevant recreational and charter fishing stakeholders) have been included in the stakeholder consultation process. No concerns have been raised to date to Polarcus by fishery licence holders. The Marine Aquarium, Beche de Mer and the Specimen Shell Managed Fisheries have subsequently been added to the list of relevant stakeholders for the Cygnus 3D MSS. Copies of the information sheet were sent to the licence holders of these three fisheries on 11 August 2015. Due to low effort or location of the majority of commercial fishing activities away from the Survey Area, the Cygnus 3D MSS is not expected to interfere with most of the nine State managed commercial fisheries which operational zones overlap with the Survey Area. The letter included a description of the several management measures being proposed in the Cygnus 3D MSS EP so as to reduce the risk of potential impacts to fish and fishing operations to both ALARP and acceptable levels. Due to the location and environmental setting of the Survey Area, significant numbers of spawning adults are not expected to be encountered during the survey. Given the survey design and observed fish behaviour related to sound emissions, behavioural changes to fish are therefore expected to be localised and temporary, with fish (including those during spawning and pre-spawning periods) expected to rapidly return to normal behaviour once the seismic vessel has passed. A description was provided of the biofouling management measures for all vessels during the survey.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	13/08/2015	To stakeholder	A reply letter to DOF was sent on 13 August 2015. Polarcus confirmed that the majority of the fisheries listed in the DOF's letter (as well as relevant recreational and charter fishing stakeholders) have been included in the stakeholder consultation process. No concerns have been raised to date to Polarcus by fishery licence holders. The Marine Aquarium, Beche de Mer and the Specimen Shell Managed Fisheries have subsequently been added to the list of relevant stakeholders for the Cygnus 3D MSS. Copies of the information sheet were sent to the licence holders of these three fisheries on 11 August 2015. Due to low effort or location of the majority of commercial fishing activities away from the Survey Area, the Cygnus 3D MSS is not expected to interfere with most of the nine State managed commercial fisheries which operational zones overlap with the Survey Area. The letter included a description of the several management measures being proposed in the Cygnus 3D MSS EP so as to reduce the risk of potential impacts to fish and fishing operations to both ALARP and acceptable levels. Due to the location and environmental setting of the Survey Area, significant numbers of spawning adults are not expected to be encountered during the survey. Given the survey design and observed fish behaviour related to sound emissions, behavioural changes to fish are therefore expected to be localised and temporary, with fish (including those during spawning and pre-spawning periods) expected to rapidly return to normal behaviour once the seismic vessel has passed. A description was provided of the biofouling management measures for all vessels during the survey.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	20/08/2015	From stakeholder	Email received from DOF on 20 August 2015. The DOF thanked Polarcus for the response to their letter and requested that engagement with all relevant stakeholders of fisheries "not considered further in the EP" be maintained, in the event that a fisher commences operating in the proposed survey area.	Request that consultation with licence holders of fisheries "not considered further in the EP" be maintained, in the event that a fisher commences operating in the proposed survey area.	Recommended stakeholders have been contacted. Marine Aquarium Managed Fishery, Beche de Mer Fishery and the Specimen Shell Managed Fishery to be added to stakeholder contact list and sent information, although due to distance offshore, no impacts are expected to coastal fisheries.	Polarcus replied via email on 20 August 2015 confirming that the fisheries listed in the Polarcus response letter dated 13 August 2015 are being kept as relevant stakeholders for the Cygnus 3D MSS consultation process, including those with which interactions are considered low.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	20/08/2015	To stakeholder	Polarcus replied via email on 20 August 2015 confirming that the fisheries listed in the Polarcus response letter dated 13 August 2015 are being kept as relevant stakeholders for the Cygnus 3D MSS consultation process, including those with which interactions are considered low.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	06/04/2016	From stakeholder	Email response received 6/4/16 thanking ERM for the email update and requesting to be consulted closer to the expected start time, this will enable the Department to re-assess the fishing activity in the area and provide any other relevant information. Previous advice received from Fisheries was also attached.	Request to be informed nearer time of survey	Stakeholder to be kept informed	N/A

	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	19/10/2016	To stakeholder	Email update sent 19 October 2016 confirming that the survey had not yet commenced but may possibly commence in December 2016 or Q1 2017. Requested clarification on whether original advice was still current or if there is any new information.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	10/11/2016	From stakeholder	Email received from Carli Telfer 10 November 2016 advising that spawning periods should be reviewed given the change in survey timing, and advising that the Department's annual status report and other published literature be reviewed. Carli also advised that the Department would be undertaking a general risk assessment on the effects seismic surveys have on fish and invertebrates in December 2016.	Advised to review spawning periods due to DOF believing that survey timeframes had changed.	Survey timeframes have not changed. Cygnus 3D MSS has a multi-year EP. Spawning periods considered previously. Fish species listed by DOF spawn throughout the year. It is therefore not possible to avoid all spawning periods. Fish listed are understood to spawn over broad areas in the region, near coastal reefs, bays and estuaries in the vicinity of nursery habitat and significant spawning habitat is not expected offshore. No significant impacts expected.	ERM replied 29 November 2016 and clarified that the survey timing had not changed and the EP was originally accepted for a 2 year period. A summary of the risk assessment for impacts to fish and spawning was provided, and confirmation that the 2014/15 status of the fisheries report and the NDSF Management Plan and understood that stocks were sustainable. Requested update on DOF risk assessment when available.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	29/11/2016	To stakeholder	ERM replied 29 November 2016 and clarified that the survey timing had not changed and the EP was originally accepted for a 2 year period. A summary of the risk assessment for impacts to fish and spawning was provided, and confirmation that the 2014/15 status of the fisheries report and the NDSF Management Plan and understood that stocks were sustainable. Requested update on DOF risk assessment when available.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	06/12/2016	From stakeholder	Email reply from Carli Telfer on 6 December 2016 acknowledging email and confirmed that the Department's risk assessment on the effects seismic surveys on finfish and invertebrates is expected to feed into new guidance and policy, and they will try to send key documents from the workshop out for publication ASAP. Once published, Carli will let us know.	N/A	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	15/12/2016	To stakeholder	Email to Dr Newman following claim raised by Northern Wildcatch Seafoods Australia (NWSA) about goldband snapper and red emperor spawning, requesting information on timing and location of Goldband snapper and red emperor spawning, as well as clarification on status of stocks and spawning behaviours.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	20/12/2016	To stakeholder	Attempted call then email to ask for clarification about the status of goldband snapper and red emperor stocks and requested information about the locations, depths and timing of spawning.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	21/12/2016	To stakeholder	Email to Corey Wakefield in Dr Newman's absence, requesting information on goldband snapper and red emperor	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	31/01/2017	To stakeholder	Phone call and follow up summary email to Corey Wakefield clarifying some details and goldband snapper and red emperor. Spawning times show evidence of spawning between September and May, with possible peaks in December and March with some fluctuation in between, which differs from previous advice received from DoF. Stock is assessed as sustainable although the method of assessment means there is some uncertainty about whether spawning biomass is close to target level or threshold level.	Advised that goldband snapper spawning period is different from what is published in DOF guidance/advice. Spawning times show evidence of spawning between September and May.	Note that spawning period is more extended than previously understood. More information required and therefore follow-up with Dr Stephen Newman.	Follow up emails/phone calls to Dr Newman are proposed to obtain available information. Note that Dr Newman is on leave until early February.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	06/02/2016	To stakeholder	Email to Dr Newman (returning from annual leave), requesting call/email for further detail on spawning issues.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries	09/02/2017	To stakeholder	Attempted call and follow up email to Dr Newman	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	09/02/2017	From stakeholder	Email from Dr Newman supporting previous advice given by Corey Wakefield and clarifying that they may aggregate throughout their depth range, though spawning sites are not known.	Previous advice confirmed. No known specific spawning areas. Goldband snapper and red emperor expected to spawn throughout their range (~50-200m, denser between ~80-140m)	Potential impacts to spawning goldband snapper and red emperor to be assessed in EP given presence of suitable water dpeths in Survey Area. Goldband snapper to be key focus as stock assessment reports indicate separate biological stocks and therefore recruitment may not occur from as broad an area (regional) as other species. Assessment to consider May to September spawning period with December to March peak, plus avaialble spawning habitat in 50-200 m water depths with key habitat in 80-140 m.	Email to Dr Newman, thanking him for the information and clarifying if the new advice on spawning seasons supersedes previous advice received on spawning periods, and ask if they had similar information they could share on red emperor.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	09/02/2017	To stakeholder	Email to Dr Newman, thanking him for the information and clarifying if the new advice on spawning seasons supersedes previous advice received on spawning periods, and ask if they had similar information they could share on red emperor.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	N/A	N/A	N.B. Future correspondence with Dr Stephen Newman and Corey Wakefield to be Cc'd with email to DoF stakeholder contacts (Carli Telfer and Hans Kemps)	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	01/06/2017	To stakeholder	Update sent to Carli and Hans (Cc'ing Dr Newman and Corey Wakefiled) about the rescheduling of the previous survey phase and the intent to resubmit the EP for an extended area and timeframe. Also requested clarification on the correct goldband snapper and red emperor spawning periods and further information regarding the stock assessments and monitoring which may give us more insight into spawning levels and variability.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	19/06/2017	From stakeholder	Email from Hans Kemps requesting additional details regarding the proposed survey times, duration and equipment (where known), as well as results of any acoustic modelling if available.	Requests details rof proposed survey times, duration and equipment (where known)	Details to be provided.	Details to be provided.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	26/06/2017	From stakeholder	More comprehensive email from Hans Kemps requesting additional information on the survey, potential impacts and mitigation; and stating that the Department generally objects to seismic in water depths less than 50m, and seismic using array volume >2000 cui in water depths 50-100 m. Recommended that seismic companies support research and undertake validation monitoring of modelled sound exposure predictions. Hans will check with Dr Newman re goldband snapper and red emperor spawning, but advised reviewing available research on the DoF website.	Requests details rof proposed survey times, duration and equipment (where known). Department generally objects to seismic in water depths less than 50m, and seismic using array volume >2000 cui in water depths 50-100 m.	Details to be provided. Clarification needed from Department about their objections to particluar water depths and the basis of the objection.	Email to Hans Kemps 07/07/2017 acknowledging email and concerns raised, and requesting meeting the following week to talk through the issues.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	07/07/2017	To stakeholder	Email to Hans Kemps acknowledging email and concerns raised, and requesting meeting the following week to talk through the issues.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	12/07/2017	From stakeholder	Email from Hans proposing potential times for meeting.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	14/07/2017	To stakeholder	Email providing initial response and additional details to Hans from email dated 26 June 2017, prior to meeting in the afternoon. The following points were addressed: -Acquisition details (three-subarrays discharged alternatively in a 'flip-flop-flap' configuration, 3,090 cui, 2,000 psi, 112.5 m apart, towed at 15 m depth, every 12.5 m, every 5 seconds and travel at 4.5 knots) -Commencement - multiple phases up until December 2020 (10-12 months) Exact timing and location of each phase will vary depending on season retractions, industry demand and environmental sensitivities. -ERM have contacted AFMA, WAFIC, Recfishwest and individual license holders -Oil spill modelling and sound modelling will be conducted -Exclusion zone will be put in place around sensitive shallow areas (banks, shoals etc.)	N/A	N/A	N/A
	Department of Primary Industries and Regional Development (formerly WA Department of Fisheries (DOF))	14/07/2017	Meeting with stakeholder	Meeting with Hans Kemps. Hans provided an overview of the Department's recent ecological risk assessment for seismic involving industry. Shallow waters (<100m) are a concern to the Department. Key issues that the Department expect to be addressed include potential impacts to: o Fisheries activities – Hans explained that 'FishCUBE' would be launched in a few months, providing up to date catch data maps for each fishery. o Fish, including key life stages such as spawning, eggs and larvae – Hans flagged the recent McCauley et al (2017) publication in Nature about the potential impacts of seismic to Zooplankton o Mobile and sessile benthic invertebrates – Hans flagged concerns in relation to sessile epifauna and infauna and what the implications of lower trophic level impacts might be General discussion also had around scientific understanding of impacts and impact thresholds used in assessments. The stakeholder engagement process was clarified with Hans, noting that further assessment will be undertaken and the assessments could be provided to the Department for comment prior to submission to NOPSEMA.	Key issues that the Department expect to be addressed include potential impacts to: o Fisheries activities. o Fish, including key life stages such as spawning, eggs and larvae, noting recent McCauley et al (2017) publication in Nature about the potential impacts of seismic to Zooplankton o Mobile and sessile benthic invertebrates and what the implications of lower trophic level impacts might be	Impacts to fisheries activities, fish (including key life stages such as spawning, eggs and larvae, noting recent McCauley et al (2017)) and invertebrates will be assessed in the EP	Risk assessments will be provided to the Department prior to submission.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	14/07/2017	To stakeholder	Email sent to Hans Kemp regarding the key summary points that raised from the meeting/discussion. The keys points raised were: -the Department had undertaken a high level Ecological Risk Assessment (ECA) of the potential impacts of seismic surveys on fish and invertebrates. -The ECA has resulted in risk matrices indicating that the potential risk to receptors in water depths <50m, and in water depths <100m using >2,000 cui was severe. -ERM are aware of shallow water sensitivities within the Cygnus survey area, including banks and shoals -FishCube will be relaunched in a few month - providing up to date catch data maps for each fishery -DoF raised concerns around spawning, eggs and larvae, zooplankton, sessile epifauna and infauna -DoF developing a new guideline for the seismic industry based on the ECA - expected to come out in 2018. -Fact sheet did not provide sufficient information - to comment on the potential impacts -ERM will share further details on the outcome of the risk assessment and proposed control measures with the Department prior to submission.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	23/08/2017	To stakeholder	Email sent to Hans Kemp, at the DoF. ERM provided the Department with the draft risk assessment sections for the impacts to fish for the Cygnus and Zénaïde 3D MSS. A summary of the risk assessments for site-attached fish, other demersal and pelagic fish, fish spawning, plankton, eggs and larvae, commercial fisheries and cumulative impacts were also provided.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	30/08/2017	From stakeholder	Email received from the Department. The Department intends to provide ERM with comments/feedback on the information provided dated 23/08/2017. The Department was not able to provide a response to the comments, due to the timeframe. The department thinks a 4-week turn-around timeframe is reasonable.	Department requires more time to review and provide comment	Await feedback and incoporate into EP prior to submission if available in time.	Email sent to the Department 31/08/2017 acknowledging that the Department has not yet been able to review or provided a comment.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	31/08/2017	To stakeholder	Email sent to the Department acknowledging that the Department has not yet been able to review or provided a comment. Polarcus looks forward to receiving the Departments comments.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	01/09/2017	From stakeholder	Email received from the Department, acknowledging information received. The Department will respond formally with comments next week from email dated on 23/08/2017.	N/A	N/A	N/A

	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	07/09/2017	From stakeholder	Email received from the Department of Fisheries in response to ERM email dated 23/08/2017. The main points raised: -The fisheries normally expects a 4-6 week timeframe and the advice provided is current for 6 months. -The Cygnus 3D MSS has a high risk profile compared to Zénaïde. -The fisheries generally objects to strategic EPs with extended timeframes and poorly defined survey parameters. -The fisheries facilitated a qualitative assessment of risks posed by seismic surveys on finfish and invertebrates in December 2016 - the consensus risk levels agreed to on the day indicated that airgun arrays with the capacity between 2000 and 4500 cui pose a high or severe risk. - Impact estimates for injury, TTS and behavioural impacts to fish do not acknowlwedge damage to sensory hair cells in pink snapper after fish had been exposed to sound levels approximately 185 dB re 1µPa mean squared pressure (McCauley et al. 2003), which may be reached hundreds of meters from a seismic source. Similarly, damage to the hair cells lying on the sensory epithelia surrounding the sagittal otolith in goldband snapper were observed after exposure to a 3090 cui airgun array at ranges of 370 m, 2.1km and 58 km from the closest airgun pass with an exponentially increasing amount of hair cell damage with decreasing range (McCauley and Kent 2012). -With respect to benthic invertebrates the under representation of potential impacts I particularly evident in both Cygnus and Zénaïde. -The Department provided information on the potential effects to scallops and lobsters from seismic surveys. -The impact on fish spawning adopted by Polarcus on goldband snapper is to be appropriate but note that the result of this assessment are not directly transferable to other species. -Fisheries are concerned about the implications of the findings with respect to zooplankton reported by McCauley et al. (2017). -Cumulative impact assessments should include considerations of pressures from all relevant sources - WA fisheries is concerned about the potential in WA for adjacent surveys to be conducted within the sam season. -The fisheries noted that no monitoring has been proposed and that even sound source verification of acoustic modelling was only considered as a means for informing adaptive management around shoals.	-The fisheries normally expects a 4-6 week timeframe and the advice provided is current for 6 months. -The Cygnus 3D MSS has a high risk profile compared to Zénaïde. -The fisheries generally objects to strategic EPs with extended timeframes and poorly defined survey parameters. -The fisheries facilitated a qualitative assessment of risks posed by seismic surveys on finfish and invertebrates in December 2016 - the consensus risk levels agreed to on the day indicated that airgun arrays with the capacity between 2000 and 4500 cui pose a high or severe risk. - Impact estimates for injury, TTS and behavioural impacts to fish do not acknowlwedge damage to sensory hair cells in pink snapper after fish had been exposed to sound levels approximately 185 dB re 1µPa mean squared pressure (McCauley et al. 2003), which may be reached hundreds of meters from a seismic source. Similarly, damage to the hair cells lying on the sensory epithelia surrounding the sagittal otolith in goldband snapper were observed after exposure to a 3090 cui airgun array at ranges of 370 m, 2.1km and 58 km from the closest airgun pass with an exponentially increasing amount of hair cell damage with decreasing range (McCauley and Kent 2012). -With respect to benthic invertebrates the under representation of potential impacts I particularly evident in both Cygnus and Zénaïde. -The Department provided information on the potential effects to scallops and lobsters from seismic surveys. -The impact on fish spawning adopted by Polarcus on goldband snapper is to be appropriate but note that the result of this assessment are not directly transferable to other species. -Fisheries are concerned about the implications of the findings with respect to zooplankton reported by McCauley et al. (2017). -Cumulative impact assessments should include considerations of pressures from all relevant sources - WA fisheries is concerned about the potential in WA for adjacent surveys to be conducted within the sam season. -The fisheries noted that no monitoring has been proposed and that even sound source verification of acoustic modelling was only considered as a means for informing adaptive management around shoals.	-The risk assessment undertaken for the purposes of the EP is supported by site-specific and activity-specific modelling, and takes a broad range of recent published research into account. Therefore, the risk assessment and proposed control measures in the EP are considered to be robust and appropriate for reducing risks to ALARP and acceptable levels. We consider this more relevant to the location and activity than the high level generic assessment undertaken by DPIRD. - The experiment by McCauley et al. (2003): exact levels/distance at which such damage may have occurred in the caged fish is unknown since the airgun was towed repeatedly from a maximum distance of 800 m to a minimum distance of 5 m. Damage may have occurred at any point during this exposure period, or as a result of the cumulative exposure (Worcester 2006). It remains unclear if the damage found at 58 days was the result of the accumulation of many moderate to high level pulse energies over the short time frame (<3 hours) or due to the two most intense signals that occurred at the 5 m range. At 5 m range the maximum received level would have been approximately 210 dB SPLpk-pk. The caged fish exposures in the Jervoise Bay experiment used multiple short approach-departures rather than a single pass-by, as the experiments were designed to capture fish behaviour. Hence, the exposures in this case were not representative of a typical marine seismic survey. So, based on the findings of the McCauley et al. (2003) study it is not possible to conclude that "extensive damage to the sensory hair cells" occurred at received sound levels of ~185 dB re 1µPa rms. McCauley and Salgado Kent (2012) report observations of exponentially increasing amount of hair cell damage with decreasing range from the seismic pass or increasing cumulative sound exposure, although the authors point out that the sample size was low. The maximum received level at the test cages was 212 dB SPLpeak, based on the maximum received SEL of 187 dB re 1 µPa2.s reported in McCauley and Salgado Kent (2007). As pointed out by Carroll et al. (2017) the findings of studies based on exposure of caged fish to airgun noise should be treated with caution, as they are clearly not representative of the ecological parameters and exposure regime that would apply for a typical marine seismic survey and wild populations of fishes. Popper et al. (2014) took the findings of both McCauley et al. (2003) and McCauley and Salgado Kent (2012) into account when determining the sound exposure criteria in these guidelines. These criteria have been taken into account in the acoustic modelling and the EP. -The environmental risk assessment conducted for the Cygnus 3D MSS EP took into account the findings of the Day et al. (2016) study with respect to lobsters and scallops, and the findings of McCauley et al. (2017) and Richardson et al. (2017) studies concerning potential impacts to zooplankton. The risk is considered to be low and therefore the Departments concerns are considered to have been addressed. -As outlined in the EP, the focus of the assessment was primarily on goldband snapper due to the various stocks in the region being biologically distinct. Therefore, the goldband snapper spawning biomass was considered to be potentially more sensitive to disturbance. Red emperor (and other species) are considered less sensitive than goldband snapper, as genetic homogeneity between different regions and stocks across northern Australia is maintained by dispersal of eggs and larvae throughout their range. - It is not the purpose of cumulative impact assessment to assess the impact of all activities and other natural stressors in the region in addition to other seismic surveys. - Sound verification has is deemed impracticable - there are no reliable methods to assess received levels at seabed at such short ranges and deviation from predictions over such short ranges is unlikely. -Polarcus can confirm that the Zénaïde 3D MSS will not be acquired concurrently with the Cygnus 3D MSS acquisition and a minimum separation distance of 40 km shall be maintained between the Polarcus seismic source and another seismic source, although it is highly unlikely that two surveys would occur concurrently over the same area. Response has been considered but no changes are proposed to the EP. Current risk assessments and controls are deemed appropriate.	Response to be provided to stakeholder following detailed review of queires and information provided. Reponse to be provided prior to submission of the EP.
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	08/09/2017	To stakeholder	Email sent to Hans Kemp at the Fisheries, acknowledging the information received from the fisheries dated 07/09/2017.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	02/10/2017	To stakeholder	Email sent to Hans Kemp at the Fisheries, informing the Department the EP was not submitted for a number of reasons and Polarcus has decided to reduce the spatial and temporal boundaries of this EP to a more specific acquisition area and more refined timeframes. ERM informing the Department that a response to the email dated 07/09/2017 will be provided within the week.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	02/10/2017	From stakeholder	Email from the Department, acknowledging that the ERM will provide them with a response to the initial email and that the Department will update their advice based on the details they are presented.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	05/10/2017	To stakeholder	Email sent to the Department, with an updated image of the planned Acquisition/Operational Area for the EP. The email also addresses the points raised in the email dated 07/09/2017. The main points raised: -Polarcus has reduced the temporal and spatial scales of proposed acquisition under the Cygnus 3D MSS EP -The EP can no longer be regarded as a strategic EP as it incorporates a clearly defined Acquisition Area, valid over a period of 12 months. The revised Acquisition Area is also considerably smaller than the Survey Area proposed originally. -The risk assessment undertaken for the purposes of the EP is supported by site-specific and activity-specific modelling, and takes a broad range of recent published research into account. Therefore, the risk assessment and proposed control measures in the EP are considered to be robust and appropriate for reducing risks to ALARP and acceptable levels. - McCauley et al. (2003) and McCauley and Salgado Kent (2012) not considered representative. Popper et al. (2014) took the findings of both McCauley et al. (2003) and McCauley and Salgado Kent (2012) into account when determining the sound exposure criteria in these guidelines. These criteria have been taken into account in the acoustic modelling and the EP. -The risk assessment conducted for the Cygnus EP takes into account the findings of the Day et al. (2016) study on scallop and lobster fisheries, including the various sub-lethal effects observed in exposed animals. -As outlined in the EP, the focus of the assessment was primarily on goldband snapper due to the various stocks in the region being biologically distinct. Therefore, the goldband snapper spawning biomass was considered to be potentially more sensitive to disturbance. Red emperor (and other species) are considered less sensitive than goldband snapper, as genetic homogeneity between different regions and stocks across northern Australia is maintained by dispersal of eggs and larvae throughout their range. -The risk assessment conducted for the Cygnus EP takes into account the findings of the McCauley et al. (2017) and Richardson et al. (2017) studies on potential impacts to zooplankton, as well as the findings of a broader body of research. -It is not valid to apply the zooplankton mortality impact range observed in the McCauley et al. (2017) experiment to an effect range for 'similarly vulnerable invertebrate taxa associated with the seabed', particularly as the McCauley et al. (2017) paper provides no indication of the extent of the particle motion component of the sound field. -Polarcus can confirm that the Cygnus 3D MSS will not be acquired concurrently with the Zénaïde 3D MSS acquisition and a minimum separation distance of 40 km shall be maintained between the Polarcus seismic source and another seismic source, although it is highly unlikely that two surveys would occur concurrently over the same area. Response has been considered but no changes are proposed to the EP. Current risk assessments and controls are deemed appropriate.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	05/10/2017	From stakeholder	Email from the Hans Kemp acknowledging receipt of information and at this stage has no further comments. The Fisheries are pleased to see some significant changes to the MSS that go a considerable way in addressing their concerns.	No further comments. The Fisheries are pleased to see some significant changes to the MSS that go a considerable way in addressing their concerns.	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	05/10/2017	To stakeholder	Email sent to Hans Kemp acknowledging the quick response and suggesting another meeting at a later stage t discuss some of the ongoing issues. All emails sent have been forwarded to NOPSEMA.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	0610/2017	From stakeholder	Email sent from Hans Kemp, agreeing a follow up meeting at some stage would be a good idea. Hans suggested once the Department has finalised the guidance statement.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	23/10/2017	To stakeholder	Email sent to DPIRD asking for the status of Fish Cube as the information that can be provided from the program will be benificial. Currently, in order to communicate the location and timing of the Zenaide and Cygnus survey activities as effectively as possible, notifications to fishers and ongoing consultation are expected to include: • Notifications to be sent to licence holders and fishery stakeholders at least 4 weeks prior to the commencement of survey activities, including confirmation of the location and expected timing. • Option for licence holders to register for daily look-aheads that inform of the survey lines that are proposed for the following day. • Notification to be sent to stakeholders within 2 weeks of completion. • Notifications will also be sent if there are any significant modifications to the activity or schedule.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	24/10/2017	From stakeholder	Email sent from Hans Kemp informing ERM, that he will inform ERM once the program comes online. Hans said the program will be very useful as he has had a preliminary view of the program 2 months ago.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	24/10/2017	From stakeholder	Hans further emailed informing ERM, Fish Cube will be online from early 2018, however ERM can request data from the program by contacting DataRequest@fish.wa.gov.au. FishCube is currently only accessible from inside our firewall and the spatial resolution sometimes will be in blocks 60nm by 60nm to prevent the dissemination of confidential data External stakeholders can download a data request form (general) from the Fisheries website at: http://www.fish.wa.gov.au/Sustainability-and-Environment/Fisheries-Science/Stock-assessment-and-data-analysis/Pages/Making-a-data-request.aspx	Advising that Fish Cube data may soon be available	Data to be persued if available and considered in terms of potential impacts to fish catch and effort. To be reviewed as new information and integrated where appropriate during the life of the EP.	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	25/10/2017	To stakeholder	Email sent to stakeholder acknowledging receipt of information.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries) (DATA REQUEST - FISH CUBE DIVISION)	25/10/2017	To stakeholder	Emails sent to datarequest@fish.wa.gov.au (FISH CUBE) requesting information on Northern Demersal Scalefish, Mackeral, Northern shark, Kimberley Prawn, Pearl Oyster and Recreational charter boats.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	31/10/2017	To stakeholder	Phone call to Department to follow up on data request. Department are not aware of the data request service and recommended speaking to Hans Kemps again.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	31/10/2017	To stakeholder	Phone call to Hans Kemps to ask about the data request. He will follow up and let us know.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	31/10/2017	From stakeholder	Email from Hans Kemps to confirm he has spoken to Veronique Vanderklift who has led the development of Fish Cube and will get in touch today or tomorrow.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	31/10/2017	From stakeholder	Call from Veronique Vanderklift to confirm requirements. Fish Cube can be queried by month, but if only one vessel has fished in a block, data cannot be included as it is considered confidential. Fish Cube cannot be queried by quarter. Therefore, data is available for the whole calendar year. It was agreed that shapefiles could be provided for blocks by calendar year for NDSF, Kimberley Prawn and Mackerel fisheries. Data Use Agreement to be signed.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	01/11/2017	From stakeholder	Email from Veronique Vanderklift providing ERM with additional information on the termination date.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	02/11/2017	To stakeholder	Email sent to Veronique Vanderklift - attached the Data Use Agreement.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	07/11/2017	To stakeholder	Email sent to Hans Kemp, with a notice of commencement of Phase 3 (as early as 5 December 2017).	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Primary Industries and Regional Development - Fisheries Division (Formerly Department of Fisheries)	21/11/2017	To stakeholder	Email update to advise that Polarcus have taken further measures to reduce potential impacts to goldband snapper spawning. Phase 3 North is expected to go ahead, but Phase 3 South and the infill lines in the Phase 1 area will no longer occur during the peak goldband snapper season (December-March).	N/A	N/A	N/A

	Department of Transport (DOT) (Maritime Environmental Emergency Response)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	28/07/2015	From stakeholder	DOT replied on 28 July 2015 confirming receipt and intent to reply in a timely manner.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency	04/08/2015	To stakeholder	Follow-up email to secondary contacts sent on 4 August 2015.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	13/08/2015	To stakeholder	Follow-up phone call made to Matt Verney on 13 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	17/03/2016	From stakeholder	Marine Safety - Email response received 17/3/2016 thanking ERM for the email and advising that the email had been forwarded to the appropriate persons. No further email communications received.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	17/03/2016	From stakeholder	Marine Pollution - Email response received 17/3/16 thanking ERM for their email update. No further email communications received.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	08/06/2017	From stakeholder	Email acknowledging stakeholder information and confirming that the extended area and timeframes are understood. To be kept informed on scheduling of the next phase.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	20/10/2017	From stakeholder	Email sent from the Department acknowledging update to the MSS. DoT would like to be kept informed on when the next phase of activity is schedule to occur.	N/A	N/A	N/A
	Department of Transport (DOT) (Maritime Environmental Emergency Response)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	04/08/2015	To stakeholder	Follow-up phone call made on 4 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015 - message left for Sue Osborne requesting a call-back	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	17/08/2015	From stakeholder	Email received from DPAW on 17 August 2015 relaying that DPAW had reviewed the information sheet and they did not wish to make any further comments.	No comments of objection	N/A	N/A
	Department of Parks and Wildlife (DPAW)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	02/06/2017	From stakeholder	Additional advice requested on the minimum distances between air guns and Rowley Shoals Marine Park requested from Susan Osborne	Additional advice requested on the minimum distances between air guns and Rowley Shoals Marine Park	Reasonable request given proximity to State-managed Marine Parks and conservation values of the Rowley Shoals, however, distance is over 600 km and therefore no possibility of impacts.	Response to Susan Osborne on 02/06/2017 advising the Polarcus Cygnus 3D Marine Seismic Survey Area is 600 km from the boundary of the Rowley Shoals Marine Park. Given the distance from the activity, there are no predicted impacts from planned or unplanned activities.
	Department of Parks and Wildlife (DPAW)	13/06/2017	To stakeholder	Response to Susan Osborne advising the Polarcus Cygnus 3D Marine Seismic Survey Area is 600 km from the boundary of the Rowley Shoals Marine Park. Given the distance from the activity, there are no predicted impacts from planned or unplanned activities.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	26/06/2017	From stakeholder	Email from Susan Osborne confirming no further comments from DPAW	No further comments	N/A	N/A
	Department of Parks and Wildlife (DPAW)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	06/10/2017	From stakeholder	The Department called, to inform ERM to send all future emails to the follow email: embadmin@dbca.wa.gov.au to save emails being bounced around various people within the Department.	Request to update contact details	N/A	Phone call and voicemail on 31/10/2017 to confirm update to contact details
	Department of Parks and Wildlife (DPAW)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Department of Parks and Wildlife (DPAW)	31/10/2017	To stakeholder	Email sent from stakeholder informing ERM/Polarcus that all correspondence is to be directed to EMBAdmin@dbca.wa.gov.au and all other accounts are to be removed.	Request to update contact details	N/A	Phone call and voicemail on 31/10/2017 to confirm update to contact details
	Department of Parks and Wildlife (DPAW)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	05/08/2015	To stakeholder	Follow-up call made on 5 August 2015. Donna has forwarded the email on to the Marine Branch and they will respond.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	13/08/2015	To stakeholder	Follow-up phone call made on 13 August 2015 during which the Marine Branch manager relayed that they had no feedback to provide given the Survey Area is located outside of State waters. He also referred Polarcus to the EPA Advice for the Woodside Torosa Subsea Development: http://www.epa.wa.gov.au/News/Publicadvice/Documents/CMS14397-TorosaSubsea-s39A-160215.pdf The advice document provides details on the values of various atolls and shoals in the region. It was confirmed to OEPA during the call that benthic communities and habitat were being considered in the assessments of the Cygnus 3D MSS EP. OEPA had no further response to provide.	No comments or objection	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Office of the Environmental Protection Authority (OEPA)	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A

	Office of the Environmental Protection Authority (OEPA)	01/12/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Office of the Environmental Protection Authority (OEPA)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Member of Parliament for Kimberly	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Member of Parliament for Kimberly	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Member of Parliament for Kimberly	05/08/2015	To stakeholder	Follow-up phone call made on 5 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Member of Parliament for Kimberly	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015. A message has been left requesting a call back.	N/A	N/A	N/A
	Member of Parliament for Kimberly	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Member of Parliament for Kimberly	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Member of Parliament for Kimberly	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Member of Parliament for Kimberly	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Member of Parliament for Kimberly	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Member of Parliament for Kimberly	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Shire of Derby West Kimberley	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Shire of Derby West Kimberley	05/08/2015	To stakeholder	Follow-up phone call made on 5 August 2015. Email was circulated within the Shire as a notification. They have no response.	N/A	N/A	N/A
	Shire of Derby West Kimberley	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Shire of Derby West Kimberley	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Shire of Derby West Kimberley	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Shire of Derby West Kimberley	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Shire of Derby West Kimberley	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Shire of Derby West Kimberley	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	05/08/2015	To stakeholder	Follow-up phone call made on 5 August 2015. Lady that deals with consultation not in, left message requesting call-back.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015. A message has been left for Louis requesting a call back.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	16/03/2016	To stakeholder	Email update sent 16/3/16	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Shire of Wyndham East Kimberley	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Commercial Fisheries & Associations							
	North West Slope Trawl Fishery (Commonwealth) - AFMA	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	04/08/2015	To stakeholder	Follow-up phone call on 4 August 2015 during which it was relayed that general consultation letters for Commonwealth Commercial Fisheries related to seismic surveys should be submitted to petroleum@afma.gov.au	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	16/03/2016	To stakeholder	Email update sent 16/3/16.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	18/03/2016	To stakeholder	Resent to Paul Ryan 18/3/16 after first email undelivered.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	North West Slope Trawl Fishery (Commonwealth) - AFMA	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Western Tuna and Billfish Fishery (Commonwealth) - AFMA	As per North West	As per North West Slope	As per North West Slope Trawl Fishery above	N/A	N/A	N/A
	Western Skipjack Tuna Fishery (Commonwealth) - AFMA	As per North West	As per North West Slope	As per North West Slope Trawl Fishery above	N/A	N/A	N/A
	Southern Bluefin Tuna Fishery (Commonwealth) - AFMA	As per North West	As per North West Slope	As per North West Slope Trawl Fishery above	N/A	N/A	N/A
	Kimberley Prawn Managed Fishery (State) - All individual licence holders	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Kimberley Prawn Managed Fishery (State) - All individual licence holders	16/03/2016	To stakeholder	Letter sent 16/3/16.	N/A	N/A	N/A
	Kimberley Prawn Managed Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was	N/A	N/A	N/A
	Kimberley Prawn Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Kimberley Prawn Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Kimberley Prawn Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	West Coast Deep Sea Crustacean Managed Fishery (State) - All	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	West Coast Deep Sea Crustacean Managed Fishery (State) - All	16/03/2016	To stakeholder	Letter sent 16/3/16.	N/A	N/A	N/A
	West Coast Deep Sea Crustacean Managed Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was completed Tuesday 8th November 2016.	N/A	N/A	N/A
	West Coast Deep Sea Crustacean Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	West Coast Deep Sea Crustacean Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	West Coast Deep Sea Crustacean Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Northern Demersal Scalefish Fishery (State) - All individual licence holders	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Northern Demersal Scalefish Fishery (State) - All individual licence holders	16/03/2016	To stakeholder	Letter sent 16/3/16.	N/A	N/A	N/A
	Northern Demersal Scalefish Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was completed Tuesday 8th November 2016.	N/A	N/A	N/A
	Northern Demersal Scalefish Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Northern Demersal Scalefish Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Northern Demersal Scalefish Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A

	Old Brown Dog Fishing Co. (OBD) - Northern Demersal Scalefish Fishery	13/08/2015	From stakeholder	Email received on 13 August 2015 from Doug Gibson, Managing Director of Old Brown Dog Fishing Co. (OBD), which operates a vessel the FV Ashburton Road in the Northern Demersal Scalefish fishery. OBD takes issue with your assumption that fishing vessel operators will assume the burden of ceasing fishing activities in the event of an interaction. It is a policy position adopted by WAFIC that when an incoming proponent proposes a disruption to the activities of a pre-existing activity then the onus shall be on the incoming proponent to take steps to mitigate or compensate the disruption. It is an offence under the Fish Resources Management Act 1994, for any vessel other than a licensed fishing vessel to interfere with fishing gear.	OBD have an issue with having to cease fishing in the event of an interaction. It is a policy position adopted by WAFIC that when an incoming proponent proposes a disruption to the activities of a pre-existing activity then the onus shall be on the incoming proponent to take steps to mitigate or compensate the disruption. It is an offence under the Fish Resources Management Act 1994, for any vessel other than a licensed fishing vessel to interfere with fishing gear.	Objection acknowledged, however, planning and notification to stakeholders should allow adequate pre-planning for fishers. The ability to fish in other locations and meet catch quotas are not expected to be impacted and therefore compensation is not a reasonable option. Under COLREGS and marine orders, vessels should give way to a vessel restricted in her ability to manoeuvre (including an active seismic survey vessel). Position to be advised to stakeholder.	Polarcus replied via email on 17 August 2015. Polarcus acknowledged OBD's issue and WAFIC's policy regarding interactions between fishing vessels and other vessels. Polarcus described the various controls proposed to be implemented to reduce the risk of disruption or interrupting with other users of the area (including fishery operators) to both ALARP and acceptable levels. Polarcus confirmed that they will be complying with legislation relevant to the interaction between vessels, including the AMSA Marine Orders and Fish Resources Management Act 1994. It was noted that under Marine Order 30 Rule 18(c), a vessel engaged in fishing when underway shall, so far as possible, keep out of the way of a vessel restricted in her ability to manoeuvre (including an active seismic survey vessel).
	Old Brown Dog Fishing Co. (OBD) - Northern Demersal Scalefish Fishery	17/08/2015	To stakeholder	Polarcus replied via email on 17 August 2015. Polarcus acknowledged OBD's issue and WAFIC's policy regarding interactions between fishing vessels and other vessels. Polarcus described the various controls proposed to be implemented to reduce the risk of disruption or interrupting with other users of the area (including fishery operators) to both ALARP and acceptable levels. Polarcus confirmed that they will be complying with legislation relevant to the interaction between vessels, including the AMSA Marine Orders and Fish Resources Management Act 1994. It was noted that under Marine Order 30 Rule 18(c), a vessel engaged in fishing when underway shall, so far as possible, keep out of the way of a vessel restricted in her ability to manoeuvre (including an active seismic survey vessel).	N/A	N/A	N/A
	Old Brown Dog Fishing Co. (OBD) - Northern Demersal Scalefish Fishery	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Old Brown Dog Fishing Co. (OBD) - Northern Demersal Scalefish Fishery	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Old Brown Dog Fishing Co. (OBD) - Northern Demersal Scalefish Fishery	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A

	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	23/11/2016	From stakeholder	Email received from 'NWSA' on 23 November 2016. NWSA owns and operates 73% of the West Australian NDSF Fishery and claim ongoing seismic activity is having a detrimental impact on business. NWSA object to the survey as proposed and to it being conducted during the dates nominated on the basis that they do not believe the risks are reduced to ALARP. They refer to ample literature available establishing both physiological and behavioural effects of seismic on fin fish, and to WA Fisheries Publication No. 112 of 2013 which provides guidance on seismic surveys in WA waters, acknowledges the precautionary principle and the potential avoidance of areas by, or dispersal of, spawning aggregations as a consequence of seismic. NWSA have highlighted spawning Goldband Snapper (January to April) and Red Emperor (January, March and October) in particular as they are indicator species in our fishery. NWSA do not believe that conducting the seismic survey on prime fish grounds and bathymetry during the spawning season is consistent with the precautionary principle. They also highlight that the Department of Fisheries raised spawning as a potential issue 2015 and believe statements made in the EP in response are without foundation and wrong. NWSA also mentioned that the survey is in a high effort area in the NSDF fishery and will interfere with their activities.	NWSA have highlighted spawning Goldband Snapper (January to April) and Red Emperor (January, March and October) in particular as they are indicator species in our fishery. NWSA do not believe that conducting the seismic survey on prime fish grounds and bathymetry during the spawning season is consistent with the precautionary principle.	• The potential impacts to fish spawning, in particular red emperor and goldband snapper have been assessed based on the potential spatial overlap with the areas utilised by these stocks, the temporal overlap with the available spawning periods and peak spawning periods, and taking into account natural variability in spawning and recruitment. • Based on information received from the Department of Fisheries, we understand that red emperor and goldband snapper are broadcast multiple batch spawners that spawn throughout their range and release millions of eggs throughout their spawning periods. Red emperor spawn between October and March, with a peak in October, and occur in water depths up to 180 m. Polarcus has been advised by DoF that goldband snapper spawn between September and May with a peak spawning period between December and March. Red emperor stocks occur across northern Australia and biological connectivity and genetic homogeneity is maintained between the different stocks by dispersal of eggs and larvae throughout its range. Goldband snapper generally occur between 50 m and 200 m water depth, and are typically more concentrated between the 80 m and 140 m depth contours. Specific areas of aggregation are not known. Goldband snapper stocks, however, are found to be genetically distinct from other adjacent stocks (e.g. Pilbara, Broome, Timor Sea, Arafura Sea stocks), which has implications for stock recruitment if the spawning biomass is impacted. There is also currently some uncertainty about the status and sustainability of the stock. Therefore, goldband snapper is considered to be potentially more sensitive. • To estimate the largest area where spawning behaviour may be influenced by sound from the Cygnus 3D MSS, the most extensive impacts and ranges identified in the scientific literature for changes in fish behaviour, abundance and distribution were applied to the largest area of acquisition expected to overlap with the goldband snapper spawning depth and geographical range. • Complete avoidance of the peak goldband snapper spawning period was given careful consideration, but was not considered practicable. Polarcus is required contractually to acquire data in this region for one client before the end of March 2018 and it is therefore possible that some overlap may occur. However, recognising that there is some uncertainty about the status and sustainability of the stock, Polarcus has considered limiting the temporal overlap with the peak goldband snapper spawning period (December to March). Accounting for the spatial and temporal overlap, for Cygnus this equates to between <1% and 4.2% of the total suspected goldband snapper spawning area and peak spawning period; for Zenaide, this equates to between <2% and 3.4% of the goldband snapper spawning area and peak spawning period. • These percentages also assume that all spawning in the potential area of influence will cease completely for the duration of the survey, which is considered to be conservative given that no actual reduction in the total spawning biomass is expected to occur and, as the effects are expected to be behavioural it is possible that some of the affected schools of goldband snapper could aggregate and spawn further from the seismic source. • Given natural variability in spawning and recruitment rates, no significant impacts to goldband snapper spawning and recruitment are expected. • Given the connectivity of red emperor stocks, the impacts to red emperor spawning are predicted to be negligible.	Response, including copies of the risk assessments and a summary of the outcomes to be provided to stakeholder prior to submission of the EP.
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	24/11/2016	To stakeholder	ERM replied to NWSA via email on 24/11/2016 explaining that spawning had been considered but risk was expected to be low. Requested meeting / phone conversation to discuss further.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	25/11/2016	From stakeholder	Glenn Davis replied 25/11/2016 requesting further evidence to support the risk assessment.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	30/11/2016	To stakeholder	ERM replied to NWSA via email on 30/11/2016 with summary of references and information forming the basis of the assessment.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	01/12/2016	To stakeholder	ERM sent follow up email on 1st December requesting meeting/phone call early the following week. Glenn Davis responding requesting clarification of time zone.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	05/12/2016	To stakeholder	ERM attempted phone call with Glenn Davis at 10am Monday 5th December. Outlook Invitation was not acknowledged, but attempted calling anyway. No answer. Followed up with email to arrange an alternative time.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	09/12/2016	To stakeholder	ERM sent follow up request on 9th December. Glenn replied referring to an email that he sent on the 5th of December but which ERM did not receive.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	12/12/2016	To stakeholder	ERM emailed 12th December asking what time was convenient for Glenn to discuss. Call confirmed for 13th December.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	13/12/2016	To stakeholder	Telephone meeting held between Polarcus, ERM and Glenn Davis of the NWSA on 13 December 2016. Follow up correspondence between Glenn Davis and ERM provided the 2015 stock status report for Red emperor and Goldband snapper in the NDSF, and Glenn recommended speaking with Dr Stephen Newman, Principal Research Scientist, at the Department of Fisheries. He reemphasised his view that the survey should avoid the spawning periods. ERM and Polarcus to review information and attempt to speak with Dr Stephen Newman.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	23/12/2016	To stakeholder	ERM emailed 23rd December 2016 to confirm that it had not been possible to reach Dr Stephen Newman but would try again and will be in touch again in the new year.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	24/02/2017	To stakeholder	ERM emailed 24th February 2017 to confirm that information had been received from Dr Stephen Newman and colleagues, and that the survey had been postponed until further notice, but based on schedule we expect the survey phase will mostly avoid peak spawning periods.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	14/03/2017	From stakeholder	Glenn Davis emailed objecting to our advice that we expect the survey phase "will mostly avoid peak spawning periods." on the basis that it is not consistent with legislation and the requirements for ALARP, and repeat their orignal submissions of objections.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	15/3/2017	To stakeholder	ERM replied clarifying that the previous response had not been intended as a final response and decision on the matter but that it was still being looked into. A summary of the information provided by Dr Stephen Newman and Colleagues at DOF was also provided.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	28/4/2017	From stakeholder	Glenn Davis emailed asking if there is an update.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	28/4/2017	To stakeholder	ERM replied explaining that the survey phase is unlikely to go ahead until later in the year, and that Polarcus are considering reviewing the EP and resubmission to NOPSEMA			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	01/06/2017	To stakeholder	Update sent to Glenn Davis about the rescheduling of the previous survey phase and the intent to resubmit the EP for and extended area and timeframe. Also advised that we were seeking further advice and information from DoF to inform the assessment of impacts on spawning goldband snapper and red emperor.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	05/07/2017	From stakeholder	Email acknowledging the update and asking if the WA Department of Fisheries is involved in the risk assessment workshop? NWSA's previous submission remains unchanged.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	07/07/2017	To stakeholder	Email sent confirming that Polarcus is engaging with the Department of Fisheries and they have provided us with some initial comments and advice but still confirming the correct spawning months to take into account for goldband snapper and red emperor. The Department of Fisheries will not be directly involved in the workshop itself, but Polarcus will be taking on board their comments and information and will share the outcomes of the assessment with them and Glenn.			
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	23/08/2017	To stakeholder	Email sent to Glenn Davis. Glenn was provided the risk assessments for both the Cygnus and Zénaïde 3D MSS (species sensitivity, acoustic modelling, site-attached fish, other demersal and pelagic fish, fish spawning, plankton, eggs and larvae, commercial fisheries and cumulative impacts). A summary of the outcomes of the assessment of impacts to spawning was included, explaining that impacts would be minor based on the spatial and temporal overlap, but acquisition will be limited to a maximum of 70 days during the Dec-March period. Requested comments/feedback. ERM also requested additional information from Glen: 1) what information would be most useful to him (line start and end coordinates, timing etc.), How would he prefer to receive on the water updates/notifications (e.g. via email or text message) and at what frequency would be useful to receive these updates (i.e. 24 hrs, weekly, fortnightly).	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	27/09/2017	To stakeholder	Attempted phone call to Glenn Davis on Northern Wildcatch Seafood Australia office number. No answer. No option for voicemail/answer phone.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder that Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	23/10/2017	To stakeholder	Email sent to Glenn Davis to touch base regarding Cygnus and Zenaide EPs asking if he had any other information regarding the risk assessment that were supplied to him on 23/08/2017. ERM have suggested jumping on a call to talk over any issues. Currently, in order to communicate the location and timing of the Zénaïde and Cygnus survey activities as effectively as possible, notifications and ongoing consultation are expected to include: • Notifications to be sent to licence holders and fishery stakeholders at least 4 weeks prior to the commencement of survey activities, including confirmation of the location and expected timing. • Option for licence holders to register for daily look-ahead that inform of the survey lines that are proposed for the following day. • Notification to be sent to stakeholders upon completion of surveys. • Notifications will also be sent if there are any significant modifications to the activity or schedule. ERM requesting if there is anything more that NWSA thinks Polarcus needs to consider for the two EPs.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	27/10/2017	To stakeholder	Attempted phone call to Glenn Davis on Northern Wildcatch Seafood Australia office number. No answer. No option for voicemail/answer phone.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	31/10/2017	To stakeholder	Attempted phone call to Glenn Davis on Northern Wildcatch Seafood Australia office number. No answer. No option for voicemail/answer phone.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	01/11/2017	To stakeholder	Email sent to Glenn Davis -Explained had tried calling a couple of times and requested talking re information on the location and seasonality of his fishing activities.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	03/11/2017	To stakeholder	Attempted phone call to Glenn Davis on mobile number. No answer. Left voicemail asking to get in touch.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	07/11/2017	To stakeholder	Email sent to Glenn Davis, with a notice of commencement of Phase 3 as early as 5 December 2017.	N/A	N/A	N/A
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	14/11/2017	From stakeholder	NWSA do not agree on the following statement: "Fishers are requested to remove pots, traps, lines and other gear from the vicinity or the Phase 3 (north) area or acquisition during the survey to prevent damage or entanglement with the towed seismic array." NWSA have stated that daily look ahead reports and emails comms at sea are not guaranteed. NWSA requesting the name and contant number of the master of the seismic vessel and precise operational dates and plans.	- Disagrees with statement: "Fishers are requested to remove pots, traps, lines and other gear from the vicinity or the Phase 3 (north) area or acquisition during the survey to prevent damage or entanglement with the towed seismic array." - Daily lookahead reports offered may not be effective for fishers at sea as email access is not guaranteed. - NWSA requesting the name and contant number of the master of the seismic vessel and precise operational dates and plans.	- The request to remove gear was included in the notification so that all licence holders are aware that the seismic vessel will be towing equipment and there is the potential for entanglement and damage to fishing gear, which Polarcus are obviously aiming to avoid by providing as much notification as possible. The survey support vessel will also be checking ahead of the seismic vessel to spot gear. - Can provide the vessel contact details and confirm the exact commencement date during the week leading up to the survey. - Daily lookaheads can still be provided as expected to be of use to some. Radio communications on the water will also be used.	Email clarification provided 16/11/2017
	Northern Wildcatch Seafoods Australia (NWSA) - Northern Demersal Scalefish Fishery	16/11/2017	To stakeholder	- Polarcus can include you in the daily look-ahead emails if at all helpful, but is also able to provide the vessel contact details and confirm the exact commencement date during the week leading up to the survey.The request to remove gear was included in our notification so that all licence holders are aware that the seismic vessel will be towing equipment and there is the potential for entanglement and damage to fishing gear, which Polarcus are obviously aiming to avoid by providing as much notification as possible. The survey support vessel will also be checking ahead of the seismic vessel to spot gear and with on-the-water communication we trust we can work together and minimise interactions with your vessels and gear. - Asked if VHF radio was the most useful form of communication with vessels. - Confirmed that additional controls are now being integrated into the EP to further reduce impacts to spawning. Phase 3 North may occur in December to March, but 'Phase 3 South' and any additional lines in the other areas presented in the attached map (including in the vicinity of Vulcan Shoal) will no longer occur during the peak spawning period (between 1st December and 31st March).	N/A	N/A	N/A
	Northern Shark Fishery (State) - All individual licence holders	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Northern Shark Fishery (State) - All individual licence holders	16/3/2016	To stakeholder	Letter update sent 16/3/16.	N/A	N/A	N/A
	Northern Shark Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was completed Tuesday 8th November 2016.	N/A	N/A	N/A

	Northern Shark Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Northern Shark Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Northern Shark Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Mackerel Managed Fishery (State) - All individual licence holders	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Mackerel Managed Fishery (State) - All individual licence holders	16/3/2016	To stakeholder	Letter update sent 16/3/16.	N/A	N/A	N/A
	Mackerel Managed Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was	N/A	N/A	N/A
	Mackerel Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Mackerel Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Mackerel Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Pearl Oyster Managed Fishery (State) - All individual licence holders	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Pearl Oyster Managed Fishery (State) - All individual licence holders	16/3/2016	To stakeholder	Letter update sent 16/3/16.	N/A	N/A	N/A
	Pearl Oyster Managed Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was	N/A	N/A	N/A
	Pearl Oyster Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Pearl Oyster Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Pearl Oyster Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Marine Aquarium Managed Fishery (State) - All individual licence	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Marine Aquarium Managed Fishery (State) - All individual licence	16/3/2016	To stakeholder	Letter update sent 16/3/16.	N/A	N/A	N/A
	Marine Aquarium Managed Fishery (State) - All individual licence	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was	N/A	N/A	N/A
	Marine Aquarium Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Marine Aquarium Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Marine Aquarium Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Beche de Mer Fishery Managed Fishery (State) - All individual licence	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Beche de Mer Fishery Managed Fishery (State) - All individual licence	16/3/2016	To stakeholder	Letter update sent 16/3/16.	N/A	N/A	N/A
	Beche de Mer Fishery Managed Fishery (State) - All individual licence	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was	N/A	N/A	N/A
	Beche de Mer Fishery Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Beche de Mer Fishery Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Beche de Mer Fishery Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Specimen Shell Managed Fishery (State) - All individual licence holders	03/08/2015	To stakeholder	Information sheet and map mailed on 3 August 2015	N/A	N/A	N/A
	Specimen Shell Managed Fishery (State) - All individual licence holders	16/3/2016	To stakeholder	Letter update sent 16/3/16.	N/A	N/A	N/A
	Specimen Shell Managed Fishery (State) - All individual licence holders	05/11/2016	To stakeholder	Mail out of Letter dated 5th November 2016 communicating commencement of survey on or about the 1st December 2016 was	N/A	N/A	N/A
	Specimen Shell Managed Fishery (State) - All individual licence holders	02/06/2017	To stakeholder	Letter update sent. The letter advised that the previous survey phase did not go ahead and that Polarcus are resubmitting the EP to allow for acquisition up to the end of 2020. A factsheet with general information was included.	N/A	N/A	N/A
	Specimen Shell Managed Fishery (State) - All individual licence holders	27/10/2017	To stakeholder	Update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The letter also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Specimen Shell Managed Fishery (State) - All individual licence holders	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	04/08/2015	To stakeholder	Follow-up phone call on 4 August 2015 during which the CFA relayed that they have no response to provide besides advising to contact the relevant fisheries associations and operators directly.	No objection or claim	N/A	N/A
	Commonwealth Fisheries Association (CFA)	16/03/2016	To stakeholder	Email to CEO 16/3/16. Email address did not work; as such a message was sent to the CFA through their inquiry function on their website (18/3/16) - Awaiting a response.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	18/03/2016	To stakeholder	Email resent 18/3/16	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	23/03/2016	To stakeholder	Follow-up call made on 23/03/2016 asking for alternative email address to send the email. Was advised that the current address was full. Email resent 23/03/2016.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Commonwealth Fisheries Association (CFA)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	04/08/2015	To stakeholder	Follow-up phone call on 4 August 2015 during which WAFIC requested the information sheet to be resent to the reception email address. WAFIC will respond should they have any feedback to provide.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015 during which WAFIC relayed that they have passed the information sheet on to the relevant fishers in the area. They mentioned that if they received any feedback from the fishers they would relay that back to us. They however have no feedback to provide.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	01/06/2017	From stakeholder	Email received acknowledging receipt of email and factsheet, and clarifying contact details.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	06/07/2017	Meeting / phone call	Phone call to Mannie at WAFIC to clarify our approach to consultation and request a response if she has any comments.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	06/07/2017	To stakeholder	Email summarising prior call	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	14/07/2017	From stakeholder	Email from WAFIC acknowledging receipt on information provided in email on 1 June 2017. WAFIC noted the following points: -Seismic surveys in water depth less than 50 m is unacceptable -Water depths of 10 - 500 m is prime range for commercial fishing -The EP needs to address the cumulative impacts of multiple seismic surveys conducted over the same broad site. -WAFIC requests that ERM provide WAFIC with a seismic history of the area from the past 5 years -ERM need to address the impact of seismic on plankton -ERM need to demonstrate how they plan to avoid key indicator species spawning and aggregations. -WAFIC requests ERM provide stakeholders (license holders) with clear and succinct information. WAFIC believe the map provided to stakeholders is not clear and to small. -WAFIC has informed ERM of the fisheries located in the proximity of the survey (Pearl Oyster Managed Fishery Zone 1, Northern Demersal Scalefish, Joint Authority Shark, North West Slope Trawl and Western Tuna & Billfish.	-Seismic surveys in water depth less than 50 m is unacceptable -Water depths of 10 - 500 m is prime range for commercial fishing -The EP needs to address the cumulative impacts of multiple seismic surveys conducted over the same broad site. -WAFIC requests that ERM provide WAFIC with a seismic history of the area from the past 5 years -ERM need to address the impact of seismic on plankton -ERM need to demonstrate how they plan to avoid key indicator species spawning and aggregations. -WAFIC requests ERM provide stakeholders (license holders) with clear and succinct information. WAFIC believe the map provided to stakeholders is not clear and to small. -WAFIC has informed ERM of the fisheries located in the proximity of the survey (Pearl Oyster Managed Fishery Zone 1, Northern Demersal Scalefish, Joint Authority Shark, North West Slope Trawl and Western Tuna & Billfish.	-WAFICs concerns will be fed into the EP, regarding potential impacts to the fishing industry into the assessment (spawning, aggregation and impacts to indicator species). -Cumulative impact assessment is not a typically retrospective analysis, instead it is a forward looking assessment to understand the potential impacts that may occur as a result of several surveys. It is important to note that although a range of EPs for potential seismic surveys may be submitted to the regulator, not all of them are actually proceed. -ERM are aware of recent research regarding potential impacts to zooplankton, and will ensure the findings of the research are capture in the EP. -ERM have consulted with a number of individual license holders or the State managed fisheries, the DoF, the PPA and AFMA. -ERM are happy to provide a copy of the EP summary when it becomes available (this will include details conversations with all relevant stakeholders). -ERM would like WAFIC input into an example of a preferred map style for the stakeholder factsheet.	Email sent to WAFIC 27/07/2017 with a response to email date 14 July 2017. ERM responded with the following points: -WAFICs concerns will be fed into the EP, regarding potential impacts to the fishing industry into the assessment (spawning, aggregation and impacts to indicator species). -Cumulative impact assessment is not a typically retrospective analysis, instead it is a forward looking assessment to understand the potential impacts that may occur as a result of several surveys. It is important to note that although a range of EPs for potential seismic surveys may be submitted to the regulator, not all of them are actually proceed. -ERM are aware of recent research regarding potential impacts to zooplankton, and will ensure the findings of the research are capture in the EP. -ERM have consulted with a number of individual license holders or the State managed fisheries, the DoF, the PPA and AFMA. -ERM are happy to provide a copy of the EP summary when it becomes available (this will include details conversations with all relevant stakeholders). -ERM would like WAFIC input into an example of a preferred map style for the stakeholder factsheet.
	Western Australian Fishing Industry Council (WAFIC)	27/07/2017	To stakeholder	Email sent to WAFIC with a response to email date 14 July 2017. ERM responded with the following points: -WAFICs concerns will be fed into the EP, regarding potential impacts to the fishing industry into the assessment (spawning, aggregation and impacts to indicator species). -Cumulative impact assessment is not a typically retrospective analysis, instead it is a forward looking assessment to understand the potential impacts that may occur as a result of several surveys. It is important to note that although a range of EPs for potential seismic surveys may be submitted to the regulator, not all of them are actually proceed. -ERM are aware of recent research regarding potential impacts to zooplankton, and will ensure the findings of the research are capture in the EP. -ERM have consulted with a number of individual license holders or the State managed fisheries, the DoF, the PPA and AFMA. -ERM are happy to provide a copy of the EP summary when it becomes available (this will include details conversations with all relevant stakeholders). -ERM would like WAFIC input into an example of a preferred map style for the stakeholder factsheet.	N/A	N/A	N/A

	Western Australian Fishing Industry Council (WAFIC)	27/07/2017	From stakeholder	Email received from WAFIC with a response to email dated 27/07/2017. WAFIC noted the following points/concerns: -The proposed survey in on the outer limits of many fisheries so you will not be contending with a large number of vessels but it is prime fishing/spawning/aggregation for the larger vessels. -Ongoing concern expressed by the broader community is the cumulative impacts of seismic activity (i.e. past history) -Cygnus and Zénaïde surveys overlap by time and location (WAFIC estimate 1/3 overlaps) -WAFIC requests to be provided a map with both the Zénaïde and Cygnus survey areas. Two surveys in similar regions is a multiplied impact to the commercial fishing sector. -WAFIC request that ERM provide a seismic history of this area for the past 5 years (2D, 3D and 4D) -Research shows that seismic surveys kill plankton - a significant and important component of the food chain. How does Polarcus plan to address this environmental issue. -WAFIC believe their queries in email 14 July have not been addressed.	-The proposed survey in on the outer limits of many fisheries so you will not be contending with a large number of vessels but it is prime fishing/spawning/aggregation for the larger vessels. -Ongoing concern expressed by the broader community is the cumulative impacts of seismic activity (i.e. past history) -Cygnus and Zénaïde surveys overlap by time and location (WAFIC estimate 1/3 overlaps) -WAFIC requests to be provided a map with both the Zénaïde and Cygnus survey areas. Two surveys in similar regions is a multiplied impact to the commercial fishing sector. -WAFIC request that ERM provide a seismic history of this area for the past 5 years (2D, 3D and 4D) -Research shows that seismic surveys kill plankton - a significant and important component of the food chain. How does Polarcus plan to address this environmental issue. -WAFIC believe their queries in email 14 July have not been addressed.	- Polarcus recognises that there are sensitive shallow areas within the Survey Area (banks and shoals) that can rise from depth to less that 30 m. Seismic acquisition will take place in deeper waters and not enter these shallower areas. - Ensuring good communication and advanced notice of when phases of survey will occur to minimise interactions with fishers and this will be addressed in the EP -The EP will address cumulative impacts and include measures to prevent overlap with any other survey. -Research provided by WAFIC on lobsters, zooplankton and scallops will be taken into account when assessing these impacts -ERM confirm that we have engaged with all the fisheries you list since the commencement of the Cygnus 3D MSS EP process in 2015 -The maps we provided in the factsheets attached to our emails were A3 and had all features labelled -The Zénaïde and Cygnus surveys are over 110 km from Acquisition Area to Acquisition Area	Email sent to WAFIC 04/08/2017 with a response to emails dated 14 July and 27 July 2017. ERM responded with the following points: -Polarcus recognises that there are sensitive shallow areas within the Survey Area (banks and shoals) that can rise from depth to less that 30 m. Seismic acquisition will take place in deeper waters and not enter these shallower areas. - Ensuring good communication and advanced notice of when phases of survey will occur to minimise interactions with fishers and this will be addressed in the EP -The EP will address cumulative impacts and include measures to prevent overlap with any other survey. -Research provided by WAFIC on lobsters, zooplankton and scallops will be taken into account when assessing these impacts -ERM confirm that we have engaged with all the fisheries you list since the commencement of the Cygnus 3D MSS EP process in 2015 -The maps we provided in the factsheets attached to our emails were A3 and had all features labelled -ERM provided WAFIC with a map of Zénaïde and Cygnus. The Zénaïde Operational Area has been reduced slightly from the maximum acquisition scenario that was depicted in the stakeholder factsheet. This is due to a small area in the NW part of Zénaïde being dropped due to lack of industry interest so Polarcus has reduced the potential footprint -The distance between the surveys is over 110 km from Acquisition Area to Acquisition Area.
	Western Australian Fishing Industry Council (WAFIC)	01/08/2017 - 04/08/2017	N/A	Email correspondence in relation to Zénaïde and Cygnus in person meeting: -01/08/2017 - Email sent from WAFIC to ERM suggested catching up in person to discuss the concerns/queries WAFIC has with the proposed activities, if possible. -02/08/2017 - Email sent from ERM to WAFIC, a discussion in person will be hard to find time and to organise and suggests a phone conversation at a specified time will be more efficient. -03/08/2017 - Email from WAFIC to ERM suggesting to meet with WAFIC and a commercial fisher (potentially from a Northern Demersal Scalefish operator with fishing activities that cross-over both Polarcus Eps) at WAFIC in Fremantle. -03/08/2017 - Email sent to WAFIC from ERM , agreeing to meet face to face in Fremantle at WAFIC on Monday (7/08/2017) afternoon (Sabrina, Joe and a representative from Polarcus will be attending the meeting). Additional information will be supplied by email in coming days. -04/08/2017 - Email sent to WAFIC from ERM, touching base on the meeting in Fremantle. -04/08/2017 - Email from WAFIC to ERM informing ERM they have contacted Doug Gibson, who is very reluctant to make himself available. WAFIC requests that Glenn's (NWSA) queries are to be addressed before the in person meeting. WAFIC would also like the queries from the Mackerel fishery to be addressed by Polarcus prior to meeting in person. The overlap of Cygnus and Zénaïde also need to be addressed.	Series of emails to arrange call/meeting	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	04/08/2017	To stakeholder	Email sent to WAFIC with a response to email dated 14 July and 27 July 2017. ERM responded with the following points: -Polarcus recognises that there are sensitive shallow areas within the Survey Area (banks and shoals) that can rise from depth to less that 30 m. Seismic acquisition will take place in deeper waters and not enter these shallower areas. - Ensuring good communication and advanced notice of when phases of survey will occur to minimise interactions with fishers and this will be addressed in the EP -The EP will address cumulative impacts and include measures to prevent overlap with any other survey. -Research provided by WAFIC on lobsters, zooplankton and scallops will be taken into account when assessing these impacts -ERM confirm that we have engaged with all the fisheries you list since the commencement of the Cygnus 3D MSS EP process in 2015 -The maps we provided in the factsheets attached to our emails were A3 and had all features labelled -ERM provided WAFIC with a map of Zénaïde and Cygnus. The Zénaïde Operational Area has been reduced slightly from the maximum acquisition scenario that was depicted in the stakeholder factsheet. This is due to a small area in the NW part of Zénaïde being dropped due to lack of industry interest so Polarcus has reduced the potential footprint -The distance between the surveys is over 110 km from Acquisition Area to Acquisition Area.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	8/08/2017 - 14/08/2017	N/A	Email correspondence in relation to Zénaïde and Cygnus in person meeting: -08/08/2017 - WAFIC requesting a face to face meeting -09/08/2017 - Email sent to WAFIC, discussing times to catch up for a face to face meeting. -10/08/2017 - Email sent from WAFIC, discussing times to meet. -10/08/2017 - Email sent to WAFIC, discussing times to meet. Glenn Wrath Polarcus Regional Operations Manager located in Singapore will join for the call. -14/08/2017 - Email sent from WAFIC, agreeing to a time to meet for a face to face meeting (Tuesday 15/08/2017 at 9am at WAFIC in Fremantle). -14/08/2017 - Email sent to WAFIC, requesting a number that Glenn from Polarcus can call to be transferred into the meeting. -14/08/2017 - Email sent from WAFIC informing Polarcus and ERM to call reception for Polarcus representatives to be transferred into the board room. -14/08/2017 - Email sent to WAFIC, thanking for instructions on how to be transferred into the board room.	Further email corresondence to arrange call/meeting	N/A	
	Western Australian Fishing Industry Council (WAFIC)	15/08/2017	Meeting / phone call	In person meeting at WAFIC in Fremantle. Sabrina, Glenn and Joe attended, Mannie from WAFIC attended. Discussion generally focussed on concerns that the overall fishing industry had about seismic and the NOPSEMA stakeholder process, including stakeholder fatigue and need for clearer information. Polarcus suggested that daily lookaheads could be provided. WAFIC agreed these may be useful. Polarcus offered to provide an example for feedback on what information would be useful to fishers. - Fishers believe that seismic scares off fish and they do not return. - Discussion regarding impacts to spawning and plankton included Polarcus' initial assessment which indicates limited spatial and temporal overlap, and low impact in the context of natural variability. - McCauley et al research on zooplankton has a number of limitations, but Polarcus has factored the research into the assessment. Again, in the context of natural variability, the impacts are considered to be small. Recruitment is not expected to be impacted due to broadscale of spawning and recruitment from waters across the region. Food source impacts also limited due to plankton from non-impacted areas and plankton remain in water column or are scavenged from bottom. - WAFIC again requested cumualtive impacts are considered and include past 5 years of surveys. Polarcus and ERM agreed to include. - Copies of draft risk assessment to be provided to WAFIC prior to submission of the EP to NOPSEMA.	- Stakeholder fatigue is an issue - Ongoing consultation is important - Perception that fish scared by seismic and do not return / recover - Concerns regarding impacts to spawning aggregations - Concerns regarding impacts to plankton/eggs/larvae - McCauley research to be included in risk assessment - Cumulative impact assessment to include past 5 years surveys - Agreed to receive copies of draft assessment	- Stakeholder fatigue acknowledged as issue. Ongoing consultation will be provided to notify fishers of surevy when confirmed - Daily lookaheads to be provided to stakeholders during the survey and to be included as control in EP. - Impacts to spawning will be addressed in EP but provisional findings indicate low risk - Impacts to plankton will be addressed in the EP including recent research, but preliminary assessment findings indicate limited impacts in conext of natural variability and limited flow onto recruitment or food. - Past 5 years surveys to be considered in cumulative impact assessment as requested by stakeholder. - Copies of risk assessments to be provided.	Copies of the draft risk assessments, addressing all of the issues raised to be provided to WAFIC prior to submission, along with summary of assessment outcomes and proposed control measures.
	Western Australian Fishing Industry Council (WAFIC)	23/08/2017	To stakeholder	Email sent to Mannie, at WAFIC. ERM provided WAFIC with the draft risk assessment sections for the impacts to fish for the Zénaïde and Cygnus 3D MSS. A summary of the Zénaïde and Cygnus 3D MSS risk assessments for fish were also provided. ERM also acknowledging and taking on board comments on cumulative impacts.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	30/08/2017	From stakeholder	Email received from WAFIC, providing comments from email date 23/08/2017. WAFIC acknowledges the EP will be submitted this Friday 1st September. The main points/concerns raised: -WAFIC does not support multi-year seismic environmental plans -WAFIC expectation that Polarcus will reengage with fishers after approval of the EP - Fish apparently do not return after seismic. Still have concerns -WAFIC are concerned of the impact of seismic activity on spawning (cumulative impacts/previous impacts) -WAFIC would like Polarcus to note there is an impact from the loss of zooplankton, however as a standalone impact it might not be significant, coupled with all other activities, the cumulative impact is real. Food source is impacted. -WAFIC is concerned if a vessel becomes available at short notice and a competitive price, WAFIC believe the good intentions of the EP will be sidelined. -WAFIC noted Western Australian commercial fishers have been significantly commercially compromised with zero financial compensation.	-WAFIC does not support multi-year seismic environmental plans -WAFIC expectation that Polarcus will reengage with fishers after approval of the EP - Fish apparently do not return after seismic. Still have concerns -WAFIC are concerned of the impact of seismic activity on spawning (cumulative impacts/previous impacts) -WAFIC would like Polarcus to note there is an impact from the loss of zooplankton, however as a standalone impact it might not be significant, coupled with all other activities, the cumulative impact is real. Food source is impacted. -WAFIC is concerned if a vessel becomes available at short notice and a competitive price, WAFIC believe the good intentions of the EP will be sidelined. -WAFIC noted Western Australian commercial fishers have been significantly commercially compromised with zero financial compensation.	- Ongoing consultation will be provided to notify fishers of surevy when confirmed - Concern that fish do not return has no merit. No reason for this and comprehensive review of research shows that fish abundance returns to normal within days after survey - Spawning impacts have been comprehensively researched. It is acknowledged that WAFIC still have concerns but assessment is through and controls have been included to limit number of days temporal overlap. - Concern that the EP will ignored has no merit. Polarcus must comply with the EP and controls and performance standards	Email to be provided to confirm that ongoing consultation will be undertaken and notifications provided and to highlight scientific research underpinning our assessments and selsction of control measures.
	Western Australian Fishing Industry Council (WAFIC)	31/08/2017	To stakeholder	Email sent to WAFIC, acknowledging receipt of email and included a response to the comments raised by WAFIC. The main points: -The defined controls defined in the EP have performance standards set to each and therefore will need to comply with all controls. -The risk assessment sections in the EP are based on comprehensive reviews of the available scientific literature. -Polarcus will provide a notification to fisheries stakeholders, confirming locations and intended timings, prior to commencement. -Stakeholder engagement will continue to be ongoing throughout the life of the EP.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP. ERM asking WAFIC if they have had any feedback regarding the look-ahead notification by Polarcus?		N/A	
	Western Australian Fishing Industry Council (WAFIC)	18/10/2017	From stakeholder	Email sent from WAFIC in relation to the update to the Cygnus EP sent on 05/10/2017. WAFCI still believe despite all consultation the final outcome is still 'coming through ready or not'. WAFIC has not received any feedback regarding the proposed look-ahead notifications. WAFIC have some additional questions in regards to the look-ahead notifications: 1) Will the vessel make strategic changes to it's acquisition survey if a fisher are actively fishing in this areas and (2) if fishers express concern that this may a key spawning period? WAFIC have expressed concern and estimate the approxiamte combined total of activie seismic work between the phases (1,2,3) will equal approx 20% of 2018. WAFIC requests to be advised on Palarcus' plan/streategy if / when seismic acquisition overlaps and impacts commercial fishing (loss of time, lack of access to key fishing grounds, potential increased fuel and other costs, fish dispersment etc) and when the survey vessel timings overlap key fish spawning times.	N/A	N/A	N/A

	Western Australian Fishing Industry Council (WAFIC)	23/10/2017	To stakeholder	Email sent to WAFIC regarding the Cyngus EP, asking if there is any other information regarding the location and timing of fishing that Polarcus have not considered or are currently not aware of. ERM requesting to have a call or meeting this week if possible. Polarcus will mail notifications to licence holders at least 4 weeks prior to the commencement of survey activities and licence holders will be able to register for the daily look-ahead so they can understand specifically where the survey vessel is expected to be, progress, etc. Polarcus will also notify stakeholders once the survey is complete.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	23/10/2017	From stakeholder	Email from Mannie at WAFIC, informing ERM that she will be unavailable to meet this week and will be on holiday for 5 weeks from 25/10/2017. WAFIC have forwarded emails to key operators in the Polarcus survey region, asking them to directly respond to ERM.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	23/10/2017	To stakeholder	Email sent to WAFIC, acknowledging that Mannie will be away and informing WAFIC that Glen Davis from NWSA will be contacted for any further feedback.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Western Australian Fishing Industry Council (WAFIC)	21/11/2017	To stakeholder	Email update to advise that Polarcus have taken further measures to reduce potential impacts to goldband snapper spawning. Phase 3 North is expected to go ahead, but Phase 3 South and the infill lines in the Phase 1 area will no longer occur during the peak goldband snapper season (December-March).	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	04/08/2015	To stakeholder	Follow-up phone on 4 August 2015 during which ASBTIA relayed that they had no feedback to provide given the Survey Area is located outside of the known southern blue fin tuna spawning ground.	No feedback to provide given the Survey Area is located outside of the known southern blue fin tuna spawning ground.	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Australian Southern Bluefin Tuna Industry Association	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Australian Southern Bluefin Tuna Industry Association	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	05/08/2015	To stakeholder	Follow-up call on 5 August 2015 and spoke to Graeme. Graeme stated that he does not foresee any issues for anyone within the area except for maybe Westmore Seafoods, Australia Bay Seafoods or the North West Slope Trawl Fisheries. ACPF had no response other than to check with those potential stakeholders. Australia Bay Seafoods operate outside of the Survey Area in the Northern Territory and Gulf of Carpentaria and are thus not considered to be a relevant stakeholder. The North West Slope Trawl Fisheries were confirmed to be included in the Cygnus 3D MSS stakeholder consultation process. Westmore Seafoods was added to the stakeholder list per below.	No objection or claim	N/A - Advice / request for further information only. No objection or claim made.	N/A
	Australian Council of Prawn Fisheries	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Australian Council of Prawn Fisheries	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	04/08/2015	To stakeholder	Follow-up phone on 4 August 2015 during which AFTA relayed that the information sheet had been forwarded to their CEO and should they wish to provide a response they will do so.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	14/08/2015	To stakeholder	Follow up call made on 14 August 2015 during which a message was left requesting a call back.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Australian Fishing Trade Association (AFTA)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	05/08/2015	To stakeholder	Follow-up phone call made on 5 August 2015 during which it was discussed that due to the Survey Area location, interference with the Pearl Oyster Managed Fishery and impacts from sound emissions from the seismic survey on pearl oysters are not expected. The PPA made a query regarding the potential impacts of seismic sound resulting from the Cygnus 3D MSS on food sources for pearl oysters within the Survey Area, and associated effects on the fishery's pearl oysters.	Query regarding potentil impacts to food source of oysters (phytoplankton)	Phytoplankton is not known to be affected by seismic sound emissions. Even if phytoplankton were conservatively assumed to be affected by seismic sound emissions as zooplankton can be, information was provided to demonstrate that the proportion of plankton affected by sound from the seismic source at distances sufficient to cause physiological effects (5 - 6 m) would tube extremely small in comparison to the overall population in the Survey Area. Thus, impacts to feeding pearl oysters (including those commercially cultured along the Kimberley coastline) are not expected.	Polarcus replied via email on 13 August 2015 describing how according to scientific literature, phytoplankton is not known to be affected by seismic sound emissions. Even if phytoplankton were conservatively assumed to be affected by seismic sound emissions as zooplankton can be, information was provided to demonstrate that the proportion of plankton affected by sound from the seismic source at distances sufficient to cause physiological effects (5 - 6 m) would tube extremely small in comparison to the overall population in the Survey Area. Thus, impacts to feeding pearl oysters (including those commercially cultured along the Kimberley coastline) are not expected.
	Pearl Producers Association (PPA)	13/08/2015	To stakeholder	Polarcus replied via email on 13 August 2015 describing how according to scientific literature, phytoplankton is not known to be affected by seismic sound emissions. Even if phytoplankton were conservatively assumed to be affected by seismic sound emissions as zooplankton can be, information was provided to demonstrate that the proportion of plankton affected by sound from the seismic source at distances sufficient to cause physiological effects (5 - 6 m) would tube extremely small in comparison to the overall population in the Survey Area. Thus, impacts to feeding pearl oysters (including those commercially cultured along the Kimberley coastline) are not expected.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Pearl Producers Association (PPA)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Pearl Producers Association (PPA)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	WA Seafood Exporters	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	WA Seafood Exporters	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	WA Seafood Exporters	05/08/2015	To stakeholder	Follow-up call made 5 August 2015 - Norm was busy, we were advised to email him directly as that was best way to contact him (Email was sent previously - 4 August 2015)	N/A	N/A	N/A
	WA Seafood Exporters	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015 during which a message was left for Norm requesting a call back	N/A	N/A	N/A
	WA Seafood Exporters	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	WA Seafood Exporters	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	WA Seafood Exporters	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	WA Seafood Exporters	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	WA Seafood Exporters	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	WA Seafood Exporters	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A

	Westmore Seafoods	13/08/2015	To stakeholder	Phone call made on 13 August 2015 during which an email address was provided and it was requested that the Information Sheet be sent to that email. Should Simon have any feedback to provide he will respond. The information sheet was emailed as requested that same day.	N/A	N/A	N/A
	Westmore Seafoods	16/03/2016	To stakeholder	Email sent 16/3/16. Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	Westmore Seafoods	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Westmore Seafoods	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Westmore Seafoods	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Westmore Seafoods	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Westmore Seafoods	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Recreational Fishing, Charters, Marine Tourism Operators							
	Australian Recreational Fishing Foundation	04/08/2015	To stakeholder	Phone call made on 4 August 2015 with message left requesting call-back. Follow-up message of Fisheries information sheet details made through the organisation's online contact form.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	10/08/2015	To stakeholder	Phone call made on 10 August 2015 with message left requesting call-back.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	16/03/2016	To stakeholder	Phone call made 16/3/16. Message left requesting contact email address. Contact made via online contact form 16/3/16 requesting contact email address.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	18/03/2016	To stakeholder	March 2016 update emailed to enquiries@recreationalfishing.com.au on 18/3/16.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Australian Recreational Fishing Foundation	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Recfishwest	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015. Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Recfishwest	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. Message left for Ruth requesting call back. She was not in today.	N/A	N/A	N/A
	Recfishwest	12/08/2015	To stakeholder	Follow-up call made on 12 August - Ruth was not in today. We are advised to email Matt Gillett (not in today either). (Email previously sent to Matt on 4th August).	N/A	N/A	N/A
	Recfishwest	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Recfishwest	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Recfishwest	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Recfishwest	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Recfishwest	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Recfishwest	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	One Tide Charters	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	One Tide Charters	05/08/2015	To stakeholder	Follow-up call made 5 August 2015 Message left requesting call back.	N/A	N/A	N/A
	One Tide Charters	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015 during which a message was left requesting a call back	N/A	N/A	N/A
	One Tide Charters	16/03/2016	To stakeholder	Email sent 16/3/16.	N/A	N/A	N/A
	One Tide Charters	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	One Tide Charters	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	One Tide Charters	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	One Tide Charters	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	One Tide Charters	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Unreel Adventure Safaris	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Unreel Adventure Safaris	05/08/2015	To stakeholder	Follow-up call made 5 August 2015 to Stephanie. Message left requesting call back.	N/A	N/A	N/A
	Unreel Adventure Safaris	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015 during which a message was left requesting a call back	N/A	N/A	N/A
	Unreel Adventure Safaris	16/03/2016	To stakeholder	Email sent 16/3/16. Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	Unreel Adventure Safaris	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Unreel Adventure Safaris	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Unreel Adventure Safaris	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Unreel Adventure Safaris	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Unreel Adventure Safaris	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	KAS Helicopters	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	KAS Helicopters	05/08/2015	To stakeholder	Follow-up call made 5 August 2015 Message left requesting call back.	N/A	N/A	N/A
	KAS Helicopters	12/08/2015	To stakeholder	Follow-up call made 12 August 2015 - They have been away and will respond to the email tomorrow (13 August 2015).	N/A	N/A	N/A
	KAS Helicopters	16/03/2016	To stakeholder	Email sent 16/3/16. Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	KAS Helicopters	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	KAS Helicopters	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	KAS Helicopters	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	KAS Helicopters	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	KAS Helicopters	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Kingfisher Tours	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Kingfisher Tours	05/08/2015	To stakeholder	Follow-up call made 5 August 2015 - advised to speak to Rosie on 6 August 2015. Call made 6 August 2015, our email cannot be found.	N/A	N/A	N/A
	Kingfisher Tours	06/08/2015	To stakeholder	Follow-up email sent 6 August 2015	N/A	N/A	N/A
	Kingfisher Tours	12/08/2015	To stakeholder	Follow-up call made 12 August during which the email has been received and sent to the relevant people asking them to respond to us.	N/A	N/A	N/A
	Kingfisher Tours	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Kingfisher Tours	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Kingfisher Tours	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Kingfisher Tours	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Kingfisher Tours	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Kingfisher Tours	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Aviair	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Aviair	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. Spoke to general manager Mr. Nottle - he mentioned that survey will have no impact to their operations.	N/A	N/A	N/A
	Aviair	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A

	Aviair	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Aviair	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Aviair	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Aviair	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Aviair	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Peregrine Bird Tours	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Peregrine Bird Tours	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. No concerns with the survey	N/A	N/A	N/A
	Peregrine Bird Tours	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Peregrine Bird Tours	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Peregrine Bird Tours	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Peregrine Bird Tours	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Peregrine Bird Tours	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Peregrine Bird Tours	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Kimberley Bird Watching	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Kimberley Bird Watching	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. Message left requesting call back.	N/A	N/A	N/A
	Kimberley Bird Watching	12/08/2015	To stakeholder	Follow-up call made 12 August 2015, we had trouble leaving message as kept getting cut off.	N/A	N/A	N/A
	Kimberley Bird Watching	13/08/2015	To stakeholder	Email resent on 13 August 2015	N/A	N/A	N/A
	Kimberley Bird Watching	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Kimberley Bird Watching	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Kimberley Bird Watching	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Kimberley Bird Watching	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Kimberley Bird Watching	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Kimberley Bird Watching	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Kimberley Air Tours	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Kimberley Air Tours	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. Email with consultation letter has been forwarded to the manager with message asking him to respond.	N/A	N/A	N/A
	Kimberley Air Tours	12/08/2015	To stakeholder	Follow-up call made 12 August 2015 during which we were told that the email will be forwarded to relevant people asking them to respond if they had any concerns.	N/A	N/A	N/A
	Kimberley Air Tours	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Kimberley Air Tours	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Kimberley Air Tours	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Kimberley Air Tours	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Kimberley Air Tours	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Kimberley Air Tours	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Kimberley Whale Watching	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015. Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Kimberley Whale Watching	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. Message left for Annabelle requesting call back.	N/A	N/A	N/A
	Kimberley Whale Watching	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015. Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Kimberley Whale Watching	05/08/2015	To stakeholder	Follow-up call made 5 August 2015. Message left for Annabelle requesting call back.	N/A	N/A	N/A
	Kimberley Whale Watching	12/08/2015	To stakeholder	Follow-up call made 12 August 2015 during which we spoke to Annabelle. she will pass on the email to her husband Richard for him to respond with any concerns.	N/A	N/A	N/A
	Kimberley Whale Watching	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Kimberley Whale Watching	18/03/2016	To stakeholder	Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	Kimberley Whale Watching	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Kimberley Whale Watching	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Kimberley Whale Watching	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Kimberley Whale Watching	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Kimberley Whale Watching	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Kimberley Outback Tours	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Kimberley Outback Tours	05/08/2015	To stakeholder	Follow-up call made 5 August 2015 spoke to Merilyn. Requested to send the email to kimberleyinfo@bigpond.com	N/A	N/A	N/A
	Kimberley Outback Tours	06/08/2015	To stakeholder	Follow-up email to new contact sent on 6 August 2015.	N/A	N/A	N/A
	Kimberley Outback Tours	12/08/2015	To stakeholder	Follow-up call made 12 August 2015 during which a message was left requesting a call back.	N/A	N/A	N/A
	Kimberley Outback Tours	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Kimberley Outback Tours	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Kimberley Outback Tours	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Kimberley Outback Tours	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Kimberley Outback Tours	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Kimberley Outback Tours	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
Ports and Shipping							
	Port of Broome	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Port of Broome	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which the Port requested that the email with information sheet and map be resent. Email was resent to operations@kimberleyports.wa.gov.au following the phone call	N/A	N/A	N/A
	Port of Broome	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Port of Broome	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Port of Broome	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Port of Broome	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
Environmental Non-Governmental Organisations							
	The Wilderness Society	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	The Wilderness Society	06/08/2015	To stakeholder	Follow-up call made 6 August 2015. Advised to send through to wa@wilderness.org.au and to jenita.enevoldsen@wilderness.org.au.	N/A	N/A	N/A
	The Wilderness Society	06/08/2015	To stakeholder	Email sent 06 August 2015	N/A	N/A	N/A
	The Wilderness Society	13/03/2016	To stakeholder	Follow-up call made on 13 August 2015 during which a message was left for Jenita Enevoldsen requesting a call back	N/A	N/A	N/A
	The Wilderness Society	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	The Wilderness Society	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	The Wilderness Society	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	The Wilderness Society	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	The Wilderness Society	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A

	The Wilderness Society	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	Save the Kimberley	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Save the Kimberley	06/08/2015	To stakeholder	Follow-up call made 06 August 2015 spoke to Meredith. She requested the letter be sent to westernabalone@hotmail.com instead. Email sent 6 August 2015	N/A	N/A	N/A
	Save the Kimberley	12/08/2015	To stakeholder	Follow-up call made on 12 August 2015 during which we spoke to Kevin Blatchford. He has no concerns in regards to Cygnus 3D MSS.	N/A	N/A	N/A
	Save the Kimberley	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Save the Kimberley	18/03/2016	To stakeholder	Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	Save the Kimberley	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Save the Kimberley	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Save the Kimberley	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Save the Kimberley	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Save the Kimberley	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Save the Kimberley	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Environs Kimberley	06/08/2015	To stakeholder	Follow-up call made 6 August 2015 - message left for the director requesting a call back.	N/A	N/A	N/A
	Environs Kimberley	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which a message was left requesting a call back	N/A	N/A	N/A
	Environs Kimberley	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Environs Kimberley	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Environs Kimberley	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Environs Kimberley	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Environs Kimberley	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	Environs Kimberley	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	Australian Conservation Foundation	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Australian Conservation Foundation	06/08/2015	To stakeholder	Follow-up call made 6 August 2015 - Advised to email w.freeman@acfonline.org.au instead. Email sent 6 August 2015.	N/A	N/A	N/A
	Australian Conservation Foundation	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which a message was left for Wade Freeman requesting a call back.	N/A	N/A	N/A
	Australian Conservation Foundation	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Australian Conservation Foundation	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Conservation Foundation	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Conservation Foundation	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	Australian Conservation Foundation	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	The Conservation Council of WA	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	The Conservation Council of WA	06/08/2015	To stakeholder	Follow-up call made 6 August 2015 - message left for Chantelle requesting a call back.	N/A	N/A	N/A
	The Conservation Council of WA	13/08/2015	To stakeholder	Follow up call made 13 August 2015 during which Inan would pass our contacts to Helen his colleague to respond to the email.	N/A	N/A	N/A
	The Conservation Council of WA	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	The Conservation Council of WA	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	The Conservation Council of WA	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	The Conservation Council of WA	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	The Conservation Council of WA	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	The Conservation Council of WA	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	World Wildlife Fund	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	World Wildlife Fund	04/08/2015	To stakeholder	Follow-up phone call on 4 August 2015 during which WWF requested the information sheet to be resent, which was done so that day. They relayed that they will respond should they have any feedback.	N/A	N/A	N/A
	World Wildlife Fund	13/08/2015	To stakeholder	Follow up call made 13 August 2015 during which the Perth office requested the email be resent to Meril Halley at mhalley@wwf.org.au. Email was resent following the phone call.	N/A	N/A	N/A
	World Wildlife Fund	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	World Wildlife Fund	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	World Wildlife Fund	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	World Wildlife Fund	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	World Wildlife Fund	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	World Wildlife Fund	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	04/08/2015	To stakeholder	Follow-up phone call on 4 August 2015 during which IFAW requested the information sheet to be resent to Matthew Collis within their organisation and that he will get back to Polarcus as soon as possible.	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	12/08/2015	To stakeholder	Follow-up call made 12 August 2015 during which a message was left for Matthew Collins requesting a call back.	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	24/09/2015	To stakeholder	Follow-up call made on 24 September 2015 confirming that the contact person is appropriate, but not available.	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	International Fund for Animal Welfare (IFAW)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
Land Councils							
	Northern Land Council	07/08/2015	To stakeholder	Phone call made on 7 August 2015 during which it was requested that the information sheet be emailed to their reception email address provided over the phone. The land council relayed that should they have any feedback they will get in contact. Information sheet was emailed following the phone call.	N/A	N/A	N/A
	Northern Land Council	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which a message was left for Carol Cristopherson requesting a call back.	N/A	N/A	N/A
	Northern Land Council	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Northern Land Council	18/03/2016	To stakeholder	Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	Northern Land Council	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Northern Land Council	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Northern Land Council	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Northern Land Council	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Northern Land Council	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	07/08/2015	To stakeholder	Phone call made on 7 August 2015 during which it was requested that the information sheet be emailed to their reception email address provided over the phone. The land council relayed that should they have any feedback they will get in contact. Information sheet was emailed following the phone call.	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which the Corporation requested that the email with information sheet and map be resent. Email was resent following the phone call.	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	Kimberley Land Council Aboriginal Corporation	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
Industry							
	APPEA	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	APPEA	14/08/2015	To stakeholder	Follow-up call made on 14 August 2015 during which APPEA mentioned that the email was received and forwarded on to the respective people within APPEA.	N/A	N/A	N/A
	APPEA	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	APPEA	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	APPEA	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	APPEA	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A

	APPEA	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	APPEA	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Telstra	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015.	N/A	N/A	N/A
	Telstra	04/08/2015	To stakeholder	Follow-up email to secondary contact sent on 4 August 2015.	N/A	N/A	N/A
	Telstra	14/08/2015	To stakeholder	Follow-up call made 14 August 2015 during which we spoke to Michael Costin, who has forwarded the email with the information sheet on to the relevant people within his team. He mentioned, they would respond if they had any concerns.	N/A	N/A	N/A
	Telstra	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Telstra	29/03/2016	From stakeholder	Email response on 29/3/16 thanking ERM for their email and stating that Telstra had no comments to make at this point, but would like to be kept informed of planned activities.	No objecions or claims	N/A	N/A
	Telstra	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Telstra	16/11/2016	From stakeholder	Email received from Steven Lay on 16/11/2016 confirming they have no comments at this time.	No objecions or claims	N/A	N/A
	Telstra	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Telstra	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Telstra	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Telstra	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Nextgen Networks	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Nextgen Networks	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which James Reed was not available. A message was left requesting a call back.	N/A	N/A	N/A
	Nextgen Networks	14/08/2015	From stakeholder	Nextgen (James Reed) called on 14 August 2015 relaying that Paul Ryder is the correct Nextgen contact for these sort of matters and that he will be notified to call-back soon.	N/A	N/A	N/A
	Nextgen Networks	17/08/2015	From stakeholder	Call received from Paul Ryder of Nextgen on 17 August 2015 relaying that Nextgen have no objection to Cygnus 3D MSS, but identify themselves as a stakeholder for survey and request to be kept informed. This is due to Nextgen's plans to lay down a fiber optic cable from Darwin to Port Hedland starting in early 2016. The cable route may overlap with the Survey Area. Polarcus agreed to keep Nextgen informed of the survey.	No objecions or claims	N/A	N/A
	Nextgen Networks	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Nextgen Networks	01/12/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Nextgen Networks	09/11/2016	To stakeholder	Following email from Department of Communications on 8th November, ERM emailed Greg Neylan on 9th November 2016 with details of the survey, requesting a time to discuss and the location of the cable.	N/A	N/A	N/A
	Nextgen Networks	10/11/2016	To stakeholder	ERM phoned and spoke with Greg Neylan on 10 November 2016 and followed up with email. ICPC Recommendation 8 identified as relevant standard.	Stakeholder confirmed that cable is operational and may pass in close proximity to Survey Area. It is a criminal offence to interfer or cause damage to cables. Nextgen refer Polarcus to ICPC Recommendation 8 regarding interaction between marine seismic surveys and fibre-optic cables.	Potential for interference with the cable system has merit. Accidental damage to the cable could be classed as a criminal offence and result in sunstantial costs to repair, as well as disruption to communications in Australia and at connected offshore facilities. The location of the cable, potential impacts and risks are to be assessed in the EP (if location is applicable) and adequate control measures implemented. Cable route subsequently confirmed to pass along southern boundary of Survey Area, ~24 km from the next survey phase operational area. It was also explained that the 2.0 bar pressure level specified in ICPC Recommendation 08 was only expected to be reached within approximately 45 m water depth, while the cable overlapped the survey area in >100 m depth. Therefore, no impacts are expected.	ERM sent follow up email on 15 November request cable route position. Greg Neylan replied with route positions and noted ICPC guidelines are likely relevant and confirmed he will also outline in a separate letter the protection of the cable has under the Crimes Legislation Amendment (Telecommunications Offences and Other Measures) Act (No. 2) 2004 protecting the cable from interference. ERM emailed 30 November with map showing location of cable on Survey Area boundary ~24 km from the next survey phase operational area. It was also explained that the 2.0 bar pressure level specified in ICPC Recommendation 08 was expected to be reached within approximately 45 m water depth, while the cable overlapped the survey area in >100 m depth. Therefore, no impacts are expected. Requested feedback from Nextgen.
	Nextgen Networks	15/11/2016	To stakeholder	ERM sent follow up email on 15 November request cable route position. Greg Neylan replied with route positions and noted ICPC guidelines are likely relevant and confirmed he will also outline in a separate letter the protection of the cable has under the Crimes Legislation Amendment (Telecommunications Offences and Other Measures) Act (No. 2) 2004 protecting the cable from interference.	Cable route positions received		
	Nextgen Networks	30/11/2016	To stakeholder	ERM emailed 30 November with map showing location of cable on Survey Area boundary ~24 km from the next survey phase operational area. It was also explained that the 2.0 bar pressure level specified in ICPC Recommendation 08 was expected to be reached within approximately 45 m water depth, while the cable overlapped the survey area in >100 m depth. Requested feedback from Nextgen.	N/A		
	Nextgen Networks	09/12/2016	To stakeholder	ERM sent follow up email on 9th December 2016, requesting feedback.	N/A	N/A	N/A
	Nextgen Networks	20/12/2016	To stakeholder	ERM phoned Greg Neylan on 20th December 2016. Greg explained that everything seemed ok in principal but explained that they do not endorse other parties' management measures, the expectation is that they do what they need to avoid interference. Greg confirmed he would send through the letter regarding the protection afforded to the cable, either before Christmas or in early January.	Stakeholder agreed in principle but does not endorse management measures. Responsibility is on Polarcus.	No impacts expected. Consider precautionary management measures.	N/A
	Nextgen Networks	22/12/2016	To stakeholder	ERM followed up with an email on 22 December 2016 confirming that measures would be built into the EP for the vessel and crew to be aware of the cable and to consult again if shooting within 1 km.	N/A	N/A	N/A
	Nextgen Networks	01/06/2017	To stakeholder	Update sent advising about the rescheduling of the previous survey phase and the intent to resubmit the EP for an extended area and timeframe.	N/A	N/A	N/A
	Nextgen Networks	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP. The Operational Area no longer includes the cable route.	N/A	N/A	N/A
	Nextgen Networks	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Nextgen Networks	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Sinopec Oil and Gas Australia (Puffin) Pty Ltd	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	INPEX - Ichthys	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	INPEX - Ichthys	30/07/2015	From stakeholder	Received confirmation from INPEX on 30 July 2015 that the information sheet had been forwarded to the relevant team.	N/A	N/A	N/A
	INPEX - Ichthys	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	INPEX - Ichthys	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016	N/A	N/A	N/A
	INPEX - Ichthys	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	INPEX - Ichthys	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	INPEX - Ichthys	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	INPEX - Ichthys	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	PTTEP AA Cash-Maple	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	PTTEP AA Cash-Maple	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	PTTEP AA Cash-Maple	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	PTTEP AA Cash-Maple	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	PTTEP AA Cash-Maple	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	PTTEP AA Cash-Maple	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	PTTEP AA Cash-Maple	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	Shell Development Australia - Prelude	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Shell Development Australia - Prelude	16/03/2016	To stakeholder	Email sent 16/3/16.	N/A	N/A	N/A
	Shell Development Australia - Prelude	18/03/2016	To stakeholder	Letter posted 18/3/16	N/A	N/A	N/A
	Shell Development Australia - Prelude	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Shell Development Australia - Prelude	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Shell Development Australia - Prelude	17/07/2017		Stakeholder removed from database on basis that Prelude is over 60km from the Survey Area; they will not be impacted by routine activities; they are unlikely to be impacted by a spill; generic email address is no longer functional, and they have not responded to any previous correspondence (since 2015) . Can be notified in the event of a spill.	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	18/03/2016	To stakeholder	Re-sent 18/3/16 after first email undelivered	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A

	Conoco Phillips Greater - Poseidon	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus 3D MSS EP.	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Conoco Phillips Greater - Poseidon	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Hunt Oil - Schooner	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Hunt Oil - Schooner	16/03/2016	To stakeholder	Email sent 16/3/16. Email undeliverable. Schooner exploration drilling campaign complete. Phone number disconnected. Contact details for Hunt Oil Company of Australia Pty Ltd are no longer available. Consultation closed.	N/A	N/A	N/A
	Hunt Oil - Schooner	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Hunt Oil - Schooner	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A
	Woodside - Browse FLNG	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Woodside - Browse FLNG	18/03/2016	To stakeholder	Letter hand delivered to WEL on 18/3/16	N/A	N/A	N/A
	Woodside - Browse FLNG	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Woodside - Browse FLNG	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Woodside - Browse FLNG	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Woodside - Browse FLNG	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	Woodside - Browse FLNG	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which the Broome Chamber of Commerce and Industry requested that the email with	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	17/08/2015	To stakeholder	Email from the Broome Chamber of Commerce received on 17 August 2015. The email relayed that they have no issues or concerns with	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	Broome Chamber of Commerce and Industry	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	13/08/2015	To stakeholder	Follow-up call made on 13 August 2015 during which the Port Hedland Chamber of Commerce requested that the email with the	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on	N/A	N/A	N/A
	Port Hedland Chamber of Commerce	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5	N/A	N/A	N/A
Potential Ongoing Seismic Surveys							
	Forge Multi-Client 3D Marine Seismic Survey, PGS Australia Pty Ltd	24/08/2015	To stakeholder	Email sent by Polarcus on 24 August 2015 notifying of the overlap between the two seismic programs. The email expresses the intents to	N/A	N/A	N/A
	Other Seismic Operators	N/A	N/A	Polarcus remains in contact directly regarding coordinating surveys in Australia generally. Pre-planning occurs when a potential survey phase is being planned and with seismic companies with known survey plans (and accepted EP).	N/A	N/A	N/A
Oil Spill Response Agencies							
	Australian Marine Oil Spill Centre (AMOSC)	28/07/2015	To stakeholder	Email with information sheet and map sent on 28 July 2015	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	14/08/2015	To stakeholder	Follow-up call made on 14 August 2015 during which AMOSC mentioned that the email was received and forwarded on to Neil Rowarth,	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	16/03/2016	To stakeholder	Email sent 16/3/16	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	04/11/2016	To stakeholder	Email notification communicating commencement of survey on or about the 1st December 2016 was sent to stakeholder on Friday 4th November 2016.	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	01/06/2017	To stakeholder	Stakeholder update sent regarding previous phase not going ahead and Polarcus intention to extend timeframe and area of the EP.	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	05/10/2017	To stakeholder	Stakeholder update sent informing stakeholder, Polarcus has reduced the proposed area of acquisition and timeframes under the Cygnus	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	27/10/2017	To stakeholder	Email update sent to stakeholders informing them the EP has been submitted to NOPSEMA. A link was provided to the EP status on NOPSEMAs website. The email also outlined the ongoing consultation methods including the option to register for the daily activity look-ahead notification.	N/A	N/A	N/A
	Australian Marine Oil Spill Centre (AMOSC)	07/11/2017	To stakeholder	Email sent to stakeholder with a Notice of Commencement of Phase 3 (North). The MSS is proposed to commence on or soon after the 5 December 2017.	N/A	N/A	N/A

ERM has over 100 offices across the following countries worldwide

Australia
Argentina
Belgium
Brazil
China
France
Germany
Hong Kong
Hungary
India
Indonesia
Ireland
Italy
Japan
Korea
Malaysia
Mexico
Myanmar
Netherlands
New Zealand
Peru
Poland
Portugal
Puerto Rico
Singapore
Spain
Sri Lanka
Sweden
Taiwan
Thailand
UK
USA
Venezuela
Vietnam

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