



# TECHNICAL DOCUMENT

Approval Status: **Approved Native**

Title:	<b>Timor Sea Well Suspension Environment Plan</b>		
Revision No:	<b>1</b>	Technical ID:	HQ202003901.1
Hard Copy Location	<b>PTTEP Australia</b>		

<b>Approver:</b>  Chief Executive Officer	<b>Technical Authority:</b>  VP Environment	<b>Commercial Authority:</b>  VP Cash Maple Project	<b>SSHE Review:</b>  VP Process Safety and Assurance	<b>Drilling Review:</b>  Senior Engineer, Drilling	<b>Originator:</b>  Partner, ERM
Date: 17/06/2020	Date: 29/04/2020	Date: 29/04/2020	Date: 29/04/2020	Date: 29/04/2020	Date: 18/06/2020

Revision Number	Revision Date	Revision Remarks	Originator
Revision 1	18/06/2020	Submission to NOPSEMA	ERM
Revision 1 Draft	10/06/2020	For PTTEP AA review	ERM
Revision 0	30/04/2020	Submission to NOPSEMA	ERM
Revision C	29/04/2020	For PTTEP AA review	ERM
Revision B	20/04/202	For PTTEP AA review	ERM
Revision A	17/03/2020	For PTTEP AA review	ERM

## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>6</b>
1.1	BACKGROUND	6
1.2	PURPOSE	6
1.3	SCOPE	6
1.4	THE TITLEHOLDER	9
1.5	ENVIRONMENT PLAN STRUCTURE AND CONTENT	9
<b>2</b>	<b>PTTEP SSHE POLICY</b>	<b>11</b>
2.1	SSHE POLICY	11
<b>3</b>	<b>LEGISLATION AND REGULATORY FRAMEWORK</b>	<b>13</b>
3.1	COMMONWEALTH LEGISLATION	13
3.1.1	Offshore Petroleum and Greenhouse Gas Storage Act	13
3.1.2	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	13
3.1.3	Additional Commonwealth Legislation	13
3.2	INTERNATIONAL TREATIES, AGREEMENTS AND CONVENTIONS	16
<b>4</b>	<b>DESCRIPTION OF ACTIVITIES</b>	<b>20</b>
4.1	OVERVIEW	20
4.2	ACTIVITY TIMING	20
4.3	LOCATION	20
4.4	DETAILED ACTIVITY DESCRIPTION	20
4.4.1	Details of the Suspended Wells	20
4.4.2	Operational Area	21
4.4.3	Project Vessel	21
4.4.4	Locating the Wellheads	21
4.4.5	ROV Visual Inspection and Leak Testing Activities	22
4.4.6	Integrity Monitoring	22
4.5	CONTINGENT ACTIVITIES	22
<b>5</b>	<b>DESCRIPTION OF THE ENVIRONMENT</b>	<b>23</b>
5.1	OVERVIEW	23
5.1.1	The Environment that May Be Affected	23
5.2	REGIONAL SETTING	25
5.2.1	Timor Sea	25
5.2.2	North-west Marine Region	25
5.3	PROTECTED AREAS	25
5.3.1	Australian Marine Parks	25
5.3.2	State Managed Reserves	26
5.3.3	Key Ecological Features	26
5.3.4	Wetlands of Conservation Significance (declared Ramsar wetlands)	26
5.4	PHYSICAL ENVIRONMENT	29
5.4.1	Climate	29
5.4.2	Air Quality	29
5.4.3	Oceanography	29
5.4.4	Bathymetry and Seabed Geomorphology	30

5.4.5	Sediment Composition	33
5.5	<b>BIOLOGICAL ENVIRONMENT</b>	33
5.5.1	Productivity and Planktonic Communities	33
5.5.2	Benthic Habitats and Communities	33
5.5.3	Fish Assemblages	34
5.5.4	Listed Marine Fauna of Conservation Significance	35
5.6	<b>SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT</b>	47
5.6.1	Jurisdictional Arrangements with Indonesia	47
5.6.2	Australian Commercial Fisheries	47
5.6.3	Indonesian Commercial Fisheries	47
5.6.4	World Heritage and National Heritage Sites	48
5.6.5	Indigenous Heritage	50
5.6.6	Maritime Heritage	50
5.6.7	Tourism and Recreational Activities	50
5.6.8	Petroleum Exploration and Production	50
5.6.9	Shipping	50
5.6.10	Maritime Surveillance	50
5.6.11	Defence Activities	51
<b>6</b>	<b>STAKEHOLDER CONSULTATION</b>	<b>52</b>
6.1	OVERVIEW	52
6.2	CONSULTATION APPROACH	52
6.2.1	Stakeholder Identification	52
6.2.2	Sufficient and Timely Information	53
6.3	CONSULTATION TO DATE	53
6.3.1	Stakeholder Feedback and Assessment of Merit	53
6.4	ONGOING CONSULTATION	56
<b>7</b>	<b>ENVIRONMENTAL IMPACT AND RISK ASSESSMENT METHODOLOGY</b>	<b>57</b>
7.1	INTRODUCTION	57
7.2	RISK ASSESSMENT PROCESS	57
7.2.1	Identification of Receptors, Values and Sensitivities	57
7.2.2	Impact and Risk Identification	58
7.2.3	Risk Assessment	58
7.2.4	Demonstration of ALARP	60
7.2.5	Acceptable Level	62
7.2.6	Environmental Performance Outcomes, Standards and Measurement Criteria	64
<b>8</b>	<b>ENVIRONMENTAL IMPACT AND RISK ASSESSMENT</b>	<b>65</b>
8.1	PLANNED ACTIVITIES	66
8.1.1	Physical Presence: Disturbance to Other Marine Users	66
8.1.2	Physical Presence: Benthic Disturbance	71
8.1.3	Anthropogenic Noise: Project Vessel and Equipment	75
8.1.4	Routine Discharges to the Marine Environment: Project Vessel	81
8.1.5	Artificial Light Emissions	87
8.1.6	Atmospheric Emissions: Power Generation and Incineration	90
8.2	UNPLANNED RISKS	93
8.2.1	Physical Presence: Collision with Marine Fauna	93

8.2.2	Unplanned Discharge: Loss of Hazardous or Non-Hazardous Solid Wastes	97
8.2.3	Dropped Objects: Benthic Disturbance	101
8.2.4	Hydrocarbon Spill: Vessel Tank Failure	103
8.2.5	Deck and Subsurface Spill	119
8.2.6	Invasive Marine Species	123
<b>9</b>	<b>ENVIRONMENTAL PERFORMANCE OBJECTIVES, STANDARDS AND MEASUREMENT CRITERIA</b>	<b>128</b>
<b>10</b>	<b>IMPLEMENTATION STRATEGY</b>	<b>139</b>
10.1	SSHE MANAGEMENT SYSTEM OVERVIEW	139
10.2	LEADERSHIP, COMMITMENT, POLICY AND STRATEGIC OBJECTIVES	139
10.3	ORGANISATION, RESOURCES AND DOCUMENTATION	140
10.3.1	Roles and Responsibilities	140
10.3.2	Training and Competency	142
10.3.3	Contractor Management	143
10.3.4	Document Management	143
10.4	EVALUATION AND RISK MANAGEMENT	143
10.5	PLANNING AND OPERATIONAL CONTROL	144
10.5.1	Environment Plan Reviews	144
10.5.2	Management of Change	144
10.5.3	Oil Pollution Emergency Plan	145
10.6	IMPLEMENTATION AND MONITORING	152
10.6.1	Internal Monitoring, Recording and Reporting	152
10.6.2	External Routine Reporting	153
10.6.3	Internal Incident Reporting	153
10.6.4	External Incident Reporting	154
10.6.5	Management of Non-Conformance	154
10.7	AUDIT AND REVIEW	155
10.7.1	Compliance Assurance Activities	155
10.7.2	EP Revision and Resubmission	156
<b>11</b>	<b>REFERENCES AND ABBREVIATIONS</b>	<b>158</b>

<b>Appendix A</b>	Stakeholder Consultation Records
<b>Appendix B</b>	Protected Matter Search Tool Searches

## LIST OF FIGURES

Figure 1-1: Location of suspended wells within permit areas AC/RL12 and AC/RL4 .....	8
Figure 2-1: PTTEP AA Safety, Security, Health and Environment Policy .....	12
Figure 5-1: EMBA and socio-cultural EMBA in relation to the Operational Area .....	24
Figure 5-2: Australian Marine Parks .....	27
Figure 5-3: Key Ecological Features .....	28
Figure 5-4: Key ocean currents influencing Western Australia (source: DEWHA, 2008a) .....	30
Figure 5-5: Bathymetry of the Operational Area.....	31
Figure 5-6: Banks and shoals within the EMBA .....	32
Figure 5-7: BIAs within the EMBA .....	46
Figure 5-8: Australia–Indonesia jurisdictional arrangements in the Timor Sea (as applicable to the EP) .....	49
Figure 7-1: Decision support framework used to demonstrate ALARP (Oil & Gas UK, 2014) .....	60

Figure 8-1 Modelled surface hydrocarbon contours and the ecological and socio-cultural EMBA used for the spill assessment (surface hydrocarbons represent 300 spill trajectories) ..... 109

## LIST OF TABLES

Table 1-1: Environment Plan Summary.....	10
Table 3-1: Other Key Commonwealth Legislation and Regulations.....	14
Table 3-2: Applicable International Treaties, Agreements and Conventions .....	17
Table 4-1: Suspended Well Locations and Depth .....	20
Table 4-2: Well suspension summary .....	21
Table 5-1: Description of EPBC Listed Threatened and/or Migratory species and their potential occurrence within the Operational Area .....	36
Table 5-2: Conservation management plans relevant to the species identified in the PMST search and where this assessed in the EP. ....	44
Table 6-1: Summary of relevant matters raised and assessment of merit.....	53
Table 6-2: Ongoing Consultation Requirements .....	56
Table 6-3: Activity Notifications .....	56
Table 7-1: PTTEP AA Environmental Risk Assessment Matrix .....	59
Table 7-2 Acceptability Criteria.....	63
Table 8-1 Spill Modelling Inputs .....	105
Table 8-2 Hydrocarbon Exposure Thresholds.....	106
Table 9-1: Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria .....	129
Table 10-1: Roles and Responsibilities .....	140
Table 10-2: Emissions and Discharges Monitoring Summary.....	152

# 1 INTRODUCTION

## 1.1 BACKGROUND

PTTEP Australasia (Ashmore Cartier) Pty Ltd is the 100% titleholder of AC/RL12 and PTTEP Australia Timor Sea Pty Ltd is the 100% titleholder of AC/RL4. The titleholders (collectively, PTTEP AA) propose to continue to suspend three wells within the petroleum title areas AC/RL12 and AC/RL4. The AC/RL12 title area (formerly AC/P33) contains the Oliver-1 ST1 and Oliver-2 exploration wells and the AC/RL4 title area contains the Tenacious West-1 ST1 appraisal well. The activity includes a remotely operated vehicle (ROV) inspection of the three suspended wells that will both validate the current well barrier status and inform future permanent plug and abandonment plans for the wells.

This Environment Plan (EP) has been prepared in accordance with Regulation 9 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E)) Regulations.

## 1.2 PURPOSE

This EP has been prepared to meet the requirements of the OPGGS (E) Regulations and to demonstrate to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) that PTTEP AA:

- Understands the requirements of the OPGGS (E) Regulations and other applicable environmental legislation;
- Has identified and evaluated environmental risks and impacts associated with the activity;
- Has identified appropriate environmental performance objectives, environmental performance standards and measurement criteria to reduce risks and impacts to as low as reasonably practicable (ALARP) and acceptable levels;
- Has implemented, or will implement, appropriate systems, processes and procedures to support the execution of environmental performance objectives, environmental performance standards and measurement criteria;
- Has consulted with potentially affected stakeholders.

## 1.3 SCOPE

This EP applies to the suspension phase of three wells, Oliver-1 ST1, Oliver-2 and Tenacious West-1 ST1, which will continue to be suspended in petroleum title areas AC/RL12 and AC/RL4 until the wells are plugged and abandoned. The location of the three wellheads is presented in Figure 1-1.

As part of the suspended well phase covered by this EP, an ROV visual inspection and leak testing are proposed to confirm the integrity of the suspended wells and inform future permanent plug and abandonment plans for the wells. This ROV inspection campaign will be carried out as soon as technically and practically possible, with the intention for this to be performed in the first or second quarter (Q1/Q2) of 2021. The continued well suspension and ROV inspection will take place within a defined area referred to as the Operational Area (Section 4.4.2). A full description of the activity, the Operational Area and the planned activity schedule is provided in Section 4.

This EP covers the period from acceptance of the EP to the end of 2022 (31<sup>st</sup> December 2022) in order to cover the suspended wells until permanent plugging and abandonment.

Plans for plugging and abandonment will be finalised following the ROV visual inspection covered under this EP. The plug and abandonment phase is outside the scope of this EP and will be covered under a future amendment to this EP or a separate standalone EP. It is noted that the Oliver-2 well is currently classified as having a “permanent independent verified barrier”, whereas the Tenacious West-1 ST1 and Oliver-1 ST1 wells will need to be re-entered to install additional barrier(s) during permanent plug and abandonment (refer to Section 4.4.1 for further details).

As part of the plugging and abandonment phase, a second, more detailed ROV inspection will be undertaken of the applicable suspended wells approximately six months prior to the plugging and abandonment. This detailed inspection will assess the functionality of key components of the wellheads, and help finalise the detailed plugging and abandonment methodology. Following the results and analysis of the ROV inspections, PTTEP AA intend for the final plug and abandonment to be completed prior to the end of 2022. This timeframe accommodates the complexity in preparing a detailed WOMP and EP that cover the detail of a full plug and abandonment works program and are compliant with the work requirements specified in the Petroleum Leases for title areas AC/RL12 and AC/RL4.

It is planned that the Oliver-1 ST-1 and Tenacious West-1 ST-1 wellheads will be removed as part of the future plugging and abandonment program, which will include re-entry to install additional barriers. As the Oliver-2 well does not require re-entry, decommissioning options in relation to removal or abandonment of the wellhead will be evaluated and assessed in accordance with requirements under Section 572 of the OPGGS Act.

Further information regarding the planned well suspension phase and planned activity schedules are provided in the Well Operation Management Plan (WOMP; Revision 3, PTTEP Technical Document HQ201907644.2).

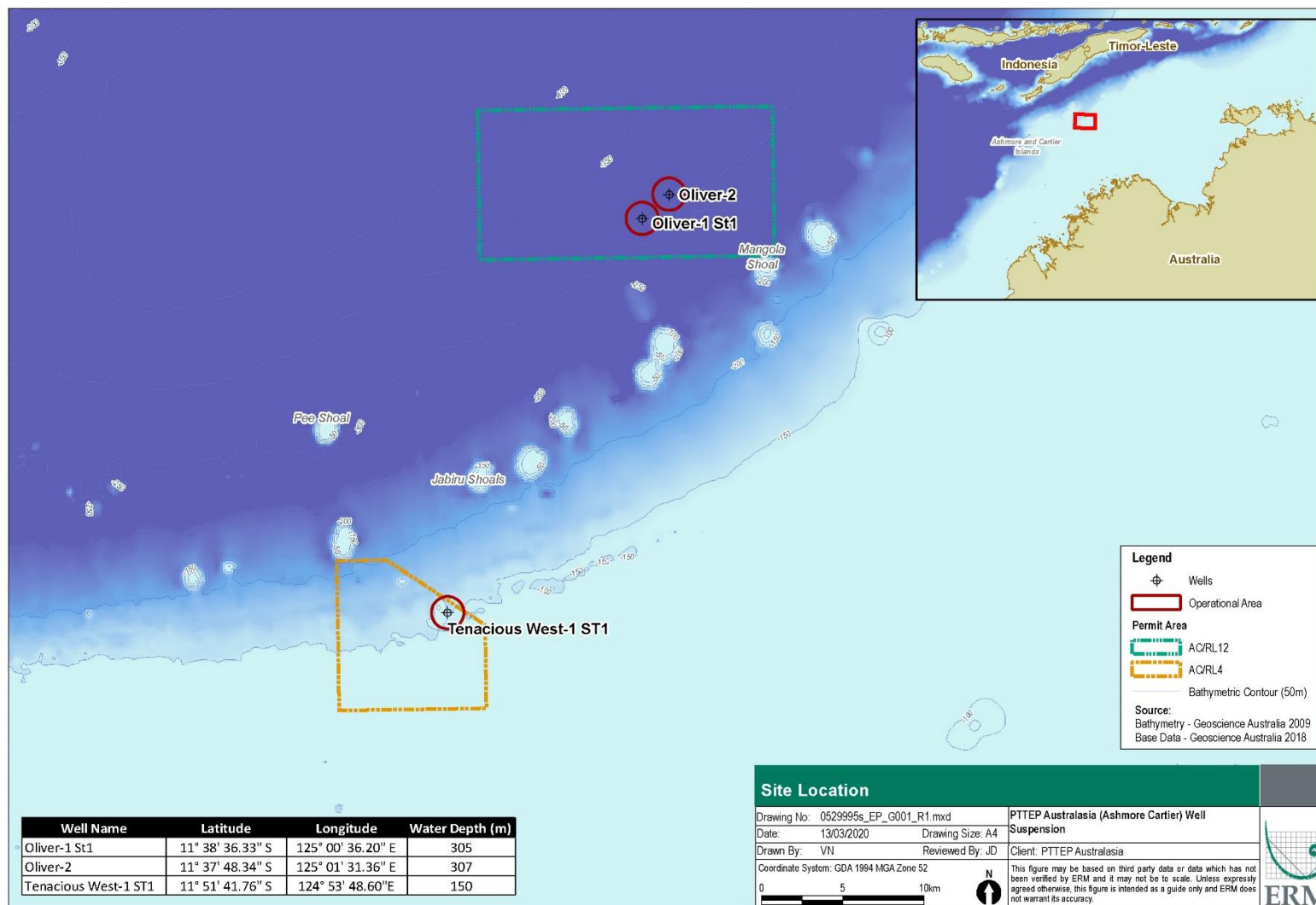


Figure 1-1: Location of suspended wells within permit areas AC/RL12 and AC/RL4

## 1.4 THE TITLEHOLDER

The titleholders undertaking this activity within the AC/RL12 and AC/RL4 petroleum titles are PTTEP Australasia (Ashmore Cartier) Pty Ltd and PTTEP Australia Timor Sea Pty Ltd (collectively, PTTEP AA). Contact details for PTTEP AA are as follows:

Address:	PTTEP Australasia (Ashmore Cartier) Pty Ltd/PTTEP Australia Timor Sea Pty Ltd Level 5, 225 St Georges Terrace Perth WA 6000
Telephone Number:	(08) 9483 9483
Website:	<a href="http://www.au.pttep.com">www.au.pttep.com</a>
ACN Number:	004210164
Nominated Liaison Person:	Ryan Hartfield

If there is a change in titleholder, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) will be notified. If the change in titleholder will result in a change in the manner in which the environmental impacts and risks of an activity are managed, a revision of the EP will be submitted to NOPSEMA in accordance with Sub-Regulation 17(7) of the OPGGS(E) Regulations and Section 10.7.2 of this EP.

## 1.5 ENVIRONMENT PLAN STRUCTURE AND CONTENT

The EP structure is summarised below. Table 1-1 provides the EP Summary requirements.

Section 1 *Introduction* presents background, document scope and purpose.

Section 2 *PTTEP SSHE Policy* presents PTTEP's corporate Safety, Security, Health and Environment (SSHE) Policy.

Section 3 *Legislation and Regulatory Framework* outlines the legislative requirements and other non-legislative requirements that apply to the activities of the EP.

Section 4 *Description of Activities* provides a detailed description of the planned activities within the scope of the EP.

Section 5 *Description of the Environment* describes the physical and biological environment, environmental receptors and social, cultural and economic environments that may be sensitive and within the Operational Area, and identifies the values and sensitivities of the environment.

Section 6 *Stakeholder Consultation* outlines and reports on the consultation process undertaken with relevant stakeholders as part of the environmental assessment for the EP. It also describes consultation processes to be performed during the implementation of the EP.

Section 7 *Environmental Impact and Risk Assessment Methodology* describes the risk assessment process (including ALARP and acceptability assessments), relevant to the scope of the EP.

Section 8 *Environmental Impact and Risk Assessment* presents the outcomes of applying the risk assessment process to the suspended wells and ROV inspection activity.

Section 9 *Environmental Performance Objectives, Environmental Performance Standards and Measurement Criteria* presents the environmental performance objectives, environmental standards and measurement criteria developed for the EP.

Section 10 *Implementation Strategy* describes the processes and practices which will be implemented by PTTEP AA to ensure that the environmental performance objectives and environmental performance standards in this EP are met; and that the environmental impacts and risks are continually identified and reduced to ALARP and are acceptable.

**Table 1-1: Environment Plan Summary**

EP Summary Requirement	Relevant EP Section
The location of the activity	Section 4.3
A description of the receiving environment	Section 5
A description of the activity	Section 4
Details of the environmental impacts and risks	Section 8
The control measures for the activity	Section 8
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 9, Section 10.6, Section 10.7
Response arrangements in the oil pollution emergency plan	Section 10
Consultation already undertaken and plans for ongoing consultation	Section 6
Details of the titleholder's nominated liaison person for the activity	Section 1.4

## **2 PTTEP SSHE POLICY**


### **2.1 SSHE POLICY**

Regulation 16(a) of the OPGGS (E) Regulations requires the EP to contain a statement of PTTEP's corporate environmental policy.

PTTEP AA is committed to proactive management of its environmental responsibilities. This commitment extends to all aspects of PTTEP AA activities including exploration, production, well suspension, decommissioning, logistics support and onshore management support. PTTEP AA operates in accordance with the PTTEP SSHE Policy (Figure 2-1). The environmental commitments made in the PTTEP SSHE Policy, and mechanisms for achievement of that policy, are incorporated in the PTTEP corporate SSHE management system. The activities described in this EP shall be managed in accordance with the PTTEP SSHE Policy.

The overarching aim of PTTEP's SSHE policy is to:

- Establish SSHE objectives and targets for continual improvement;
- Be publicly available for implementation and maintenance at all organisational levels;
- Commit to meet or exceed all relevant regulatory and legislative requirements or relevant standards where laws and regulations do not exist;
- Commit to eliminate and/or reduce high risks of company activities to ALARP level;
- Be relevant and specific to company activities, and their effects on SSHE;
- Use the SMART principle – Specific, Measurable, Achievable, Realistic, Timely;
- Use Key Performance Indicators (KPIs) to include leading and lagging indicators;
- Incorporate review of trends, past incidents, behaviours/ safety observation and SSHE audit/ review or gap analysis; and
- Plan implementation, monitoring, progress reporting and review for continuous improvement.



**PTTEP**


### Safety, Security, Health and Environment (SSHE) Policy

SSHE is a core value for PTTEP. Adherence to safe operating standards is required to ensure the safety and health of everyone involved in our operations and communities where we operate, environmental protection and the security of our people and assets. A lifecycle SSHE management approach is required. A generative SSHE culture will help to achieve our vision of being incident free with the key objective of sustainable development.

PTTEP shall:

- Work to achieve and sustain a generative SSHE culture driven by accountable leadership and involvement of all employees and contractors. Fundamentally SSHE performance is a line management accountability.
- Set measurable SSHE objectives, key performance indicators and targets that are used for continuous improvement for top quartile performance.
- Recognise compliance obligations with all applicable SSHE laws wherever we operate or the requirements of the PTTEP SSHE management system, whichever is the most stringent.
- Manage personal and process safety risks by identifying, analyzing, evaluating and treating them using the as low as reasonably practical principle (ALARP).
- Work with contractors and suppliers to achieve PTTEP's SSHE requirements.
- Continuously reinforce employees and contractors right to use of the Stop Work Authority (SWA).
- Apply Management of Change principles to administrative, organizational and engineering changes to ensure risks remain as low as reasonably practical (ALARP).
- Improve SSHE performance by investigating and learning from incidents and implementing audits and reviews.
- Plan and prepare for emergencies and crises by providing resources, training and holding regular drills and exercises.
- Promote employee and contractors health as part of an effective health management system.
- Reduce greenhouse gas emissions aligned with the pathway to a low carbon future.

The successful implementation of this Policy requires total commitment from PTTEP employees and contractors at all levels.



(Phongsthorn Thavisin)  
Chief Executive Officer

Date..... 21 NOV 2018 .....

**Figure 2-1: PTTEP AA Safety, Security, Health and Environment Policy**

### **3 LEGISLATION AND REGULATORY FRAMEWORK**

#### **3.1 COMMONWEALTH LEGISLATION**

The Operational Area is located in the Commonwealth Petroleum Jurisdiction Boundary and is therefore subject to Commonwealth legislation as described in the sections below.

##### **3.1.1 Offshore Petroleum and Greenhouse Gas Storage Act**

NOPSEMA administers the environmental management provisions of petroleum exploration and development activities in Commonwealth waters under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) and associated regulations including the OPGGS (E) Regulations.

The OPGGS Act provides a regulatory framework for all offshore petroleum exploration, production and greenhouse gas activities in Commonwealth waters.

The objective of the OPGGS (E) Regulations is to ensure that any petroleum or greenhouse gas activity in an offshore area is carried out in a manner consistent with the principles of ecologically sustainable development and in a manner by which the environmental impacts and risks of the activity are ALARP and of an acceptable level.

Pursuant to regulation 10A of the OPGGS (E) Regulations an EP must:

1. Be appropriate for the nature and scale of the activity;
2. Demonstrate that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable;
3. Demonstrate that the environmental impacts and risks of the activity will be of an acceptable level;
4. Provide for appropriate environmental performance outcomes, environmental performance standards and measurement criteria;
5. Include appropriate implementation strategies (including an OPEP) and monitoring, recording and reporting arrangements;
6. Demonstrate that the operator has carried out consultations and the measures that the operator has adopted, or proposes to adopt because of consultations are appropriate; and
7. Comply with the OPGGS Act and the OPGGS (E) Regulations.

##### **3.1.2 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)**

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection and management of nationally and internationally important flora, fauna, ecological communities, and heritage places. The EPBC Act is the Commonwealth Government's primary environmental legislation, and is administered by the Department of Agriculture Water and the Environment (DoAWE). The EPBC Act provides a legal framework for the protection of the environment in land and waters under control of the Commonwealth and provides that certain actions – in particular, actions that are likely to have a significant impact on matters of national environmental significance (MNES) – are subject to a rigorous assessment and approval process.

##### **3.1.3 Additional Commonwealth Legislation**

Table 3-1 describes additional Commonwealth legislation and its applicability to the Operational Area.

**Table 3-1: Other Key Commonwealth Legislation and Regulations**

Legislation/ Regulations	Summary	Relevance to the Operational Area
Australian Maritime Safety Authority Act 1990	This Act establishes a legal framework for the Australian Maritime Safety Authority (AMSA), which represents the Australian Government at the International Maritime Organization (IMO) and other international forums in the development, implementation and enforcement of international standards including those governing ship safety and marine environment protection. AMSA is also responsible for administering the Marine Orders in Commonwealth waters.	Relevant to the project vessel used for the ROV inspection. AMSA is also the designated Combat Agency for all vessel-sourced spills within Australian territorial waters.
Biosecurity Act 2015 <ul style="list-style-type: none"> <li>Quarantine Regulations 2000</li> <li>Biosecurity Regulations 2016</li> <li>Australian Ballast Water Management Requirements 2017</li> </ul>	This Act assesses and manages the risk of pests and diseases entering Australian territory and causing harm to animal, plant and human health, the environment and the economy. It implements mandatory controls in the use of seawater as ballast in ships and the declaration of sea vessels voyaging out of and into Commonwealth waters.	Relevant to the project vessel used for the ROV inspection.
Environment Protection (Sea Dumping) Act 1981 <ul style="list-style-type: none"> <li>Environment Protection (Sea Dumping) Regulations 1983</li> </ul>	<p>This Act provides for the protection of the environment by regulating dumping matter into the sea, incineration of waste at sea and placement of artificial reefs.</p> <p>This Act addresses Australia's obligations under the London Protocol. The aims of the London Protocol are to protect and preserve the marine environment from all sources of pollution, and to prevent, reduce and eliminate pollution by controlling the dumping of wastes and other materials at sea.</p>	Applicable to pollution prevention for the project vessel used for the ROV inspection.
Navigation Act 2012	<p>This Act regulates navigation and shipping and provides for implementation of various international treaties including the International Convention for Safety of Life at Sea (SOLAS).</p> <p>This Act is the primary legislation that regulates ship and seafarer safety, shipboard aspects of protection of the marine environment, and employment conditions for Australian seafarers. A number of marine orders are enacted under this Act.</p>	Applicable to pollution prevention standards for the project vessel used for the ROV inspection.



Legislation/ Regulations	Summary	Relevance to the Operational Area
<p>Protection of the Sea (Powers of Intervention) Act 1983</p> <p>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</p> <p>Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994</p> <p>Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007</p>	<p><i>The Protection of the Sea (Powers of Intervention) Act 1983</i> and Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994 provides AMSA with various responsibilities and powers to take measures and issue directions to prevent or respond to pollution of the sea by oil or other substances. Enacts part of the MARPOL convention in Australia in conjunction with the Navigation Act 2012 (see above).</p> <p><i>The Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> and associated regulations, in conjunction with the <i>Navigation Act 2012</i> and AMSA Marine Orders gives effect to the MARPOL convention in Australia, and associated requirements for preventing pollution from ships at sea.</p> <p><i>The Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007</i> aims to amend the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, and for other purposes. This amended Act provides the protection of the sea from pollution by oil and other harmful substances discharged from ships.</p> <p>A number of Marine Orders are enacted under this Act.</p>	<p>The project vessel used for the ROV inspection is required to meet requirements, including maintaining the required pollution certificates and plans. If the vessel is over 400 gross tonnes (GT), it will be required to have a Shipboard Oil Pollution Emergency Plan (SOPEP).</p>
<p>Protection of the Sea (Harmful Antifouling Systems) Act 2006</p> <p>Marine order 98—(Marine pollution prevention—anti-fouling systems)</p>	<p>This Act relates to the protection of the sea from the effects of harmful anti-fouling systems. It prohibits the application or reapplication of harmful anti-fouling compounds on Australian ships or foreign ships that are in an Australian shipping facility.</p>	<p>Applicable to the project vessel conducting the ROV inspection.</p>

## **3.2 INTERNATIONAL TREATIES, AGREEMENTS AND CONVENTIONS**

Australia is signatory to various international treaties, agreements and conventions that are relevant to the Operational Area. These treaties are given force by their inclusion into Australian legislation at the Federal and State/Territory level.

The key international treaties, agreements and conventions that apply to the Operational Area are outlined in Table 3-2.

**Table 3-2: Applicable International Treaties, Agreements and Conventions**

Treaties, Agreements and Conventions	Summary	Relevance to Operational Area
<p>The 1997 Treaty between the Government of Australia and the Government of the Republic of Indonesia establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries (Perth 14 March 1997) (the 1997 Perth Treaty), signed but not yet ratified</p>	<p>When ratified, the treaty will finalise the Exclusive Economic Zone (EEZ) boundary between Australia and Indonesia. Under the 1997 Perth Treaty, there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights (the Perth Treaty area).</p> <p>While the Perth Treaty has yet to enter into force, the Australian Government acts consistently with its obligations under the Perth Treaty. The obligations relevant to this activity are that i) Australia and Indonesia must take effective measures to prevent, reduce and control pollution of the marine environment; and ii) each of Australia and Indonesia is liable in accordance with international law for pollution of the marine environment caused by activities under its jurisdiction. Communications with the Government of the Republic of Indonesia on these matters is conducted by the Department of Foreign Affairs and Trade (DFAT).</p>	<p>The wellheads are located within the 1997 Perth Treaty Area. Any advice to Indonesia is handled by DFAT.</p>
<p>1981 Memorandum of Understanding (MoU)</p>	<p>Establishes the Provisional Fisheries Surveillance and Enforcement Line (PFSEL) between Australia and Indonesia, which is non-binding but both Governments have agreed will continue to apply until the 1997 Perth Treaty enters into force.</p>	<p>The wellheads are located within the PFSEL. Any advice to Indonesia is handled by DFAT.</p>
<p>China Australia Migratory Birds Agreement (CAMBA)</p>	<p>This agreement is concerned with the protection of bird species that migrate between Australia and China. Implemented in EPBC Act 1999.</p>	<p>East Asian–Australasian Flyway encompasses both the Operational Area and EMBA. Migratory bird species protected by MNES status and this agreement is identified in Section 4.4.6.</p>
<p>Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979</p>	<p>The aim of the Bonn Convention is to conserve terrestrial, marine and avian species over the whole of their migratory range. The convention commits 'range states' to take action to conserve migratory species, especially those under threat.</p>	<p>Migratory species listed under the EPBC Act that may occur in the Operational Area and EMBA are identified in Section 4.4.6. Potential impacts and risks to relevant species are considered in Section 8.</p>

Treaties, Agreements and Conventions	Summary	Relevance to Operational Area
Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs)	The COLREGs outline internationally agreed rules for safe navigation, conduct and operation of vessels. Marine Order 30 enforces this convention.	The COLREGs are relevant to the project vessel conducting the ROV inspection activity.
International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004	The Convention aims to prevent the spread of harmful aquatic organisms from one region to another by establishing standards and procedures for the management and control of ships' ballast water and sediments.	This Convention is relevant for the project vessel conducting the ROV inspection. All vessels must comply with this Convention, implemented through the Biosecurity Act 2015 and the Australian Ballast Water Management Requirements 2017 (refer to Table 3-1), see above.
International Convention for the Protection of Pollution from Ships (1973) and protocol (1978) [MARPOL 73/78]	This convention is concerned with operational discharges of pollutants from ships. It deals with oil, noxious liquid substances, harmful packaged substances, sewage and garbage. It details the extent to which such substances can be released in different sea areas.	This Convention is relevant for the project vessel conducting the ROV inspection. The vessel must adhere to the relevant MARPOL requirements as implemented through Australian Marine Orders and <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (refer to Table 3-1).
International Convention for the Safety of Life at Sea (SOLAS), 1974	This convention describes the requirement for all merchant ship to comply with minimum safety norms. Implemented by the <i>Navigation Act 2012</i> .	This Convention is relevant for the project vessel conducting the ROV inspection. The vessel must meet the requirements of the SOLAS Convention as implemented through Australian Marine Orders and the <i>Navigation Act 2012</i> (refer to Table 3-1).
International Convention on the Control of Harmful Anti-fouling Systems on Ships	Prohibits the use of harmful organo-toxins in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems. Implemented by the <i>Protection of the Sea (Harmful Anti-fouling Systems) Act 2006</i> .	This Convention is relevant for the project vessel conducting the ROV inspection. The vessel must adhere to requirements of the Convention as implemented by the <i>Protection of the Sea (Harmful Anti-fouling Systems) Act 2006</i> (refer to Table 3-1).

Treaties, Agreements and Conventions	Summary	Relevance to Operational Area
Japan Australia Migratory Birds Agreement (JAMBA)	This agreement is concerned with the protection of bird species that migrate between Australia and Japan. Implemented by the EPBC Act 1999.	East Asian–Australasian Flyway encompasses the Operational Area and the EMBA. Migratory bird species protected by MNES status and this agreement are identified in Section 4.4.6.
Republic of Korea Australian Migratory Birds Agreement (ROKAMBA)	This agreement is concerned with the protection of bird species that migrate between Australia and the Republic of Korea. Implemented by the EPBC Act 1999.	East Asian–Australasian Flyway encompasses both the Operational Area and the EMBA. Migratory bird species protected by MNES status and this agreement are identified in Section 4.4.6.
United Nations Convention on the Law of the Sea 1982	The convention imposes obligations on State parties to prevent, reduce and control marine pollution from the various major pollution sources including pollution from the land, from the atmosphere, from vessels and from dumping.	In the case of a pollution occurrence the Convention will apply as implemented by the Protection of the Sea (Powers of Intervention) Act 1983 and Environmental Protection (Sea Dumping) Act 1981 (refer to Table 3-1).

## 4 DESCRIPTION OF ACTIVITIES

### 4.1 OVERVIEW

This EP covers the continued suspension of the Oliver-1 ST1, Oliver-2 and Tenacious West-1 ST1 wells in petroleum title areas AC/RL12 and AC/RL4. The wellheads are currently suspended on the seabed, isolated from the hydrocarbon zone and assessed as having adequate tested barriers, as outlined in the WOMP (Revision 3, PTTEP Technical Document HQ201907644.2). An ROV inspection of the three wells will be performed, which will validate the current well barrier status and inform future permanent plug and abandonment plans for the wells. An ROV will be deployed from a vessel to locate the three wellheads and perform visual inspection and leak testing activities.

### 4.2 ACTIVITY TIMING

PTTEP AA proposes that the wells continue to be suspended until they are plugged and abandoned. Plugging and abandonment is expected to be undertaken by the end of 2022.

An ROV inspection has been included in the scope of activities for this EP, which PTTEP AA plans to commence in the 1st quarter (Q1) of 2021. The commencement and duration of the ROV inspection activity may be extended if weather conditions are unfavourable or other operational delays occur. Therefore, the ROV inspection may occur during Q1 or Q2 of 2021. The exact timing of the ROV inspection is subject to vessel availability, weather, or other unforeseen circumstances outside of PTTEP AA's direct control (e.g. vessel or crew availability due to restrictions during the COVID-19 pandemic, if still applicable at the time). Upon arrival at each well location, the ROV drop and inspection is anticipated to take between two and six hours. The entire activity is expected to take approximately three days from arrival at the Operational Area.

The planned activity schedule and further justification is provided in the WOMP (Revision 3, PTTEP Technical Document HQ201907644.2).

### 4.3 LOCATION

The three wells are located in a remote area of the Timor Sea, over 260 km northwest of the Kimberley coastline of Western Australia (WA), and approximately 640 km west of Darwin, Northern Territory (NT) (Figure 1-1). Oliver-1 ST1 and Oliver-2 are located in permit area AC/RL12 and Tenacious West-1 ST1 is located in permit area AC/RL4.

The approximate well locations and water depths are provided in Table 4-1.

**Table 4-1: Suspended Well Locations and Depth**

Well Name	Latitude	Longitude	Water Depth (m)
Oliver-1 ST1	11° 38' 36.33" S	125° 0' 36.20" E	305
Oliver-2	11° 37' 48.34" S	125° 1' 31.36" E	307
Tenacious West-1 ST1	11° 51' 41.76" S	124° 53' 48.60" E	150

### 4.4 DETAILED ACTIVITY DESCRIPTION

#### 4.4.1 Details of the Suspended Wells

The three wells are listed in the National Offshore Petroleum Information Management System (NOPIMS) Petroleum Exploration Database as suspended. For technical specifications of each well and the well barriers, refer to the WOMP (WOMP Revision 3, PTTEP Technical Document HQ201907644.2). The WOMP contains detailed well information for each of the three suspended wells, including:

- well review and well barrier schematics;
- a Well Barrier Risk Assessment;

- a corrosion study of the two temporary suspended wells; and
- a third party (AZTECH Well Construction Pty Ltd) Risk Assessment Report on the three wells.

An in-depth review of the three wells has been completed, including an independent third party Well Integrity Assessment & Review and well risk assessment workshop. As a result of this review work, Oliver 2 was classified as having a “permanent independent verified barrier” suitable for Long Term Suspension. Tenacious West-1 ST1 and Oliver-1 ST1 were risk assessed as acceptable under the category “temporary independent verified barriers”, which is suitable for Long Term Suspension. Tenacious West-1 ST1 and Oliver-1 ST1 will eventually need to be re-entered to install additional barrier(s) during permanent plug and abandonment.

A summary of well suspension details is provided in Table 4-2. The wellheads are isolated from the hydrocarbon zone, risk assessed as having adequate tested temporary barriers for the duration of the well so far, and the foreseeable future. An emergency loss of well containment is not considered to be credible.

**Table 4-2: Well suspension summary**

Well Name	Permit Area	Total Measured Depth Below The Seabed (m)	Rig Release Date	Type of Suspension
Oliver-1 ST1	AC/RL 12	3,178	06-Feb-88	Long Term Suspension (Exploration or Appraisal Well) (2 Temporary Independent Barriers)
Oliver-2	AC/RL 12	2,901	08-Dec-09	Long Term Suspension (Exploration or Appraisal Well) (2 Permanent Barriers)
Tenacious West-1 ST1	AC/RL 4	2,856	11-Jul-98	Long Term Suspension (Exploration or Appraisal Well) (2 Temporary Independent Barriers)

#### 4.4.2 Operational Area

A boundary with a radius of 1 km from each well has been used to define the area in which the activity will take place, henceforth referred to as the Operational Area. The activities associated with the ROV inspection will take place within the Operational Area. It is noted that when outside the Operational Area (e.g. transiting to and from port), the project vessel is not managed under this EP and is subject to all applicable maritime regulations and other requirements.

#### 4.4.3 Project Vessel

A single project vessel will be used to carry crew and an ROV to the Operational Area. The exact vessel that will be contracted to perform the works is unconfirmed at this stage; however, conservative estimates of vessel specifications based on PTTEP AA's previous experience and vessels currently being used within the industry have been used to inform the impact and risk assessment section of this EP.

#### 4.4.4 Locating the Wellheads

The ROV will be launched once the project vessel is over the coordinates identified in Table 4-1. An attempt will be made to locate the wellhead using visual methods (i.e. cameras). However, if visual identification is unsuccessful, a high-resolution single-beam sonar head mounted to the ROV may be activated to provide an image of the seabed and assist locate the wellhead. If used, the sonar equipment will operate at frequencies of approximately 650 kHz to 1,350 kHz (lower range operating frequencies are expected to be approximately 650-720 kHz and upper range frequencies are expected to be approximately 900-1,350 kHz). The ROV will make progressively larger ‘sweeps’

around the wellhead coordinates, retracted up to 75 m from the seabed, until the wellheads are located. Sonar may be operated for between approximately 12 and 24 hours at each wellhead location; approximately 6-12 hours of this time is likely to be spent with the sonar operating at the lower-range operating frequencies of 650-720 kHz, while locating the metal wellhead structure.

#### **4.4.5 ROV Visual Inspection and Leak Testing Activities**

An ROV is a specialised submersible robot that is regularly used within the oil and gas industry to inspect offshore seabed infrastructure. For this activity, an ROV will be deployed from a vessel to help assess the integrity of the three suspended wells. The ROV will not be used for well intervention.

A tether containing power and communication cables will physically connect the ROV to the project vessel for the duration of the inspection surveys. The ROV will likely be a light work-class ROV and carry several pieces of survey equipment, including:

- Cameras and LED lights to capture images and video of the wellheads and immediate surrounding environment.
- A water jet and vacuum pump to clear away marine growth that may be present and inhibiting inspection activities.
- Water sampler to detect gas/hydrocarbons in the water column.

Leak testing activities involve collecting samples above each wellhead, if gas bubbles are present. Samples will be taken in the water column above the wellhead to a horizontal distance of about 10 m from the wellhead.

ROV inspection surveys are anticipated to take between 2 and 6 hours per wellhead. This timeframe may increase slightly if the crew encounters issues locating a wellhead.

#### **4.4.6 Integrity Monitoring**

In accordance with the WOMP, the status of the Oliver-1 ST1 and Tenacious West-1 ST1 wells, having temporary independent verified barriers, which requires an ROV inspection. A single ROV inspection is proposed for all three wells covered under this EP and is considered adequate to inform future permanent plug and abandonment plans for the wells. Upon confirmation that the three wellheads are not leaking, the wells will continue to be suspended for the duration of this EP.

The Oliver-1 ST1 and Tenacious West-1 ST1 wells require ROV inspection every three years, however, no other well monitoring activities are proposed under this EP. A revised WOMP and EP will be submitted for NOPSEMA acceptance prior to the well final plug and abandonment operations being performed, which will include a detailed ROV inspection of all three wells.

### **4.5 CONTINGENT ACTIVITIES**

The project vessel will make every attempt to locate each wellhead using provided coordinates, sonar and metal detecting equipment. In the event that a wellhead cannot be located with sonar/metal detecting equipment, the project vessel will record the attempt(s) and move onto the next wellhead (or back to port). The wells would continue to be safe, as per the WOMP risk assessment; given no visible hydrocarbon leaks and the additional detailed ROV inspection campaign that would be undertaken six months prior to plugging and abandonment.

No loss of well containment is expected given that the wells are categorised as Long Term Suspended wells with adequate barriers (with monitoring) (WOMP Revision 3, PTTEP Technical Document HQ201907644.2). In the unlikely scenario that the ROV inspection identified any leakage (i.e. bubbles) from a well, PTTEP AA will immediately commence a revision to this EP to install a blowout preventer and perform final plug and abandonment operations.

## **5 DESCRIPTION OF THE ENVIRONMENT**

### **5.1 OVERVIEW**

A description of the existing environment is provided in this section to identify relevant values and sensitivities of the physical, ecological, and socio-economic environment, as required by Regulations 4(1), 11(1)(a) and 13(2)(a)(b) of the OPGGS (E) Regulations. The existing environment is described in terms of the Operational Area and the broader environment that may be affected (EMBA) by the activities covered under this EP. The largest spatial extent that may be affected is based on an unplanned hydrocarbon spill resulting from a vessel collision (Section 5.1.1). The extent of detail provided in the existing environment is commensurate with the nature and scale of the activities described in Section 4.

#### **5.1.1 The Environment that May Be Affected**

The EMBA is a conservative approximation of the furthest extent that may be affected in any credible impact scenario. In this case, the EMBA represents an unplanned release of marine diesel oil (MDO) as described in Section 8.2.4.

The widest extent of the oil pollution-based EMBA is conservatively estimated based upon worst case discharge oil spill modelling presented in Section 8.2.4, using thresholds above which impacts from a spill may be expected to occur. For the purposes of this EP, PTTEP AA have defined two EMBA's that combine the potential spatial extent of surface and in-water (entrained and dissolved) hydrocarbons. The 'ecological EMBA' is based on thresholds above which ecological impacts are expected to occur. The 'socio-cultural EMBA' identifies a broader area in which a light sheen may be visible at the surface and therefore provides a conservative extent of potential impacts to socio-economic receptors associated with visual amenity (i.e. fisheries, tourism and recreation and indigenous heritage). The extent of the EMBA is shown in Figure 5-1.

It is important to note that the extent of the EMBA is based on stochastic spill modelling which compiles data from 300 hypothetical worst case spills under different environmental conditions. The trajectory of single spill would have a considerably smaller footprint. In the event of an actual hydrocarbon spill, modelling of the spill trajectory specific to the conditions at that time would be undertaken (known as deterministic modelling).

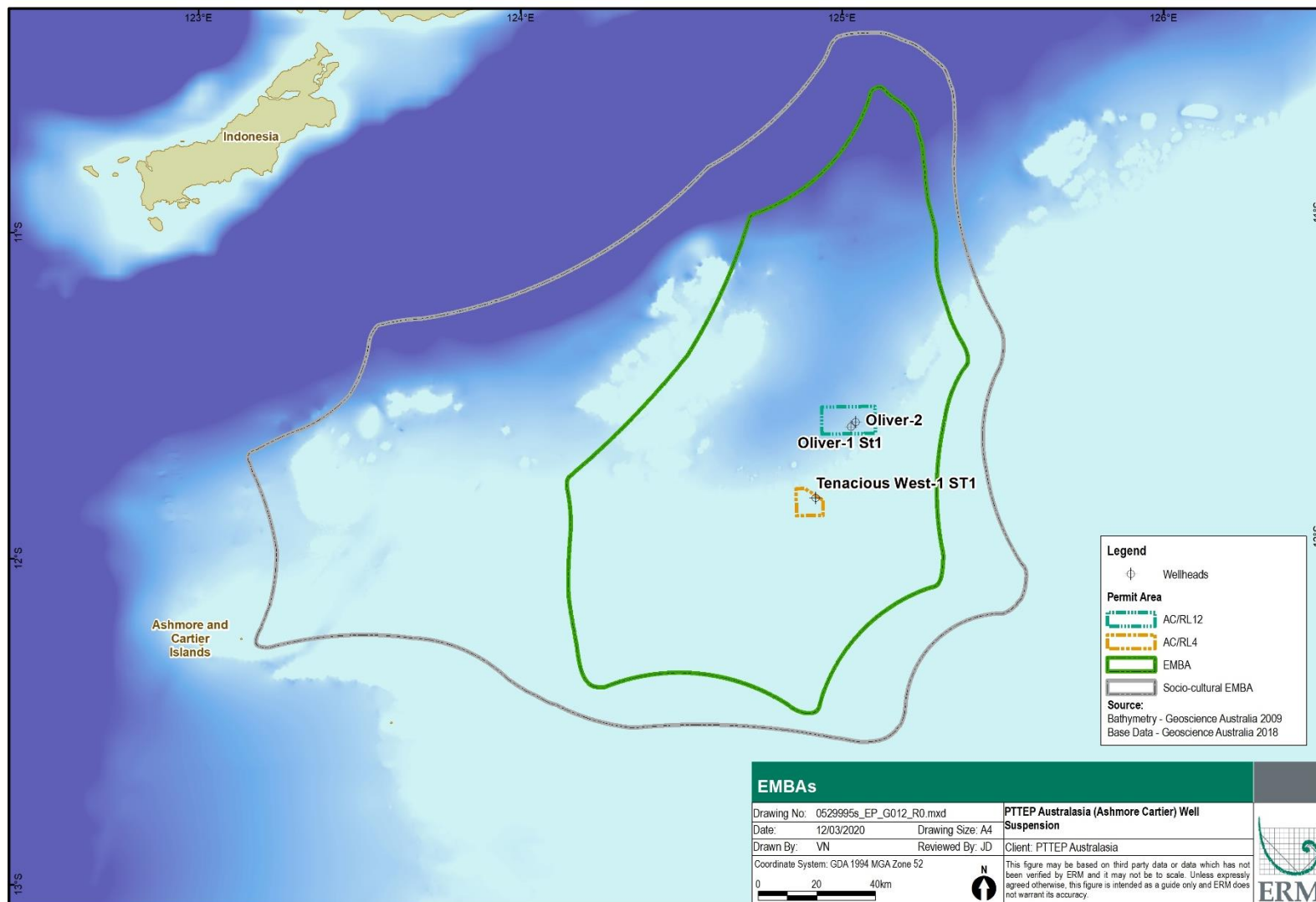


Figure 5-1: EMBA and socio-cultural EMBA in relation to the Operational Area

## 5.2 REGIONAL SETTING

### 5.2.1 Timor Sea

All three wellheads are located in a remote area of the Timor Sea (Figure 1-1). The Timor Sea is a relatively shallow sea occurring between Australia, Indonesia and East Timor, and is influenced by large-scale oceanic processes such as the Indonesian Throughflow and Timor Current. Major geomorphic features within the Timor Sea include the Australian continental shelf, continental slope and Timor Trough. Dozens of submerged banks and shoals are located on the continental slope between the Timor Trough and the Australian continental shelf, which support diverse assemblages of benthic communities.

### 5.2.2 North-west Marine Region

The offshore waters of Australia have been divided into six marine regions in order to facilitate their management by the Australian Government under the EPBC Act. The closest of these marine regions to the Operational Area is the North-west Marine Region (NWMR). The spatial extent of the NWMR terminates at the outer boundary of the Australian EEZ and therefore the three wellheads are technically located outside of the NWMR; however, since this boundary is jurisdictional in nature, the physical and ecological features of the NWMR are still considered relevant to this EP.

The NWMR has high species richness, but relatively low endemism compared with many other areas in Australian waters (DEWHA, 2008a). The majority of the region's species are tropical, and are found in other parts of the Indian Ocean and western Pacific Ocean. The NWMR has a large area of continental shelf and continental slope, with a range of bathymetric features such as canyons, plateaus, terraces, ridges, reefs, banks and shoals (DEWHA, 2008a). The continental shelf in the northern most part of the NWMR is described as a 'rimmed ramp', as the waters over the outer margins of the shelf are shallower than the middle portions. The ramp is a unique feature of the Australian margin in this region. The rim at its outer edge is the site of a number of coral reefs, including Ashmore Reef and Cartier Island.

The NWMR is further delineated into bioregions, as defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0) (DEH, 2006). The closest bioregion to the Operational Area is the Timor Province. The Timor Province provincial bioregion occupies the slope between Broome and Cape Bouganville in depths ranging from 200 m near the shelf break to 5920 m on the Argo Abyssal Plain (DEWHA, 2008a). Almost half of the reefs in the North-west Marine Region occur in the Timor Province, including Scott, Seringapatam and Ashmore reefs and Cartier Island (DEWHA, 2008a). The species composition of all the hard coral reefs in the bioregion is very similar and reflects strong links with Indo-west Pacific fauna. The reefs support a high biomass of fish species and provide important habitat for cetaceans and seabirds.

## 5.3 PROTECTED AREAS

### 5.3.1 Australian Marine Parks

The Australian Marine Park (AMP) Network has been established around Australia as part of a National Representative System of Marine Protected Areas, the primary goal of which is to contribute to the long-term conservation of marine ecosystems and protect marine biodiversity. The Operational Area is not located within or adjacent to any AMPs. The socio-cultural EMBA overlaps with the Sanctuary Zone (IUCN Category Ia) of the Ashmore Reef AMP (Figure 5-2).

The Ashmore Reef AMP covers an area of 583 km<sup>2</sup> and water depths from less than 15 m to 500 m (Director of National Parks (DNP), 2018). The cultural, heritage and socio-economic values associated with Ashmore Reef AMP include (DNP, 2018):

- tourism, recreation and scientific research activities;
- Indonesian artefacts and grave sites and Ashmore lagoon is still accessed as a rest or staging area for traditional Indonesian fishers travelling to and from fishing grounds within the MoU Box; and

- Ashmore Reef was listed on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing criteria A, B and C (refer Section 5.6.2).

The natural values of the AMP (including the coral reef ecosystem, demersal fish communities, migratory cetaceans, marine turtles, seabirds and migratory shorebirds) are not expected to be exposed to hydrocarbons above the thresholds that define the EMBA or at levels that may affect biological receptors. Therefore, the natural values of the AMP are not described or assessed further in this EP.

### **5.3.2 State Managed Reserves**

Western Australian Marine parks and reserves are created under the Conservation and Land Management Act to help to conserve marine biodiversity and are managed by the Department of Parks and Wildlife (DBCWA, 2019). No state managed marine reserves are located within, or adjacent to the Operational Area, EMBA or socio-cultural EMBA.

### **5.3.3 Key Ecological Features**

Key Ecological Features (KEFs) are components of the Commonwealth Marine Area recognised for their regional importance with respect to the region's biodiversity, ecosystem function and/or integrity (Commonwealth of Australia, 2012). No KEFs occur within or adjacent to the Operational Area.

The only KEF within the EMBA, the Carbonate bank and terrace system of the Sahul Shelf, is located over 30 km from the Operational Area but within the EMBA (Figure 5-3). The Carbonate bank and terrace system of the Sahul Shelf KEF is the most extensive region of banks and shoals in the Australian EEZ, forming a nearly continuous chain of complex submerged algal banks on the middle and outer shelf (Heap & Harris, 2008). Some banks in the chain rise to less than 30 m of the water surface and support higher levels of sessile benthic invertebrates including hard and soft corals, sponges, whips, fans and bryozoans (DoAWE, 2020). The KEF is regionally significant because it is a unique seafloor feature thought to enhance biodiversity and local productivity relative to its surrounds (DoAWE, 2020).

### **5.3.4 Wetlands of Conservation Significance (declared Ramsar wetlands)**

There are no "wetlands of international importance" under the Convention on Wetlands of International Importance (Ramsar Convention) within the Operational Area. The closest Ramsar wetland is Ashmore Reef Marine Park, over 190 km west of the Operational Area and outside the EMBA.

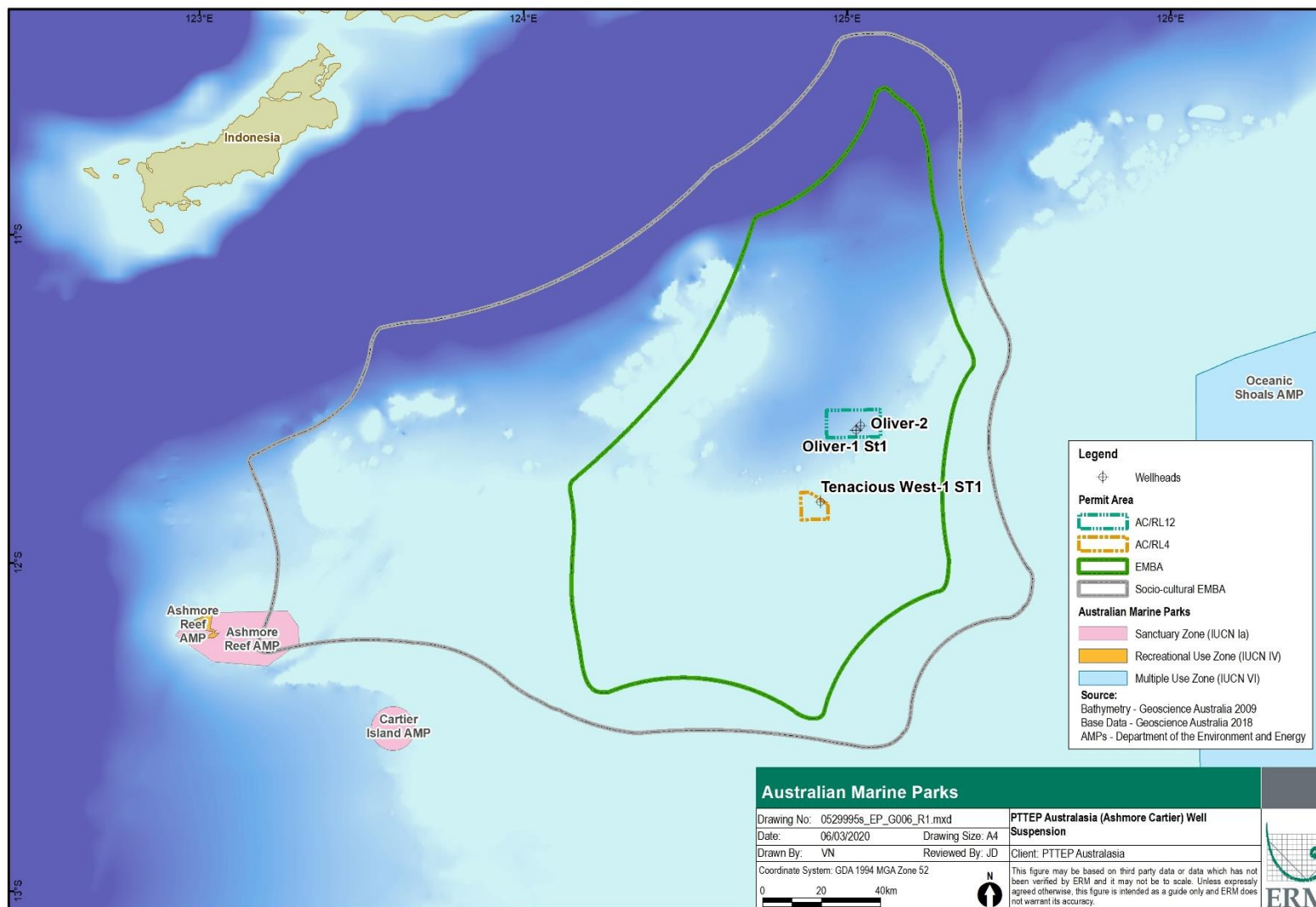


Figure 5-2: Australian Marine Parks

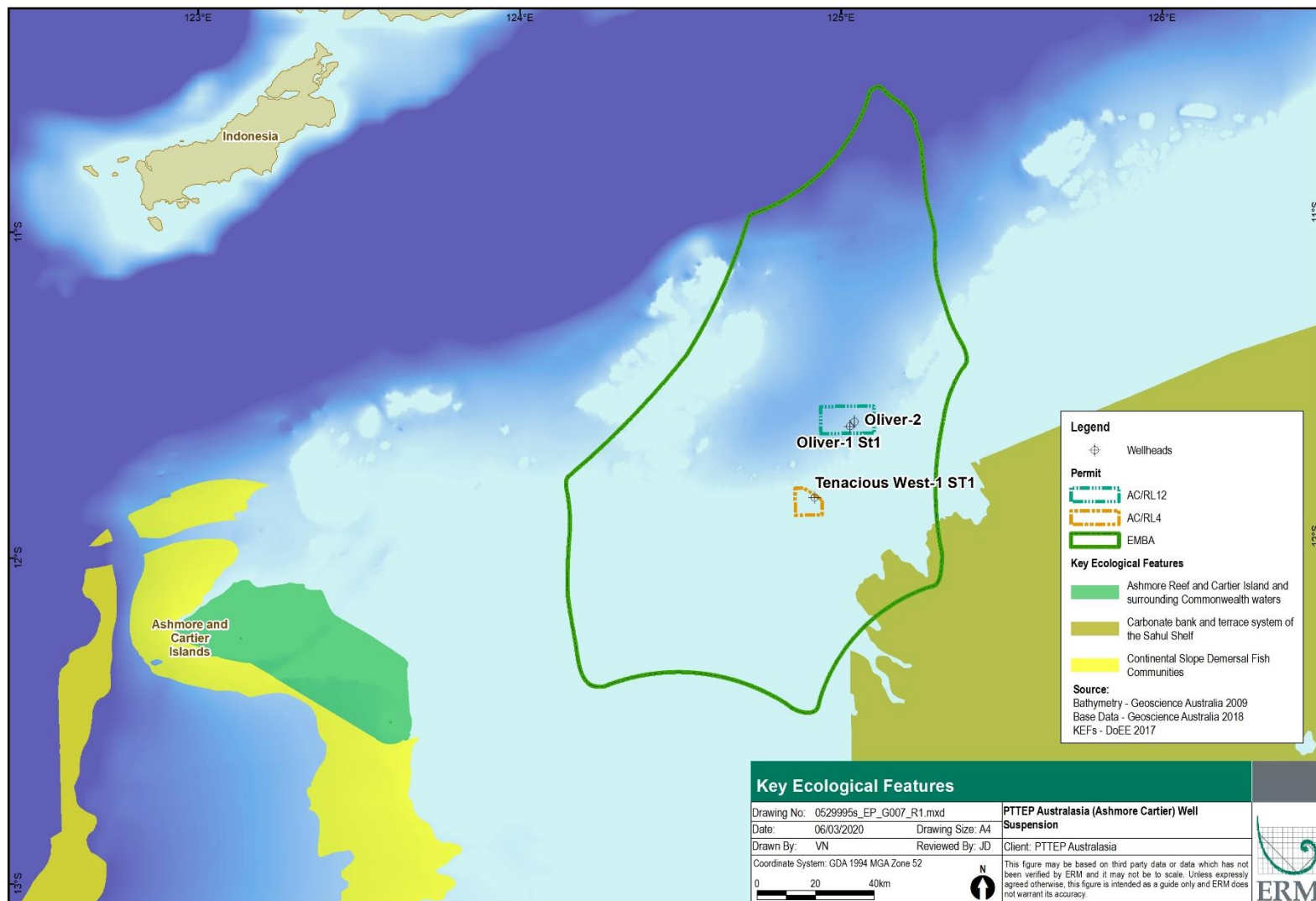


Figure 5-3: Key Ecological Features

## **5.4 PHYSICAL ENVIRONMENT**

### **5.4.1 Climate**

The Operational Area is located within a region characterised by two distinct seasons, a mild, dry winter during the months of April to September, and a hot, wet (monsoonal) summer during the months of October to March. Steady north-east to south-east winds (south-east trade winds) from April to September (dry season) caused by development and intensification of anticyclones over south-western Australia, bring predominantly fine conditions with low rainfall in most areas.

Cyclonic activity occurs from November to April and can bring very large amounts of rain, with strong swell and rough seas. Tropical cyclones usually form in an active monsoon trough, producing heavy rains, strong winds, large swells and storm surges. On average, about five cyclones occur each year in the region, two of which make landfall and one of which is severe (Category 3 or higher, with wind gusts exceeding 170 km/h) (Bureau of Meteorology (BoM), 2014). The chance of a severe cyclone occurring is highest in March and April (BoM, 2014).

### **5.4.2 Air Quality**

The Operational Area is located in offshore waters, over 260 km northwest of the Kimberley coastline of Western Australia, and approximately 640 km from Darwin. Given the distance from onshore anthropogenic influences, air quality in the region is expected to be high.

### **5.4.3 Oceanography**

Two oceanic currents dominate the offshore area between north-west WA and Indonesia: the Indonesian Throughflow and the Holloway Current (Figure 5-4). The Indonesian Throughflow influences the Timor Sea region and contributes to the South Equatorial Current, which flows westward and supplies the North West Shelf with warm, low saline water (Heyward et al., 1997). The Indonesian Throughflow is thought to be subject to the inter-annual variations of the El Niño-Southern Oscillation events (Heyward et al., 1997). The Holloway current is a surface current that flows parallel to the coastline along the North-West Shelf and provides a conduit to transport warmer, lower-salinity water from northern Australia into the Leeuwin current (Bahmanpour et al., n.d.).

Surface waves and sea swell in the region can vary widely in direction depending on wind direction, locations of major storms and local bathymetric features such as the shelf break or proximity to banks and shoals. In general, the maximum and mean sea swells are larger during the dry winter season than the summer wet season, as a result of the strong easterly wind-generated seas and larger winter swell from the Southern and Indian Oceans.

Seawater temperature in the region generally ranges from 26°C to 29°C at the surface and 14°C to 17°C at the seafloor (World Ocean Atlas, 2013). No specific water quality data is available for the Operational Area. Recent water quality profiles recorded at within petroleum permit AC/RL7 (less than 40 km from the Operational Area) during a 2017 marine baseline survey (O2 Marine, 2018) demonstrated all values are consistent within the range of the ANZECC and ARMCANZ (2000) guideline values and are considered typical concentrations for a tropical offshore environment (O2 Marine, 2018).

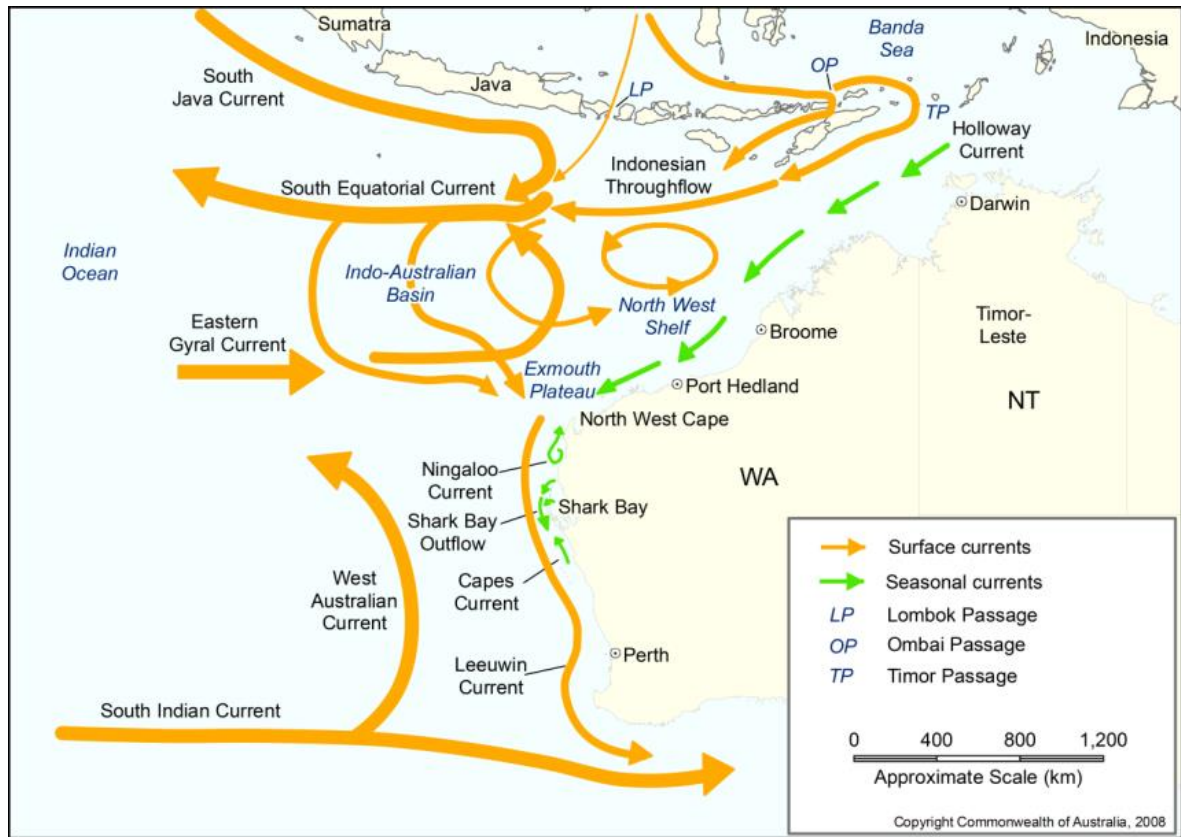


Figure 5-4: Key ocean currents influencing Western Australia (source: DEWHA, 2008a)

#### 5.4.4 Bathymetry and Seabed Geomorphology

The three wellheads are located on the continental slope in a zone of transition between the Sahul Shelf and Timor Trough. The Sahul Shelf ranges in width from 300 to 500 km and is generally characterised by soft sediments (Heyward et al., 1997). Water depths on the Sahul Shelf range from 50 and 140 m, before dropping sharply along the continental slope to 3,000 m in the Timor Trough (approximately 75 km south-east of the coastline of Timor-Leste) (Heyward et al., 1997). The three wellheads and the Operational Area are located in water depths ranging from approximately 150 m to approximately 310 m.

A series of submerged carbonate banks lie along the edge of the Sahul Shelf, which once formed a string of islands along the ancient coastline. Shoals and banks of the Sahul Shelf are abrupt geomorphological features that typically rise to within 5 to 30 m of the sea surface and extend along the continental shelf in a north-east/south-west direction. Shoals within the EMBA are shown in Figure 5-6 and described in detail in Section 5.5.2.2.

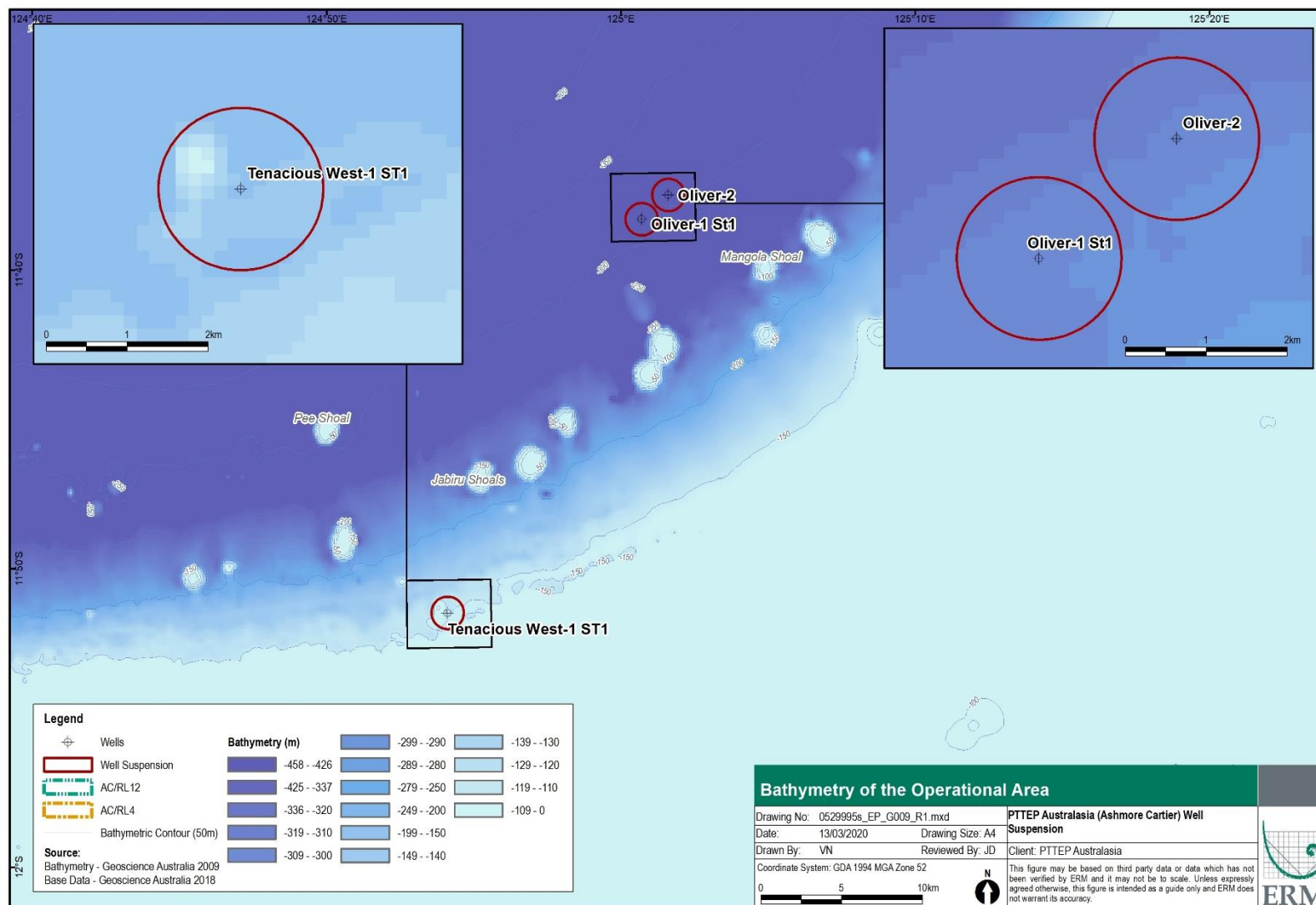


Figure 5-5: Bathymetry of the Operational Area

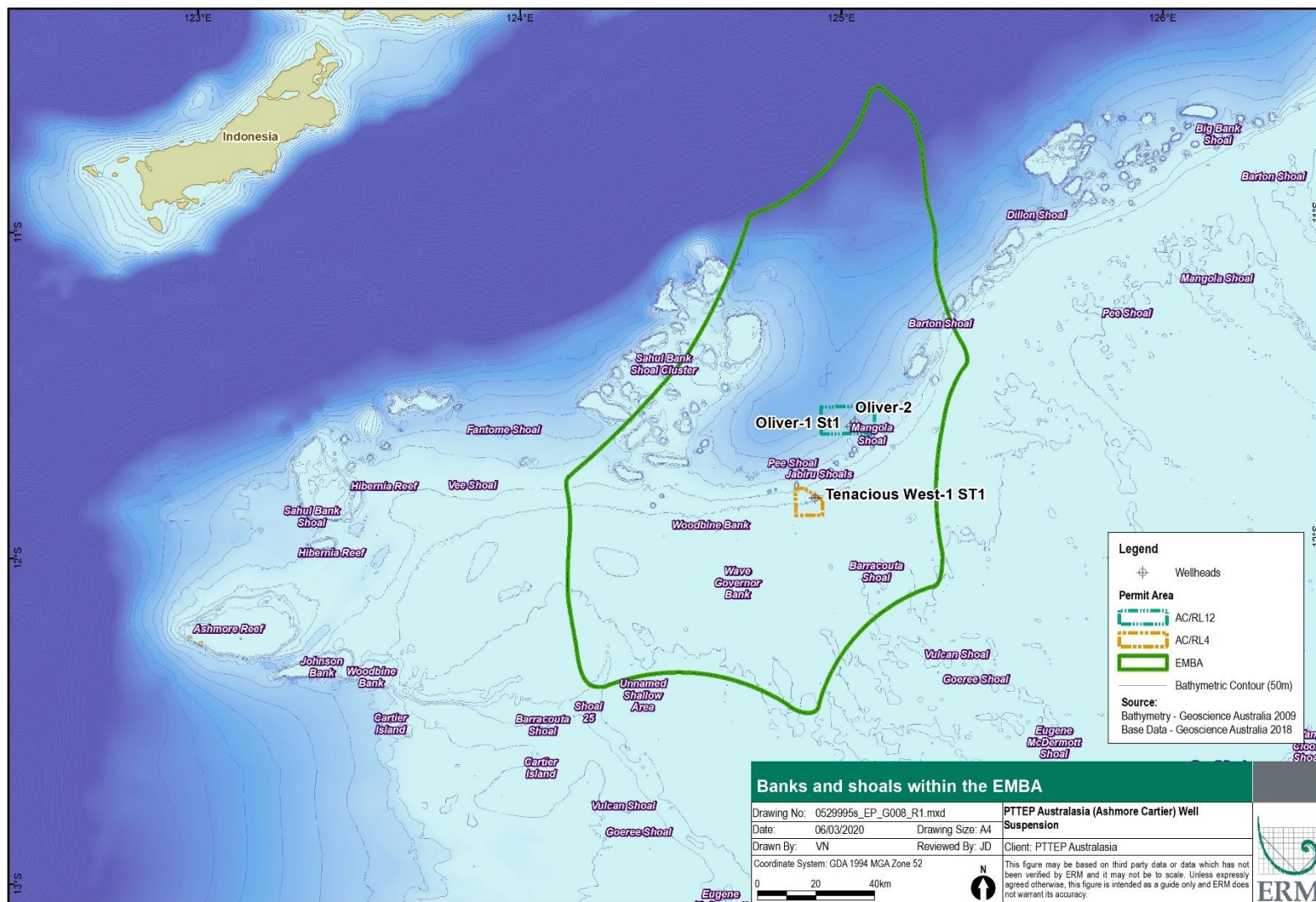


Figure 5-6: Banks and shoals within the EMBA

#### 5.4.5 Sediment Composition

Sediments in the NWMR generally become finer with increasing water depth, ranging from sand and gravels on the shelf to mud on the slope and abyssal plain. The distribution and re-suspension of sediments on the outer shelf and on the continental slope, sediment movement is primarily influenced by ocean currents and internal waves.

The sediments of the Sahul Shelf are predominantly coarse grained, while the deposits of the Timor Trough are silty clays (Van Andel & Veevers, 1967). These two deposits are separated a band of sand-silt-clay the top of the continental slope, where the Operational Area is located. This characterisation is also reflected in the general distribution of seafloor sediment in the Australian region described in the Coastal and Marine Resources Information System (CAMRIS) Project, which describes the sediment within the Operational Area as calcareous gravel, sand and silt (CSIRO, 2015). Benthic habitat mapping undertaken in 2010-11 and 2017 within permit area AC/RL7 (about 24 km west of the Operational Area) showed that sediment in this nearby area primarily composed of soft-sediment habitats of unconsolidated substrate (ERM, 2012; O2 Marine, 2018). The sediment in the Operational Area is expected to be similar.

### 5.5 BIOLOGICAL ENVIRONMENT

#### 5.5.1 Productivity and Planktonic Communities

The seasonal cycles and spatial distribution of biological productivity remains poorly understood. However, in general, the mixing of warm surface waters with deeper, more nutrient-rich waters (i.e. areas of upwelling) generates sporadic phytoplankton production and zooplankton blooms. Productivity booms are thought to be triggered by seasonal changes to physical drivers or episodic events, which result in rapid increases in primary production over short periods, followed by extended periods of lower productivity.

#### 5.5.2 Benthic Habitats and Communities

Spatial and temporal distribution of benthic fauna depends on factors such as sediment characteristics, depth and season. The softer, muddy substrates in this region are generally sparsely covered by sessile, filter-feeding organisms (such as gorgonians, sponges, ascidians and bryozoans) and mobile invertebrates (such as echinoderms, prawns, and detritus-feeding crabs) (Ramirez-Llodra et al., 2010). The harder substrates have a more diverse range of sessile benthos (such as hard and soft corals, gorgonians, encrusting sponges and macroalgae).

##### 5.5.2.1 Soft-sediment Habitats

Benthic habitat mapping and macrofauna sampling was undertaken in 2010-11 and 2017 within permit area AC/RL7, about 24 km west of the Operational Area (ERM, 2012; O2, Marine 2018). Within the AC/RL7 permit area, benthic habitats were comprised of white sandy substrate with shell grit, and sites were primarily homogenous, flat, featureless soft-sediment habitats (Section 5.4.4). Epibenthic macrofauna were sparse, with sea stars and small bony fish the only fauna recorded. The absence of hard substrate is considered a limiting factor for recruitment of epibenthic organisms. In both surveys, Annelida (polychaete bristleworms) and Malacostracea (crabs, shrimp) were recorded as the two most abundant taxa. Also recorded, albeit to a lesser degree, were sea squirts, ostracods, sea spiders, echinoderms, molluscs, bryozoa, round worms, ribbon worms, peanut worms, flatworms, sea anemones, and sponges. Given the similar water depths and geomorphology, the Operational Area is expected to support similar soft-sediment habitats and benthic communities.

##### 5.5.2.2 Banks, Shoals and Reef Communities

Shoal systems support diverse biological communities including corals, sponges, seagrasses and a variety of reef fish, with dominant organisms ranging from the algal species *Halimeda* to soft and hard coral communities (Heyward et al., 1997). The benthic communities of the shoals may act as a stepping-stone for enhanced biological connectivity throughout both the submerged and emergent reef systems of Australia's north-west (Heyward et al., 2011).

No named or unnamed banks or shoals are known to occur with the Operational Area, however several are located within the EMBA (Figure 5-6), including:

- Mangola Shoal and adjacent unnamed shoals, located about 6 km south-east of the Oliver-2 Operational Area with a shallowest depth of about 9 m (Heyward et al. 2011; National Imagery and Mapping Agency 2004);
- Jabiru Shoals, located about 7 km north of the Tenacious West-1 ST1 Operational Area (shallowest depth not available);
- Pee Shoal, located about 13 km north-west of the Tenacious West-1 ST1 Operational Area with a shallowest depth of about 10.3 m (Heyward et al. 2011; National Imagery and Mapping Agency 2004); and
- the Sahul Bank Shoal cluster, located about 42 km east of the Operational Area with a shallowest depth range of about 5-29.5 m (Heyward et al. 2011; National Imagery and Mapping Agency 2004).

Pee Shoal and five additional unnamed shoals in the vicinity of the Operational Area were surveyed in 2010 as part of the Cash Maple marine baseline surveys (ERM, 2012). Abiotic cover was characterised by patches of coarse sand, fields of coral rubble and patches of consolidated reef matrix for the shallowest areas and upper slopes. The lower slopes (>60 m) were composed of sand with patches of rubble and dead coral with algae. The rubble fields, particularly in the shallows, were composed of coral fragments (*Acropora* branches) and are evidence of the storm surge damage that must take place with periodic storms and cyclones.

Shoals surveyed were characterised by a diverse tropical ecosystem. All shoals had moderate to high cover of live hard coral and low to moderate octocoral cover at the shallowest depths. Hard coral communities were comprised predominantly of small to large sized *Porites* (large, slow-growing corals) and *Acropora* (a diverse number of branching and tabulate, fast-growing corals).

#### 5.5.2.3 Seagrass and Macroalgae

Seagrasses are marine flowering plants and important benthic primary producers. The maximum depth of seagrass is largely controlled by the availability of light, restricting these species to shallow waters. Seagrass meadows of *Halophila* spp. have been recorded up to depths of up to 60 m (Chin, 2005). Therefore, no seagrasses or macroalgae are expected to occur within the Operational Area due to water depths greater than 150 m. The shoals within the region rise to depths of between 60 and 30 m and therefore, however no macroalgae was reported as a result of the abovementioned benthic habitat mapping undertaken during the 2010-11 and 2017 marine baseline surveys (ERM, 2012; O2 Marine, 2018).

#### 5.5.3 Fish Assemblages

Coral reefs in the Timor Province and wider Indo-Pacific region support a high biomass of fish species, including coral trout, emperors, snappers, as well as larger pelagic species such as trevally, dolphinfish, marlin and sailfish (DEWHA, 2008a). The Operational Area does not contain any shoals are reefs that may provide important fish spawning habitat. Demersal fish surveys undertaken in 2010-11 and 2017 within permit area AC/RL7 (about 24 km west of the Operational Area, in comparable water depths and seabed habitats) indicate that low numbers of fish are present within the permit area (ERM, 2012; O2 Marine, 2018). The number of fish in the Operational Area is expected to be similar.

Shoals and banks within the EMBA (Section 5.4.4) are linked to higher productivity and habitat that is likely to provide spawning grounds for some species. Potential spawning grounds also exist in the EMBA for commercially important species such as goldband snapper, and red emperor. The spatial occurrence of spawning is variable and poorly understood; however, temporally it appears that goldband snapper have an extended peak spawning period from November to May, and red emperor from September to June (with bimodal peaks from September to November and January to March) (DPIRD, 2019). None of these species are listed as threatened; however, they are commercially valuable.

#### **5.5.4 Listed Marine Fauna of Conservation Significance**

DoAWE's Protected Matters Search Tool (PMST) was used to identify threatened and/or migratory species that may occur within the Operational Area and EMBA. In total, the PMST identified 15 threatened and 26 migratory species that may occur within the Operational Area. An additional three threatened species were identified as potentially occurring within the EMBA. These species are described below in Table 5-1.

No threatened ecological communities were identified within the Operational Area or EMBA.

Table 5-1: Description of EPBC Listed Threatened and/or Migratory species and their potential occurrence within the Operational Area

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
<b>Mammals</b>					
<i>Balaenoptera borealis</i>	Sei Whale	Vulnerable	Migratory	Operational Area and EMBA	Sei whales are a cosmopolitan species, found in the waters off all Australian states. Sei whales show well-defined migratory movements between polar, temperate and tropical waters, which are essentially north-south with little longitudinal dispersion. Breeding in this species is known to occur in tropical and subtropical waters; however, there are no known mating or calving areas in Australian waters.  Sei whales may occasionally transit through the Operational Area and wider EMBA.
<i>Balaenoptera edeni</i>	Bryde's Whale	N/A	Migratory		Bryde's whales are found year-round in tropical and warm temperate waters, both oceanic and inshore. No specific feeding or breeding grounds have been identified in Australian waters. The offshore form appears to undergo extensive migrations between subtropical and tropical waters during the winter months. Ambient noise monitoring conducted in the AC/RL7 permit area (about 24 km west of the Operational Area) and the Oliver and Southern fields between December 2010 and December 2011 recorded Bryde's whales at all three sites with no seasonal cycle observed (McPherson et al., 2012).  Given its wide distribution and year-round presence in this region, this species may be present in the Operational Area and are likely to be present year-round in low numbers within the EMBA.
<i>Balaenoptera musculus</i>	Blue Whale	Endangered	Migratory		Two sub-species of blue whale occur within Australian waters: Antarctic blue whale ( <i>B. m. intermedia</i> ) and pygmy blue whale ( <i>B. m. breviceauda</i> ). Blue whales that may be present at the latitudes of the Operational Area will be pygmy blue whales, specifically the East Indian Ocean (EIO) pygmy blue whale (McCauley et al., 2018). Northward migrations pass Scott Reef between June and August, and southward migrations down the WA coast pass Scott Reef between October and December (Double et al., 2014). Breeding areas are

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
					<p>unconfirmed, but likely include the Indonesian archipelago (Kahn, 2012). Ambient noise monitoring in the AC/RL7 permit area (about 24 km west of the Operational Area) recorded pygmy blue whale calls during June and September 2011 (McPherson et al., 2012).</p> <p>Given the proximity of the pygmy blue whale migration BIA (about 26 km north of the Operational Area), these animals are likely to be encountered in low numbers in the Operational Area and EMBA, particularly during migration periods (June to August and October to December).</p>
<i>Balaenoptera physalus</i>	Fin Whale	Vulnerable	Migratory		<p>Fin whales are a cosmopolitan species that occur from polar to tropical waters, but rarely in inshore waters (DoAWE, 2020). It is likely that fin whales migrate between Australian waters and Antarctic feeding areas, sub-Antarctic feeding, and tropical breeding areas (Indonesian, northern Indian Ocean, and south-west South Pacific Ocean waters). Southern Hemisphere breeding occurs between May and June, however there is insufficient data to prescribe migration times for fin whales (DoAWE, 2020).</p> <p>Based on the cosmopolitan distribution of the species, fin whales may occasionally transit through the Operational Area and wider EMBA.</p>
<i>Megaptera novaeangliae</i>	Humpback Whale	Vulnerable	Migratory		<p>In general, the species utilises the Camden Sound breeding grounds from May to October. Humpback whales are often sighted as far north as Ashmore Reef, although they typically occur in waters nearer the mainland coastline, and Camden Sound appears to be the northernmost limit for the majority of the West Australian population. Ambient noise monitoring in the AC/RL7 permit area over a six-month period (June to December 2011) recorded humpback whale calls on one day only in October (McPherson et al., 2012).</p> <p>Humpback whales are unlikely to occur within the Operational Area, however may infrequently transit through the wider EMBA.</p>
<i>Orcinus orca</i>	Killer Whale	N/A	Migratory		<p>Killer whales are a cosmopolitan species and may be seen in any marine region (DoAWE, 2020). Off Australia, killer whales are most</p>

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
					often seen along the continental slope and on the shelf, particularly near pinniped colonies. Killer whales are known to make seasonal movements, and probably follow regular migratory routes. However, no information regarding these movements is available for killer whales in Australian waters. Ambient noise monitoring conducted in the AC/RL7 permit area and the Oliver and Southern fields between December 2010 and December 2011 recorded a single killer whale at the AC/RL7 station in August 2011 (McPherson et al., 2012).
<i>Physeter macrocephalus</i>	Sperm Whale	N/A	Migratory		Sperm Whales have been recorded from all Australian states (Bannister et al., 1996). Females and young male Sperm Whales are restricted to warmer waters, generally north of approximately 45° S. Sperm Whales tend to inhabit offshore areas with a water depth of 600 m or more, and are uncommon in waters less than 300 m deep (NOAA, 2010).
<i>Tursiops aduncus</i>	Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	N/A	Migratory		Bottlenose dolphins are found in tropical and sub-tropical coastal and shallow offshore waters of the Indian Ocean, Indo-Pacific Region and the western Pacific Ocean. In Australia, the Indo-Pacific bottlenose dolphin is restricted to inshore areas such as bays and estuaries, nearshore waters, open coast environments, and shallow offshore waters including coastal areas around oceanic islands.  Due to the predominantly coastal distribution of this species, they are not expected to occur in the Operational Area but limited numbers may be present in the EMBA.
<b>Sharks</b>					
<i>Carcharodon carcharias</i>	White Shark	Vulnerable	Migratory	Operational Area and EMBA	The white shark is widely, but sparsely, distributed in all seas including cold temperate waters in both hemispheres. It is most frequently observed and captured in coastal temperate and subtropical regions, but has also been observed in tropical areas (e.g. the Coral Sea, Papua New Guinea). Accurate population assessments are not yet possible for any region (Bruce, 2008). Given its preference for

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
					temperate, coastal areas, this species is unlikely to be common in the Operational Area.
<i>Anoxypristis cuspidate</i>	Narrow Sawfish	N/A	Migratory		The narrow sawfish is an Indo-West Pacific species occurring from the Arabian Gulf to Australia and north to Japan (IUCN, 2017). The narrow sawfish is a benthic-pelagic species that occurs from inshore and estuarine areas to offshore habitat of up to 100 m depth. Given the relatively shallow-water distribution of this species, it is unlikely to be present in the Operational Area.
<i>Glyphis garricki</i>	Northern River Shark	Endangered	N/A		Within Australia, northern river sharks are known to occur in rivers, tidal sections of large tropical estuarine systems, macrotidal embayments, inshore and offshore marine habitats in Western Australia and the Northern Territory (DoE, 2014; Pillans et al., 2009). The relationship between the Australian and global populations is poorly understood (DoE, 2014).
<i>Pristis pristis</i>	Freshwater Sawfish	Vulnerable	Migratory		The Freshwater Sawfish is mainly confined to the main channels of large rivers of northern Australia from the Fitzroy River, Western Australia, to the western side of Cape York Peninsula, Queensland (Allen, 2000, pers. comm. Cited in DoAWE, 2020). Sub-adult Freshwater Sawfish predominantly occur in rivers and estuaries, while large mature animals tend to occur more often in coastal and offshore waters up to 25 m depth (Giles et al., 2006; Stevens et al., 2005).
<i>Pristis zijsron</i>	Green Sawfish	Vulnerable	Migratory		Green sawfish are distributed in coastal waters from Queensland across northern Australia to Shark Bay in Western Australia, with some records identifying green sawfish hundreds of kilometres offshore in relatively deep water (Stevens et al., 2005). Adult green sawfish inhabit both inshore and offshore waters, but appear to preference shallow inshore waters (Stevens et al., 2005).
<i>Rhincodon typus</i>	Whale Shark	Vulnerable	Migratory		The Whale Shark is an oceanic and coastal, tropical to warm-temperate pelagic species that is generally encountered close to or at the surface, but can make dives to around 1000 m in search of prey

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
					(DoAWE, 2020; Compagno, 1984). In Australia, the Whale Shark is most commonly seen in waters off northern Western Australia, Northern Territory and Queensland (Compagno, 1984; Last & Stevens, 1994).  Whale shark foraging is noted to occur in the region, from Ningaloo Reef to waters in the Timor Sea, in spring (between July and November) (Sleeman et al. 2010; Wilson et al. 2006; Reynolds et al. 2017). A BIA is designated for whale shark foraging, which is located approximately 3 km south of the Operational Area.
<i>Isurus paucus</i>	Longfin Mako	N/A	Migratory		The longfin mako is a widely distributed, but rarely encountered, tropical ocean shark. This species appears to be cosmopolitan in tropical and warm temperate waters; however, at present, records are sporadic and the complete distribution remains unclear (IUCN, 2017).
<i>Isurus oxyrinchus</i>	Shortfin Mako	N/A	Migratory		The shortfin mako has a circum-global distribution inhabiting tropical and temperate waters (Last & Stevens, 2009). To date, the shortfin mako has not been recorded in the Arafura Sea (Threatened Species Scientific Committee (TSSC), 2014) and therefore is not expected to occur within the Operational Area.
<i>Manta birostris</i>	Giant Manta Ray	N/A	Migratory		The giant manta ray has a circum-tropical and semi-temperate distribution throughout the world's major oceans. Within this broad range, populations appear to be sparsely distributed and highly fragmented (Marshall et al., 2018). The giant manta ray appears to be a seasonal visitor to coastal or offshore sites, and are capable of large-scale movements (>1,000 km; Kashiwagi et al., 2011). Whilst largely solitary, giant mantas can aggregate in large numbers to feed, mate or clean.
<i>Manta alfredi</i>	Reef Manta Ray	N/A	Migratory		The reef manta ray has a circumtropical and subtropical distribution, existing in the Pacific, Atlantic and Indian Oceans. Within this broad range, populations appear to be sparsely distributed and highly fragmented (Marshall et al., 2019). The reef manta is often resident in or along productive near-shore environments, such as island groups,

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
					atolls or continental coastlines (Marshall et al., 2019). However, individuals have been reported to make seasonal migrations of several hundred kilometres (Couturier et al., 2011).
<b>Marine Reptiles</b>					
<i>Caretta caretta</i>	Loggerhead Turtle	Endangered	Migratory	Operational Area and EMBA	<p>In WA, loggerhead turtles inhabit coral and rocky reefs, seagrass beds and muddy bays (Limpus, 1995; Limpus et al., 1992; Prince, 1994). They predominantly feed on benthic invertebrates in depths ranging from nearshore to 55 m (DoAWE, 2020; Plotkin et al., 1993).</p> <p>Adult green turtles feed on mainly seagrass, algae, egg fish cases, jellyfish and sponges (DoAWE, 2020). Post-nesting migratory routes for green turtles recorded for Barrow Island and mainland NWMR generally travelled east or south of Barrow Island, where they forage in coastal waters less than 25 m deep (Chevron, 2015).</p> <p>Hawksbill turtles are omnivorous, feeding on a variety of plant and animal species, including sponges, octopus, squid, jellyfish, seagrass and algae in nearshore habitat (DoAWE, 2020). Tracking data of hawksbill turtles in the NWMR indicate the turtles travel and forage in coastal waters less than 10 m deep (Chevron, 2015).</p> <p>Flatback turtles inhabit shallow, soft-bottomed seabed habitats and feed mostly on soft bodied prey such as sea cucumbers, soft corals and jellyfish (DoAWE, 2020). Movements of flatback turtles within the NWS are confined to longshore movements in nearshore coastal waters or travel between island rookeries and the adjacent mainland (Chevron, 2015; Whittock et al., 2014).</p>
<i>Chelonia mydas</i>	Green Turtle	Vulnerable	Migratory		
<i>Dermochelys coriacea</i>	Leatherback Turtle	Endangered	Migratory		
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Vulnerable	Migratory		
<i>Natator depressus</i>	Flatback Turtle	Vulnerable	Migratory		
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	Endangered	Migratory		
<i>Aipysurus apraefrontalis</i>	Short-nosed Seasnake	Critically Endangered	N/A	EMBA only	<p>Sea snakes are essentially tropical in distribution and are typically found in shallow inshore regions and islands however, they also occur further offshore at atolls such as Scott Reef, Ashmore Reef, Cartier Island and Hibernia Reef (Guinea, 2006). Only a few species of sea snake are known to inhabit deep pelagic environments, with</p>
<i>Aipysurus foliosquama</i>	Leaf-scaled Seasnake	Critically Endangered	N/A		

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
					<p>observations indicating that most sea snakes are rarely found in depths exceeding 30 m (Cogger 1975).</p> <p>Sea snakes are therefore not expected to be common in the Operational Area. Given the restricted distribution of the former and the shallow-water preference of seasnakes, they may be present in the EMBA around banks and shoals.</p>
<b>Seabirds</b>					
<i>Anous tenuirostris melanops</i>	Australian Lesser Noddy	Vulnerable	N/A	Operational Area and EMBA	<p>The avifauna of the north-west Australia offshore area consists of tropical and sub-tropical breeding seabird species, and non-breeding migratory shorebirds. Several seabird BIAs extend out from Ashmore Reef, however none overlap with the Operational Area. The closest seabird BIA is a foraging area for the greater frigatebird, which extends to within about 90 km of the Operational Area. The islands at Ashmore Reef are regarded as supporting some of the most important seabird rookeries in the north-west Australian offshore area.</p> <p>Breeding seabirds also make use of other offshore islands within the region, with breeding typically occurring from mid-April to mid-May (Clarke, 2010). 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. The annual cycle for shorebirds in the flyway has four approximate periods: breeding (outside Australia; May to August), southward migration (August to November); non-breeding (in Australia; December to February); and northward migration (March to May).</p> <p>There are no important sites for migratory shorebirds within the Operational Area; however, given their migratory nature, it is expected that some individuals may pass through Operational area and wider EMBA.</p>
<i>Calidris canutus</i>	Red Knot	Endangered	Migratory		
<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered	Migratory		
<i>Numenius madagascariensis</i>	Eastern Curlew	Critically Endangered	Migratory		
<i>Anous stolidus</i>	Common Noddy	N/A	Migratory		
<i>Calonectris leucomelas</i>	Streaked Shearwater	N/A	Migratory		
<i>Fregata ariel</i>	Lesser Frigatebird	N/A	Migratory		
<i>Fregata minor</i>	Great Frigatebird	N/A	Migratory		
<i>Actitis hypoleucos</i>	Common Sandpiper	N/A	Migratory		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	N/A	Migratory		

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Operational Area / EMBA occurrence*	Description of Species and Potential to Occur Within the Operational Area and Wider EMBA.
<i>Calidris melanotos</i>	Pectoral Sandpiper	N/A	Migratory		
<i>Papasula abbotti</i>	Abbott's Booby	Endangered	N/A	EMBA only	

\*as identified by the PMST for the Operational Area and EMBA

#### 5.5.4.1 Conservation Management Plans

A number of management policies, guidelines, plans and other materials exist for threatened species listed under the EPBC Act. The objectives of Recovery Plans and Conservation Advice seek to support the long-term recovery of threatened species. This is undertaken through defining the research and management measures to be undertaken to minimise the potential for the decline of, and support the recovery of a species, including the management of threatening processes. The management plans or conservation advices for the species identified by the PMST are summarised in Table 5-2.

**Table 5-2: Conservation management plans relevant to the species identified in the PMST search and where this assessed in the EP.**

Species	Recovery Plan / Conservation Advice	Key Threats Identified in the Plan / Conservation Advice and Relevant EP Section)
All vertebrate fauna	Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018).	Marine debris, including from vessels (Section 8.2.2).
Sei whale	Conservation advice Balaenoptera borealis sei whale (TSSC, 2015a).	Noise interference (Section 8.1.3) and vessel disturbance (Section 8.2.1).
Blue whale	Conservation management plan for the blue whale: A recovery plan under the Environment Protection and Biodiversity Conservation Act 1999 2015-2025 (Commonwealth of Australia, 2015a).	Noise interference (Section 8.1.3) and vessel disturbance (Section 8.2.1).
Fin whale	Conservation advice Balaenoptera physalus fin whale (TSSC, 2015b).	Noise interference (Section 8.1.3) and vessel disturbance (Section 8.2.1).
Humpback whale	Approved conservation advice for Megaptera novaeangliae (humpback whale) (TSSC, 2015c).	Noise interference (Section 8.1.3) and vessel disturbance (Section 8.2.1).
Loggerhead turtle, hawksbill turtle, green turtle, and flatback turtle	Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia, 2017).	Noise interference (Section 8.1.3) and vessel disturbance (Section 8.2.1).
White Shark	Recovery plan for the white shark (Carcharodon carcharias) (DSEWPac, 2013).	No additional threats/actions identified (excluding marine debris/pollution) that are relevant to the continued suspension of the wells or ROV inspection.
Northern River Shark	Sawfish and river shark multispecies recovery plan (DoE, 2015a). Approved Conservation Advice for <i>Glyphis garricki</i> (northern river shark) (DoE, 2014a).	
Freshwater Sawfish	Sawfish and river shark multispecies recovery plan (DoE, 2015a) Approved Conservation Advice for <i>Pristis pristis</i> (largetooth sawfish) (DoE, 2014b)	

Species	Recovery Plan / Conservation Advice	Key Threats Identified in the Plan / Conservation Advice and Relevant EP Section)
Green Sawfish	Sawfish and river shark multispecies recovery plan (DoE, 2015a)  Approved conservation advice for green sawfish (DEWHA, 2008b).	Oil spills recognised as a threat (Section 8.2.4; Section 8.2.5).  No additional threats/actions identified (excluding marine debris/pollution) that are relevant to the continued suspension of the wells or ROV inspection.
Whale Shark	Conservation advice <i>Rhincodon typus</i> whale shark (TSSC, 2015d)	
Australian Lesser Noddy	Conservation Advice <i>Anous tenuirostris melanops</i> Australian lesser noddy (TSSC, 2015e)	
Red Knot	Conservation advice <i>Calidris canutus</i> red knot (TSSC, 2016a)	
Curlew Sandpiper	Conservation advice <i>Calidris ferruginea</i> curlew sandpiper (DoE, 2015b)	
Eastern Curlew	Conservation advice <i>Numenius madagascariensis</i> eastern curlew (DoE, 2015c)	
Abbott's Booby	Conservation Advice <i>Papasula abbotti</i> Abbott's booby (TSSC, 2015f)	

#### 5.5.4.2 Habitat Critical to the Survival of a Species

The EPBC Act 1999 requires that habitat critical to the survival of a listed threatened species is identified in the Recovery Plan of that species. No habitat critical to the survival of a species was identified to overlap the Operational Area or the EMBA. The closest habitat critical to the survival of a species to the Operational Area is for green turtle nesting at Cartier Island (Commonwealth of Australia, 2017), located over 140 km south-west of the Operational Area and outside the EMBA. Note that although the pygmy blue whale migration BIA is located 26 km north of the Operational Area, the Conservation Management Plan for the Blue Whale states that it is not currently possible to define habitat critical to the survival of blue whales.

#### 5.5.4.3 Biologically Important Areas

BIAs have been identified, described and mapped for protected species under the EPBC Act through the marine bioregional planning program. BIAs are spatially and temporally defined areas or regions where species protected under the EPBC Act display biologically important behaviours, such as breeding, foraging, resting or migration. They are therefore areas of particular importance for the conservation of protected species.

A review of the Conservation Values Atlas confirmed no BIAs overlap the Operational Area. Two BIAs occur within the EMBA, including the:

- pygmy blue whale migration BIA (approximately 26 km north of the Operational Area); and
- whale shark foraging BIA (approximately 3 km south of the Operational Area).

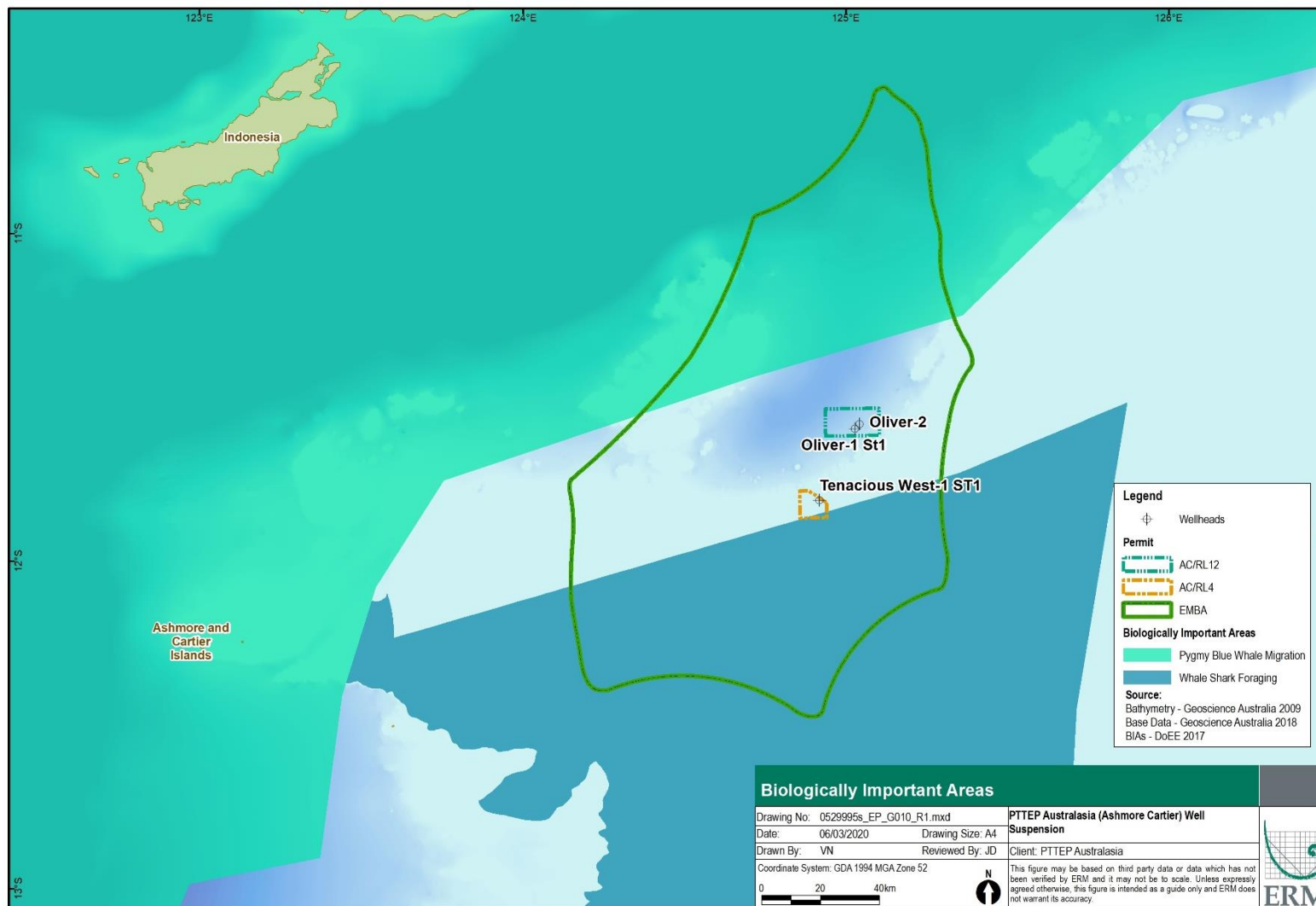


Figure 5-7: BIAs within the EMBA

## 5.6 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

### 5.6.1 Jurisdictional Arrangements with Indonesia

The wellheads are located within Australia's 200 nautical mile (NM) Exclusive Economic Zone (EEZ) as defined by the "1972 Seabed Boundaries Agreement between the Commonwealth of Australia and the Republic of Indonesia on Seabed Boundaries in the Area of the Timor and Arafura Seas" (Figure 5-8). However, in practice, the wellheads are located outside the Australian EEZ within an area of shared jurisdiction with Indonesia due to the 1997 Perth Treaty.

In 1997, the Australian and Indonesian Governments established an EEZ boundary and certain seabed boundaries, labelled the 1997 Perth Treaty. The 1997 Perth Treaty remains unsigned by the Indonesian government and has not officially entered into force; however, both Australia and Indonesia act consistently with the arrangements established under the Treaty (AFMA, 2014). Under the 1997 Perth Treaty, there is an area of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights (the Perth Treaty Area). All three wellheads are located within this area of overlapping jurisdiction (Figure 5-8). The northern boundary of the Perth Treaty Area is contingent with the seabed boundary set in the 1972 Seabed Boundaries Agreement.

The Government of Australia and the Government of the Republic of Indonesia signed a Memorandum of Understanding in 1974 (MoU 74), allowing Indonesian fishers to continue to fish using "methods which have been the tradition over decades of time". These methods include reef gleaning, free-diving, hand lining and other non-mechanised methods. The MoU Box is located about 123 km west of the Operational Area (Figure 5-8); however partially overlaps with the wider socio-cultural EMBA near Ashmore Reef. The MoU Box represents an area of approximately 50,000 km<sup>2</sup> and encompasses Scott Reef and associated reefs, including Seringapatam Reef, Browse Island, Ashmore Reef, Cartier Island and various banks.

### 5.6.2 Australian Commercial Fisheries

All three wellheads are located outside the Australian Fishing Zone, contiguous with the Australian EEZ, as amended by the Perth Treaty 1997. Although not yet countersigned by the Indonesian government, Australia acts consistently with the arrangements of this treaty (AFMA, 2014). Therefore, state and Commonwealth commercial fisheries are not permitted to fish within the Operational Area and interaction with fishers is not expected.

Within the wider EMBA and socio-cultural EMBA, the WA-managed Northern Demersal Scalefish Managed Fishery operate within the Australian Fishing Zone. The fishery use demersal traps to catch demersal snappers, emperors, groupers and rock cods, including goldband snapper and red emperor (Newman et al., 2008). No other WA-managed or Commonwealth-managed fisheries are known to operate within the EMBA or socio-economic EMBA. The EMBA or socio-economic EMBA do not extend into waters accessed by NT-managed fisheries.

### 5.6.3 Indonesian Commercial Fisheries

Indonesian fishers have traditionally visited reefs in the NWMR to collect target species such as trepang (sea cucumber), shark fin and other marine species that are economically significant. Indonesian traditional fishing within the MoU Box (refer Section 5.6.1) is concentrated on reefs or in reef lagoons and target species include trochus, sea cucumbers, abalone, sponges, giant clams, reef fish/finfish and sharks; predominantly between August and October with fishers departing the region at the onset of the North-west monsoon season.

In 1980 Indonesia began systematically prohibiting trawling throughout Indonesian waters (Presidential Decree 39/1980), and a total ban of trawling in the waters of Indonesia came into effect 1 January 1983 (Presidential Instruction No. 11/1982) (Food and Agriculture Organization (FAO), 2015). The government has since reopened some areas for trawling, including the Arafura Sea and the Indian Ocean around west of Sumatra and Aceh Island (FAO, 2015); however the Timor Sea remains closed to trawling with no immediate prospect for this to change.

Indonesian regulations require VMS on fishing vessels exceeding 30 GT (averaging about 16 meters or more) (Global Fishing Watch, 2020). In October 2019, the Indonesian government made vessel monitoring system (VMS) data publicly available for all fishing vessels equipped with the system. Analysis of these vessel tracks and ship identification data since 2013 suggests that vessels  $\geq 30$  GT operating in the Timor Sea mostly comprise of basic longline vessels and occasional handline vessels (Global Fishing Watch, 2020). These vessel types appear similar to various Indonesian vessels that have been sighted, rescued or apprehended by Australian border security from time to time within the region (AFMA, 2017; ABC, 2019; NT News, 2016). Vessels less than 30 gross tonnes that are not equipped with VMS may also operate in the Timor Sea, however due to water depths these are unlikely to be trawlers.

## **5.6.4 World Heritage and National Heritage Sites**

### **5.6.4.1 World Heritage Sites**

There are no World Heritage sites located within or adjacent to the Operational Area. Therefore, World Heritage Properties will not be considered further in this EP.

### **5.6.4.2 Commonwealth/National Heritage Sites**

There are no Commonwealth or National heritage listed places within or adjacent to the Operational Area. The closest Commonwealth Heritage Place is Ashmore Reef National Nature Reserve, about 180 km west of the Operational Area but within the wider socio-cultural EMBA. It is managed under the Ashmore Reef National Nature Reserve and Cartier Island Marine Reserve (Commonwealth Waters) Management Plans (Commonwealth of Australia, 2002). The Ashmore Reef National Nature Reserve is listed on the Commonwealth Heritage List under Criterion A (Process), Criterion B (Rarity) and Criterion C (Research) for several values, including:

- Faunal diversity, including species not previously, or only rarely, recorded in Western Australia and potentially endemic species
- Staging point for migratory waders and high concentrations of breeding seabirds
- Habitat for sea snakes, including one species endemic to the reef
- Breeding and feeding habitat for green turtles and hawksbill turtles
- Higher diversity of marine habitats compared with other North West Shelf reefs
- Significant for its history of human occupation and use; archaeological significance
- Important scientific reference area.

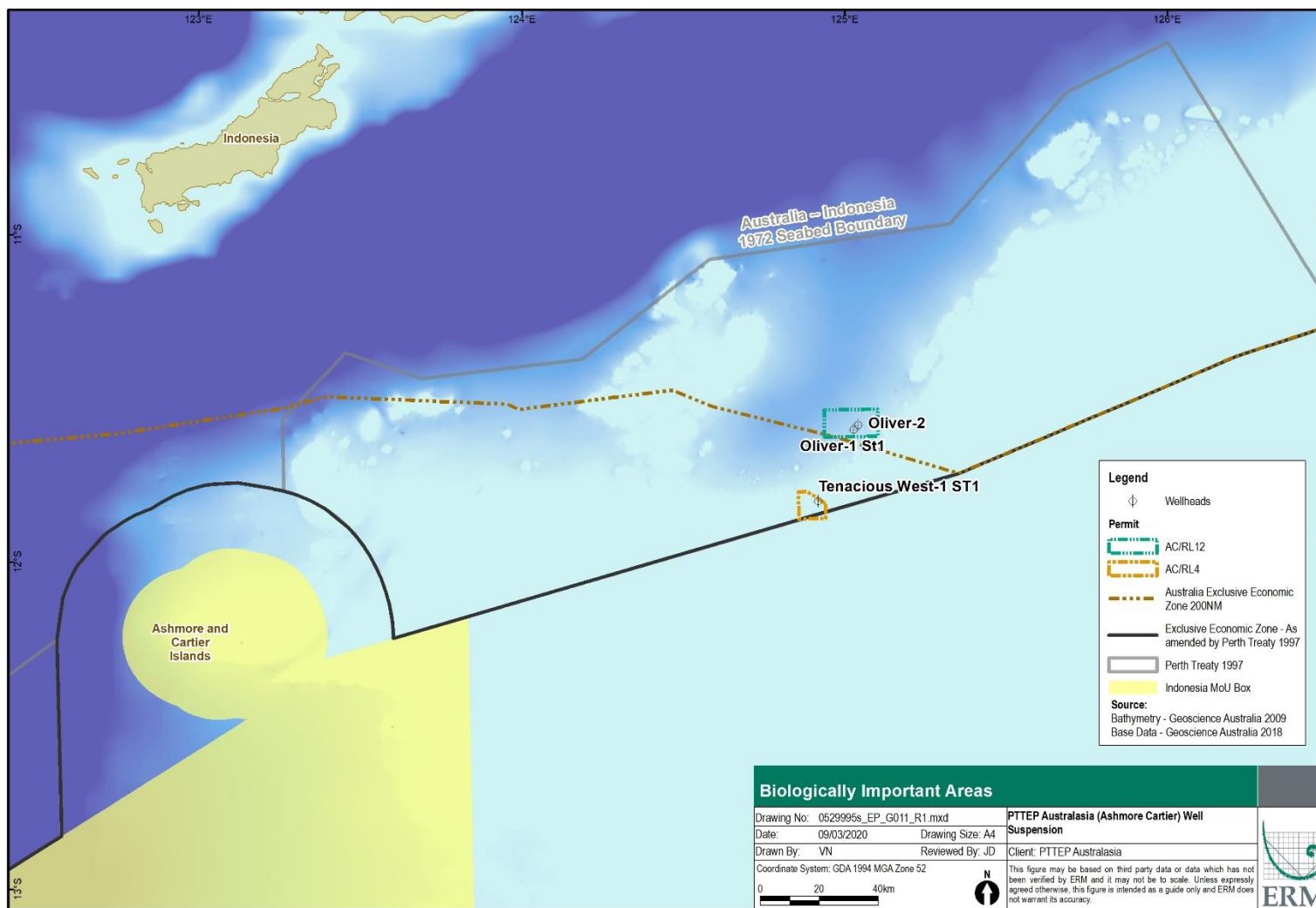


Figure 5-8: Australia–Indonesia jurisdictional arrangements in the Timor Sea (as applicable to the EP)

#### **5.6.5 Indigenous Heritage**

Sea country is valued for Indigenous cultural identity, health and wellbeing. A search of the Department of Aboriginal Affairs Aboriginal Heritage Inquiry System concluded that the Operational area does not overlap with any areas of Indigenous Heritage value.

The Ashmore Islands are thought to have been visited by Indonesian fishers from the islands of Rote, Sulawesi, and Ceram since the early eighteenth century. The Ashmore Islands were used both for fishing and as a staging point for voyages to the southern reefs off Australia's coast. Visits from traditional Indonesian have continued under the MoU 74 (refer Section 5.6.1). Therefore, Indonesian traditional fishers may be present within the wider socio-cultural EMBA, but are not expected to be present within the Operational Area.

#### **5.6.6 Maritime Heritage**

Australia protects its shipwrecks, sunken aircraft and associated relics older than 75 years through the Underwater Cultural Heritage Act 2018, which applies to Australian waters that extend from the low tide mark to the continental shelf. A search of the Australian National Shipwreck Database concluded that no protected shipwrecks occur within or adjacent to the Operational Area.

#### **5.6.7 Tourism and Recreational Activities**

The Operational Area is located in offshore waters, approximately 240 km north of the mainland coastline in an area not likely to be accessed for tourism activities. Tourism and recreation activities such as recreational fishing and cruises tend to be concentrated around nearshore waters, islands and coastal areas. They will therefore not occur within the EMBA. Some bird watching activity may occasionally occur at Ashmore Reef, within the wider socio-cultural EMBA (Kimberley Bird Watching, 2018).

#### **5.6.8 Petroleum Exploration and Production**

Oil and gas exploration activities off the coast of WA commenced in the late 1960s, and today the petroleum exploration and production industry is a significant user of offshore waters in the region. Only SapuraOMV Upstream (Western Australia) Pty Ltd hold a permit in close proximity to the Operational Area in adjacent block AC/P61. PTTEP AA has been advised by SapuraOMV that their seismic survey, "Gem 3D MSS", was conducted over AC/RL4 and AC/RL12 between February and March 2020 (Appendix A). This activity is now complete. No other oil and gas activities were identified to have occurred nearby the Operational Area recently. A search of approved EPs on NOPSEMA's website did not identify any planned activities within or adjacent to the Operational Area.

#### **5.6.9 Shipping**

The Operational Area is located outside of any major shipping routes (Shipmap, 2020). The closest major port to the Operational Area is Darwin Port, located over 650 km east of the Operational Area. Data from AMSA's vessel traffic database suggest that shipping traffic is light over Tenacious West-1 ST1 and light to moderate over Oliver-1 ST1 and Oliver-2 (AMSA, 2020).

#### **5.6.10 Maritime Surveillance**

Australian Border Force (ABF) and Royal Australian Navy (RAN) vessels undertake civil and maritime surveillance within the boundaries of the MoU, the Australian EEZ and Territorial seabed of the Continental Shelf, an area extending roughly 200 nm from the mainland (Jones, 2013). The primary purpose of these activities is to monitor the passage of suspect illegal entry vessels and illegal fishing activity. Due to the large geographic extent of these operations, direct interaction with ABF or RAN vessels is not expected to occur.



#### **5.6.11 Defence Activities**

The closest defence training area to the Operational Area is the North Australian Exercise Area, approximately 330 km to the east of the Operational Area and outside the wider socio-cultural EMBA. Therefore, defence activities will not be considered further in this EP.

## **6 STAKEHOLDER CONSULTATION**

### **6.1 OVERVIEW**

PTTEP AA is committed to engaging with stakeholders in an open and transparent manner. The objectives of doing so are to:

- Maintain positive working relationships with stakeholders;
- Keep stakeholders abreast of PTTEP AA's activities;
- Seek feedback from stakeholders in order to inform decision-making processes;
- Proactively understand and manage the issues and concerns raised by stakeholders; and
- Meet relevant regulatory requirements and align with industry good practice.

This chapter outlines the consultation process undertaken to date for the AC/RL12 and AC/RL4 well suspensions and ROV inspection, as well as the processes for ongoing engagement.

### **6.2 CONSULTATION APPROACH**

#### **6.2.1 Stakeholder Identification**

A key aspect of Regulation 11A of the OPGGS (E) Regulations is that stakeholder consultation is to be conducted with 'relevant persons'. PTTEP AA defines 'relevant' persons as those departments, agencies, individuals or organisations that:

- Have a function (including regulating) in the AC/RL12 & AC/RL4 permit areas that may be directly affected by PTTEP AA's planned petroleum activities; or
- Undertake activities in the title blocks that may be directly affected by PTTEP AA's activities. This includes organisations that may have members that undertake activities in the title blocks; or
- Have an interest in the title blocks that may be directly affected by PTTEP AA's activities; or
- Do not have a direct interest or activity in the 'title block; however, are considered relevant for the purposes of maintaining good working relationships with stakeholders.

Using these criteria, relevant stakeholders were identified as:

- Australian Fisheries Management Authority (AFMA) – Petroleum;
- Australian Hydrographic Service (AHS);
- Australian Maritime Safety Authority (AMSA);
- Department of Agriculture – Fisheries;
- Department of Defence;
- Department of Foreign Affairs and Trade (DFAT)
- Department of Industry, Innovation and Science (DIIS);
- Department of Mines, Industry Regulation and Safety (DMIRS);
- Department of Primary Industries and Regional Development (DPIRD) – Fisheries;
- Director of National Parks;
- Northern Territory Department of Primary Industry and Resources;
- Commonwealth Fisheries Association (CFA); and
- Western Australian Fishing Industry Council (WAFIC).

The Operational Area is located outside the Australian Fishing Zone, contiguous with the Australian EEZ (as amended by the 1997 Perth Treaty, refer Section 5.6.1), therefore Australian fishing licence holders were not directly consulted during the development of this EP. The approach is consistent with advice received from WAFIC in November 2019 (and again in March 2020), who were consulted as the peak body representative of state fisheries in WA.

Commercial fisheries with fishing activity noted as occurring within the EMBA and socio-economic EMBA (Section 5.1.1) are limited to the WA-managed Northern Demersal Scalefish Managed Fishery (Section 5.6.2). Though not directly consulted during the preparation of this EP, licence holders of this fishery are identified as potentially affected persons who may be notified in the unlikely event of a significant hydrocarbon spill from the project vessel (refer to ongoing stakeholder consultation in Section 6.4).

## 6.2.2 Sufficient and Timely Information

A key requirement of Regulation 16 of the OPGGS (E) Regulations is that 'relevant persons' are to be provided with sufficient information and time to make an informed decision on how their functions, activities, or interests may be impacted. PTTEP AA is committed to providing stakeholders with sufficient information in an effort to be open and transparent with all stakeholders.

## 6.3 CONSULTATION TO DATE

Stakeholders were first notified of the proposed continued well suspension on 18 November 2019. A notification was distributed to all stakeholders via email on 18 November 2019. The factsheet provided information on the project background, activity description, location of the wells, overlap with fishery management areas, and a map. A copy of the notification is contained in Appendix A2.

A follow-up notification was circulated between 28 February 2020 and 6 March 2020 to notify stakeholders of the ROV inspection, including the anticipated timing and duration of the activity.

### 6.3.1 Stakeholder Feedback and Assessment of Merit

Stakeholder feedback has been recorded in a Consultation Log for this specific activity. A record of all relevant correspondence including phone calls and email exchanges are stored in this database (Appendix A). Records of full email correspondence with relevant stakeholders are provided to NOPSEMA in a separate Sensitive Matters Report.

PTTEP AA undertook an assessment of the merit of all feedback received from stakeholders and has incorporated the feedback into the development of the EP. Table 6-1 summarises the feedback received during the engagement process and where relevant objections, claims, concerns or requests raised by stakeholders.

**Table 6-1: Summary of relevant matters raised and assessment of merit**

Stakeholder	Feedback	Assessment of Merit
AMSA	<p>On 03/03/2020 AMSA:</p> <ul style="list-style-type: none"> <li>advised that the Master should notify AMSA's Joint Rescue Coordination Centre (JRCC) for promulgation of radio-navigation warnings at least 24-48 hours before operations commence;</li> <li>advised JRCC will also need to be advised when operations start and end; and</li> <li>requested that the Australian Hydrographic Office are contacted no less than four working weeks before operations for promulgation of the appropriate Notice to Mariners (NTM).</li> </ul>	<p>The advice and requests from AMSA are considered to have merit as they relate to the petroleum activity and the stakeholder's functions, interests and activities.</p> <p>The advice represents good industry practice and reduces the risks associated with on-the-water activities. It has been incorporated into Section 8.1.1 of the EP.</p> <p>Requested notifications have been incorporated into Section 6.4 of the EP (ongoing consultation).</p>

Stakeholder	Feedback	Assessment of Merit
	<p>On 15/04/2020 PTTEP AA requested clarification from AMSA on whether AMSA required PTTEP (as the petroleum titleholder) to have any EMT capability to support AMSA (as Control Agency) during a vessel spill in Commonwealth waters. On 17/04/2020 AMSA advised:</p> <ul style="list-style-type: none"> <li>Under the National Plan for Maritime Emergencies AMSA is the Control Agency for ship sourced pollution incident from vessels within Commonwealth waters. Any response would be undertaken by AMSA in consultation with the ship owners/representatives.</li> <li>All vessels are required to have a Shipboard Oil Pollution Emergency Plan or Shipboard Marine Pollution Emergency Plan.</li> <li>All pollution incidents are to be reported consistent with the MARPOL reporting requirements.</li> </ul>	<p>The advice and requests from AMSA are considered to have merit as they relate to the petroleum activity and the stakeholder's functions, interests and activities.</p> <p>The advice represents good industry practice and reduces the risks associated with on-the-water activities. It has been incorporated into the OPEP in Section 10.5.3 of the EP.</p>
Director of National Parks (DNP)	<p>On 30/03/2020 DNP advised that the EP should:</p> <ul style="list-style-type: none"> <li>identify and manage all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and consider all options to avoid or reduce them to as low as reasonably practicable; and</li> <li>clearly demonstrates that the activity will not be inconsistent with the relevant marine park management plan.</li> </ul> <p>The DNP advised that the Director should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible</p>	<p>The advice and requests from DNP are considered to have merit as they relate to the petroleum activity and the stakeholder's functions, interests and activities.</p> <p>The advice represents good industry practice. Australian Marine park values have been described in Section 5.3.1 of the EP and assessed in Section 8.2.4 of the EP.</p> <p>The request to be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park has been included in Section 10.5.3.5.</p>
WAFIC	<p>On 28/02/2020, in response to learning that the ROV inspection and associated vessel activity were to be included in the scope of the EP, WAFIC:</p> <ul style="list-style-type: none"> <li>acknowledged the proposed activities are not within the EEZ and therefore no overlap with commercial fisheries;</li> <li>confirmed that no consultation with WA commercial fishers was required;</li> <li>requested that PTTEP AA confirm it's communication policy with all project personnel regarding interacting and</li> </ul>	<p>PTTEP AA note that WAFIC requests largely relate to vessel movements while mobilising to/from the Operational Area. Vessel movements to/from the Operational Area are not a "petroleum activity" and therefore not within the scope of activities managed under this EP (Section 1.3). Such vessel movements will take place in accordance with maritime law. Therefore, environmental performance outcomes or environmental performance standards relating to the management of the petroleum activity within the Operational Area have not been incorporated into the EP. However, PTTEP</p>

Stakeholder	Feedback	Assessment of Merit
	<p>protecting the rights of commercial fishers, including:</p> <ul style="list-style-type: none"> <li>○ that the project vessel divert around and avoid close engagement with active fishing activity (even if not convenient to do so) while <i>en route</i> to and from site;</li> <li>○ that the project vessel, when in the vicinity of a commercial fishing vessel, while <i>en route</i> to and returning from site, do their utmost not to create an ocean disturbance risking the split of schooling fish;</li> <li>○ that the above points are contained within the EP as an agreed outcome;</li> </ul> <ul style="list-style-type: none"> <li>• requested that PTTEP AA track project vessel transit route from Darwin port to site with active commercial fisheries in the area to ensure there are no on-the-water disruptions, and that this is contained within the EP as an agreed outcome; and</li> <li>• requested that no recreational fishing takes place from the project vessel, and that this is contained within the EP as an agreed outcome.</li> </ul> <p>WAFIC Cc'd the Commonwealth Fisheries Association and the Northern Territory Seafood Council.</p>	<p>AA recognises that there are reasonable steps that can be taken with the vessel contractor to reduce the potential for negative interactions between the project vessel and the fishing industry, as detailed below.</p> <p><u>PTTEP AA's communication policy regarding interactions and protecting the rights of commercial fishers:</u></p> <p>The project vessel will not be towing equipment, so is not a vessel limited in its ability to manoeuvre while underway to and from the Operational Area. The project vessel is, therefore, reasonably able to avoid other vessels while in transit, including fishing vessels and fishing activity. This is managed in accordance with standard maritime practices.</p> <p>Note also that the ROV inspection will involve a single vessel underway, no different from any other vessel (e.g. fishing, recreational, commercial freighter, tanker, etc.) underway in the region. No significant disturbance to fish populations is expected, as assessed in Section 8.1.3.</p> <p>However, PTTEP AA will include WAFIC's request to keep a reasonable distance from commercial fishing activity in the Environmental Awareness Induction (Section 10.3.2.2), given to the Vessel Master and crew prior to mobilisation to the Operational Area.</p> <p><u>Tracking the project vessel transit route:</u></p> <p>The request for PTTEP AA to track the project vessel transit route to site to ensure there are no on-the-water disruptions is not considered to have merit. PTTEP AA will not actively oversee or remotely track the project vessel's route while it is underway to and from the Operational Area. This is not practicable and would not provide any additional assurance against on-the-water interactions with fishers or other users. Please note, however, that the project vessel's automatic identification system (AIS) will record the vessel's position and course, should a situation arise where this data is needed. No control measures have been adopted in the EP in response to this request.</p> <p><u>No fishing from the project vessel:</u></p> <p>Recreational fishing from the project vessel will not be permitted. This will be communicated to the Vessel Master and crew</p>

Stakeholder	Feedback	Assessment of Merit
		<p>during the Environmental Awareness Induction (Section 10.3.2.2), given prior to mobilisation of the project vessel to the Operational Area.</p> <p>The above measures were communicated to WAFIC on 6 April 2020. WAFIC acknowledged the email and was satisfied with the response.</p>

## 6.4 ONGOING CONSULTATION

Outcomes of all consultation are documented in the Correspondence Log. At all times, PTTEP AA will maintain dedicated channels for enquiries, whether related to the EP, another project or activity, or of a general nature.

Key ongoing stakeholder consultation commitments for the EP are outlined in Table 6-2. A number of Government agencies and organisations are identified as requiring notifications prior to, during and/or after the drilling activities. The required notifications are summarised in Table 6-3

**Table 6-2: Ongoing Consultation Requirements**

Stakeholders	Timing	Method and Information
<b>Activity Commencement Notification</b>		
All identified relevant stakeholders, excluding agencies and organisations identified in Table 6-3 that have separate regulatory or operational notification requirements.	4 weeks prior to proposed date of commencement of activities.	Email or letter notification informing stakeholders of the proposed commencement, location and timing of vessel and ROV activities.
<b>Activity Cessation Notification</b>		
All identified relevant stakeholders, excluding agencies and organisations identified in Table 6-3 that have separate regulatory or operational notification requirements.	Within 2 weeks of cessation of activities.	Email or letter notification informing stakeholders of the completion of vessel and ROV activities.
<b>Hydrocarbon spills that may result in impacts to stakeholders</b>		
Refer to First Strike Response Plan (Section 10.5.3.5)		

**Table 6-3: Activity Notifications**

Agency / Organisation	Timing
<b>Commencement Notification</b>	
Australian Hydrographic Service	Notification 4 weeks prior to commencement of activities for promulgation of a Notice to Mariners.
AMSA JRCC	24 to 48 hours prior to the commencement of activities.
<b>Cessation Notification</b>	
AMSA JRCC	Upon completion of activities.

## **7 ENVIRONMENTAL IMPACT AND RISK ASSESSMENT METHODOLOGY**

### **7.1 INTRODUCTION**

This section outlines PTTEP AA's environmental risk assessment methodology for the identification, analysis and evaluation of potential environmental risks and impacts associated with the continued well suspension and ROV inspection activity.

In accordance with Regulation 4 of the OPGGS (E) Regulations, environmental impact is taken to mean any change to the environment, as described in Section 4.4.6 of this EP, whether adverse or beneficial that wholly or partially results from the activity. As required by Regulation 13(5) and 13(6), analysis and evaluation is conducted in this EP to demonstrate that the identified risks and impacts associated with this activity are reduced to ALARP and are of an acceptable level. The assessment considers direct and indirect impacts of continued suspension of the wellheads and the ROV inspection.

The outcomes of the impact and risk assessment are presented in Section 8.

### **7.2 RISK ASSESSMENT PROCESS**

The environmental risk assessment is a systematic process comprised of the following steps (detailed further in the following sections and within Figure 7-1):

- Identification of specific activities associated with the continued well suspension and ROV inspection – Section 4.
- Understanding the existing environment (physical, biological, and socioeconomic receptors) and identification of receptors, values and sensitivities – Section 7.2.1.
- Identification of potential environmental impacts and risks associated with planned activities and credible unplanned events (Section 7.2.2).
- Evaluation of the potential consequence and likelihood of these impacts and risks to the identified receptors with legal requirements and inherent design in place but without other controls, and determination of the 'inherent' risk (Section 7.2.3).
- 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 adoption of alternate and/or additional control measures from the ALARP evaluation;
- Demonstration that the environmental impacts and risks will be of an acceptable level; and
- Development of environmental performance outcomes, performance standards, and measurement criteria.

Each stage of the risk assessment is undertaken with consideration of stakeholder functions, interests and activities, with any specific feedback from stakeholder consultation being taken into account (refer to Section 7.2.5).

#### **7.2.1 Identification of Receptors, Values and Sensitivities**

The characteristics of the environment that may be affected by planned activities or credible unplanned events were identified through the review of publicly available literature and stakeholder consultation. The characteristics considered included ecosystems and their constituent parts, natural and physical resources, the qualities and characteristics of locations, heritage values and social, economic and cultural features.

Receptors, values and sensitivities were identified for the Operational Area and its surroundings, taking into account areas that may be affected directly or indirectly by the activity (both planned and

unplanned). In this respect, representative oil spill modelling was used (as described in detail in Section 8.2.4) to identify receptors, values and sensitivities within the EMBA associated with a credible worst-case oil spill scenario.

### 7.2.2 Impact and Risk Identification

The risk identification stage of the assessment includes a systematic review of all activities under consideration and the subsequent identification of the potential aspects of the activities which could result in an environmental impact or risk. PTTEP AA has defined impacts and risks as follows:

- **Impacts** result from activities that by their very nature will result in a change to the environment or a component of the environment, whether adverse or beneficial. Impacts are an inherent part of the activity.
- **Risks** result from activities where a change to the environment or component of the environment may occur from the activity (i.e., there may be consequences if the incident event occurs). Risk is a combination of the consequences of an event and the associated likelihood of its occurrence. The risk of this event is determined by assessing the consequence of the impact (using factors such as the type and volume of fuel and the nature of the receiving environment) and the likelihood of this event happening (which may be determined qualitatively or quantitatively).

### 7.2.3 Risk Assessment

The risk assessment stage involves the assessment of impacts and risks in context of the particular values and sensitivities (environmental and social) that may be impacted. Based on this assessment and using the PTTEP AA Risk Matrix (Table 7-1), a rating is given to:

- The severity of the consequences of the potential impacts and risks, taking into account the nature and scale of the activity/aspect; and
- The likelihood of the identified consequences occurring.

To determine the consequence rating, PTTEP AA determines the credible worst case consequence which could occur if controls fail. The applicable consequence rating is then chosen from the PTTEP AA Environmental Risk Assessment Matrix (Table 7-1).

The likelihood (probability or frequency) of an impact occurring takes into account the effective implementation of control measures. The likelihood rating of the credible worst-case impact is based upon knowledge/historical data of similar events/incidents occurring within PTTEP AA or in the industry as-a-whole. Definitions of likelihood ratings are detailed in the PTTEP AA Environmental Risk Assessment Matrix (Table 7-1).

An overall risk rating is derived from the combination of consequence and likelihood ratings. The inherent risk is determined through the evaluation of potential consequence and likelihood of impacts and risks to the identified receptors with legal requirements and inherent design in place but without other controls. The residual risk is evaluated with the adoption of any alternate and/or additional control measures identified through the ALARP evaluation.

Table 7-1: PTTEP AA Environmental Risk Assessment Matrix

PTTEP AA Environmental Risk Assessment Matrix						
Consequence Rating	Environmental Consequence Description	Likelihood of Occurrence				
		Rare (A)	Unlikely (B)	Possible (C)	Likely (D)	Almost Certain (E)
		Event occurrence is remote and/or never heard of within the E&P industry	Event has occurred a few times in the E&P industry or is unlikely to occur in PTTEP	Event has occurred several times in the E&P industry or occurred once in PTTEP or may occur in PTTEP	Event has occurred several times per year in the E&P industry or more than once in PTTEP or occurred in the same location or is likely to occur in PTTEP	Event occurs frequently in the E&P industry or occurred more than once per year at the same location or is expected to occur in PTTEP
Major (5)	Wide-spread to regional change to the environment (sub-lethal and/or lethal), well outside the immediate vicinity of the source, potentially extending to another bioregion. Persistent or irreversible change to baseline – populations, communities or species. Impact at population and/or species level of listed and/or non-listed species. Potential threat to ecological integrity of listed species. Potential serious or irreversible damage to World Heritage, National Heritage, Ramsar wetland, values within Australian Marine Parks or on Commonwealth Land. Very high financial consequence (>\$50M AUD). Potential for significant level of remediation required. Likely multiple breaches of statutory or prescribed limits, or cause for multiple complaints/objections from relevant external stakeholders and other interested parties. Potential for legal proceedings.					
Serious (4)	Wide-spread to regional change to the environment (sub-lethal and/or lethal), well outside the immediate vicinity of the source but within the same bioregion. Long-term but reversible change to baseline – population, community or species. Impact to multiple or population of listed species and/or non-listed species. High financial consequence (\$10M - \$50M AUD). Potential remediation required. Likely multiple breaches of statutory or prescribed limits, or cause for multiple complaints/objections from relevant external stakeholders and other interested parties.				High Risk	
Significant (3)	Wide-spread change to the environment (sub-lethal or lethal), well outside the immediate vicinity of the source. Noticeable but reversible (short to medium-term) change to baseline – population or community. Impact to individual or multiple listed species or population of non-listed species. Moderate financial consequence (\$1M - \$10M AUD). Potential for multiple breaches of statutory or prescribed limits, or cause for multiple complaints/objections from relevant external stakeholders.			Medium Risk		
Moderate (2)	Localised to wide-spread change to the environment (nuisance or sub-lethal), potentially outside the immediate vicinity of the source. Negligible and reversible change to baseline of population / community (no lasting effect). Impact to individual listed species or large number of non-listed species. Negligible to small financial consequence (\$50K - \$1M AUD). Single breach of statutory or prescribed limit, or cause for single complaint/objection from relevant external stakeholder.		Low Risk			
Minor (1)	Localised change to environment (nuisance or sub-lethal), within immediate vicinity of the source. Practically indistinguishable from existing baseline. Impact to individual or small number of non-listed species. No or negligible financial consequences (<\$50K AUD). Little to no potential impacts to relevant external stakeholders.					

## 7.2.4 Demonstration of ALARP

In alignment with NOPSEMA's ALARP Guidance Note (N-04300-GN0166, June 2015), PTTEP AA have adapted the approach developed by Oil and Gas UK Guidance on Risk Related Decision Making (Oil & Gas UK, 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 7-1). Specifically, the framework considers impact severity based upon contextual information in relation to the following factors:

- activity type;
- potential (environmental) risk/impact and (engineering / scientific) uncertainty; and
- stakeholder influence (objects or claims).

Once the overall context for each risk is established it is allocated to one of the three "Decision Types" defined below. This categorisation also aligns with the PTTEP AA approach to the low, medium and high residual risk levels as outlined in the SSHE Risk Management Standard (11038-STD-SSHE-401-R06).

In accordance with the regulatory requirement to demonstrate that environmental impacts and risks are managed to ALARP, PTTEP AA has considered the above risk context in determining the level of ALARP assessment required. The assessment techniques considered include:

- Good Practice;
- Engineering risk assessment; and
- Precautionary approach.

The application of each assessment technique in relation to the risk context is discussed further below.

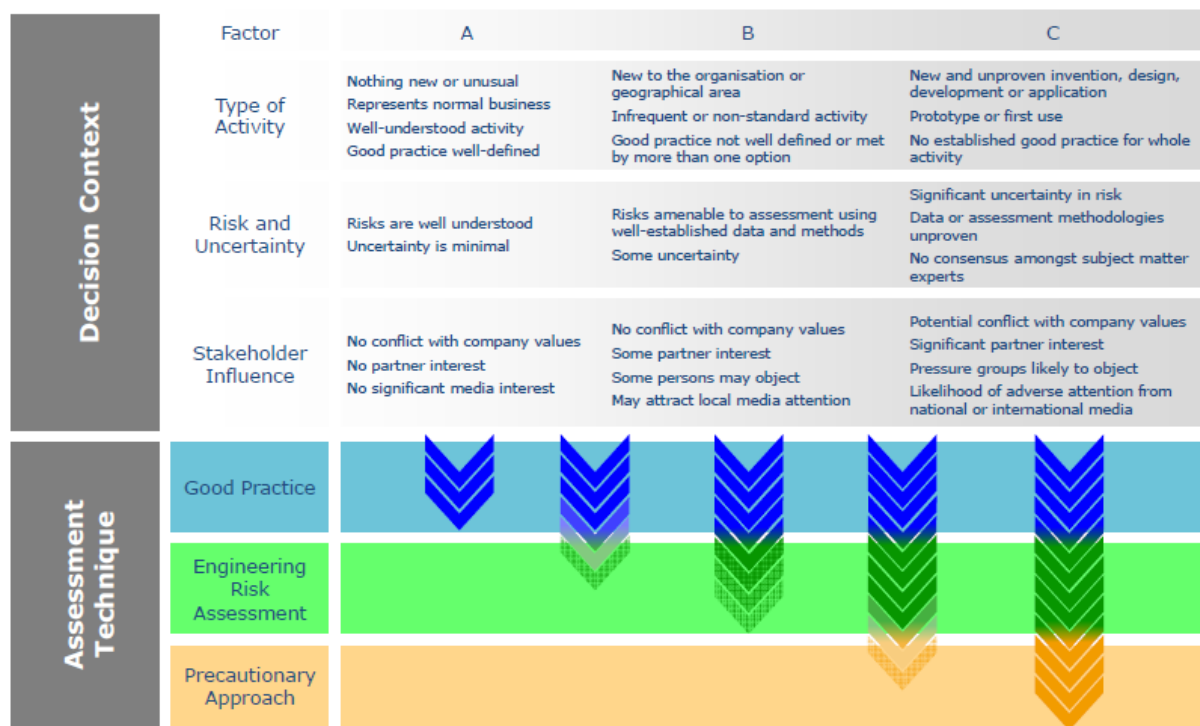


Figure 7-1: Decision support framework used to demonstrate ALARP (Oil & Gas UK, 2014)

#### 7.2.4.1 Type A Risk

The risk is determined to be Type A if the activity is relatively well understood, the potential risk is low and/or the potential consequence is minor (including to MNES when considering seasonal sensitivities), activities are well practised, and there is no significant stakeholder interest.

If the risk context is categorised as 'Type A', PTTEP AA considers the application of 'Good Practice' to be sufficient to demonstrate potential impacts and risk are managed to ALARP and further assessment ('Engineering Risk Assessment') is not necessarily required to identify additional controls. 'Good Practice' is considered to be the adoption of controls that relate to legislative requirements and inherent design, with consideration of additional controls when there is the potential to further reduce environmental impacts and risks for a small or negligible cost i.e., in relation to time, effort, money.

#### 7.2.4.2 Type B Risk

The risk is determined to be Type B if there is greater uncertainty or complexity around the activity and/or risk, the potential impacts are moderate or greater (including those to MNES when considering seasonal sensitivities), or the risk is medium or greater or generates several concerns from stakeholders.

If the context is categorised as 'Type B', PTTEP AA will undertake Engineering Risk Assessment which is an analysis of alternate and/or additional control measures to those identified by 'Good Practice'.

The implementation of a risk management hierarchy encourages the implementation of hard / engineering control measures and provides for an effective spread of controls measures as outlined in the PTTEP Corporate SSHE Risk Management Standard (SSHE-106-STD-400) as follows:

- Elimination and minimization of risk by using options with a lower impact on receptors;
- Substitution by using products and/or processes with a lower impact on receptors;
- Engineering controls – prevention and mitigation; and
- Administrative/procedural controls.

All identified control measures are categorised according to their type, further allowing for an effective spread of measures in the event of a failure of a single critical element. A statement of expected performance is provided for each control measure to ensure suitability and effectiveness is considered. The types of controls are:

- Systems;
- Procedures;
- Person(s); and
- Equipment

Based on the various approaches recommended in OGUK, and in alignment with the NOPSEMA Environment Plan Decision Making Guideline (GL1721 Rev 3 May 2017), PTTEP AA believes the methodology most suited to demonstrate ALARP with respect to determining which of the potential additional controls should be implemented is to undertake a cost-benefit analysis. The analysis is based upon:

- Predicted level of impact and risk (with adopted control measures implemented);
- The balance and weight of evidence in relation to the possible environmental benefit and the costs of adopting alternate, additional and/or improved control measures;
- Relative (and overall) cost associated with alternate, additional and/or improved control measures when compared with adopted control measures; and
- The potential environmental benefit of industry collaboration (where appropriate) in relation to research, resource, shared equity etc.

#### 7.2.4.3 Type C Risk

A risk is determined to be Type C if it is sufficiently complex, has serious or greater potential impact (including to MNES when considering seasonal sensitivities), available engineering and scientific evidence is insufficient, inconclusive, or uncertain, or stakeholder interest to require a precautionary approach. In this case, relevant good practice still has to be met and additional engineering risk assessment is required.

PTTEP AA will apply a precautionary approach to risk management. The precautionary approach will mean that uncertainty is counterbalanced with the use of conservative assumptions when undertaking environmental risk assessment, with additional control measures more likely being adopted. That is, environmental and social considerations are expected to take precedence over economic considerations, when evaluating the suitability of additional controls. In this context, PTTEP AA would be exposed to higher levels of financial cost associated with managing potential environmental impacts and risks to ALARP.

#### 7.2.4.4 ALARP Justification

For each risk, a statement of justification is provided regarding the overall certainty and effectiveness of the sum-total of the adopted control measures in reducing potential impacts and risks to ALARP.

The following criteria were used to determine where 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.
- 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 is given to trade-offs of implementing the alternatives or additional controls in terms of cost, technical, environmental, safety and logistical implications.

#### 7.2.5 Acceptable Level

PTTEP AA considers a range of factors when evaluating the acceptability of environmental impacts or risks associated with its activities. This evaluation is outlined in Table 7-2 and is aligned with the NOPSEMA Environment Plan Decision Making Guideline (GL1721 Rev 5 June 2018), the Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009 (Sub-regulation 10AI and Part 1, Section 3 – Objects of the Regulations), and Part 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Impacts and risks classified as 'Decision Type A' are considered acceptable if the level of residual risk is determined to be low or medium and the criteria outlined in Table 7-2 are met.

Impacts and risks classified as 'Decision Type B' are 'Acceptable' if the criteria outlined in Table 7-2 are met and it can be demonstrated that the predicted levels of impact and/or residual risk, are at or below pre-defined acceptable level(s) for that impact or risk. Acceptable levels are defined for relevant values and sensitivities and are informed by relevant external context including the principles of ecologically sustainable development (ESD), input from relevant persons, relevant statutory instruments (such as published recovery plans, conservation advice and management plans), good practice guidance and applicable scientific information. Predicted levels of impact or risk to relevant values and sensitivities are evaluated to demonstrate how the activity will be managed to ensure acceptable levels are met. EPOs are then established that are linked to the pre-defined acceptable levels of impact/risk.

PTTEP AA considers an impact or risk to be unacceptable when despite the application of a 'Precautionary Approach' to risk management, and the application of all reasonably practicable control measures, there remains a "Possible (C)" chance of a 'Major (5)' environmental effect

occurring or a ‘Likely (B)’ chance of a ‘Serious (4)’ environmental effect occurring as per the PTTEP AA Environmental Risk Matrix (Table 7-1).

**Table 7-2 Acceptability Criteria**

Criteria	Validation
1. Risk Level	The environmental risk is deemed to have a low or medium ranking, the environmental consequence from routine operations does not exceed a ranking of 2 and the environmental consequence from an unplanned risk does not exceed a ranking of 4. If ranked medium risk additional control measures have been applied to manage potential environmental impacts and risks to ALARP.
2. Principles of Ecologically Sustainable Development	<p>The aspect of the activity does not compromise relevant principles of Ecologically Sustainable Development (ESD) or breach relevant requirements for environmental approvals (EPBC Act Part 3, Division 1), namely:</p> <ul style="list-style-type: none"> <li>• does not pose a threat of serious or irreversible environmental damage to matters of national environmental significance: <ul style="list-style-type: none"> <li>a. the world heritage values of a declared World Heritage property;</li> <li>b. the national heritage values of a National Heritage place</li> <li>c. the ecological character of a declared Ramsar wetland;</li> <li>d. any values and sensitivities that exist in, or in relation to, part or all of a Commonwealth marine area or Commonwealth land.</li> </ul> </li> <li>• does not pose a [significant] threat to biodiversity and ecological integrity of: <ul style="list-style-type: none"> <li>e. a listed threatened species or listed threatened ecological community; or</li> <li>f. a listed migratory species;</li> </ul> </li> <li>• does not pose a threat to the quality of the environment available to future generations</li> </ul>
3. AMP Values, Management Prescriptions and IUCN Reserve Management Principles	The management of the activity is consistent with any relevant plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species that include specific management and conservation requirements.
4. Legislative Requirements	All relevant legislative and other requirements have been met or considered in context.
5. Internal Requirements	All relevant internal PTTEP AA requirements have been met
6. Stakeholder Objections, Claims, Concerns or Advice	All relevant person(s) have been provided with sufficient information with respect to potential impacts on their functions, interests or activities and all valid objections or claims made by relevant (potentially affected) person(s) have been sufficiently addressed

### **7.2.6 Environmental Performance Outcomes, Standards and Measurement Criteria**

To meet the requirements of Regulation 13 (7) of the OPGGS (E) Regulations, environmental performance outcomes, performance standards, and measurement criteria have been identified in Section 9. These terms are defined as follows:

- Environmental Performance Outcome (EPO) – a measurable level of performance required for the management of the environmental aspects of the activity to ensure the environmental impacts or risks will be of an acceptable level;
- Environmental Performance Standard (EPS) – a statement of performance required of an adopted control measure to manage impacts and risks to ALARP and acceptable levels; and
- Measurement Criteria (MC) – defines the measure by which environmental performance will be measured to determine whether the EPO has been met.

## **8 ENVIRONMENTAL IMPACT AND RISK ASSESSMENT**

This section presents the evaluation of the environmental impacts and risks completed for planned/ routine and unplanned aspects of the proposed activity using the methodology described in Section 7.

In accordance with regulation 13(5) of the OPGGS (E) Regulations, each subsection is structured to include:

- the type of decision, source of predicted impacts and risks, receptors that may be affected, and the inherent risk rating;
- a detailed evaluation of the impacts and risks and residual risk evaluation;
- identification of the control measures to be used to reduce impacts and risks and demonstration of ALARP; and
- demonstration that impacts and risks are reduced to 'acceptable levels'.

A risk assessment workshop was undertaken to identify and assess the risks associated with the continued well suspension and ROV inspection.

The following planned impacts were identified:

- Physical Presence: Disturbance to Other Marine Users (Section 8.1.1);
- Physical Presence: Benthic Disturbance (Section 8.1.2);
- Anthropogenic Noise: Project Vessel and Equipment (Section 0);
- Routine Discharges to the Marine Environment: Project Vessel (Section 8.1.4);
- Artificial Light Emissions: Project Vessel (Section 8.1.5); and
- Atmospheric Emissions: Power Generation and Incineration (Section 8.1.6).

The following unplanned risks were identified:

- Physical Presence: Collision with Marine Fauna (Section 8.2.1);
- Discharge: Loss of Hazardous and Non-hazardous Solid Wastes (Section 8.2.2);
- Dropped Objects: Benthic Disturbance (Section 0);
- Deck and Subsurface Spills (Section 8.2.5);
- Hydrocarbon Spill: Vessel Tank Failure (Section 8.2.4); and
- Invasive Marine Species (Section 8.2.5).

## 8.1 PLANNED ACTIVITIES

### 8.1.1 Physical Presence: Disturbance to Other Marine Users

Physical Presence: Disturbance to Other Marine Users				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Disturbance of other marine users as a result of the continued well suspension and/or ROV inspection.			
Receptors	<ul style="list-style-type: none"><li>Socio-economic</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Impact	Consequence	Likelihood	Inherent Risk
Physical presence of the wellheads	The wellheads could present a snag risk to fishing gear, in particular trawl nets.	Moderate (2)	Unlikely (B)	Low
Physical presence of the project vessel during the ROV survey	Temporary disturbance of other marine users.	Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
The physical presence of the suspended wellheads on the seabed could present a snag risk to fishing gear, namely trawl nets.				
The temporary presence of a project vessel for the ROV inspection could result in interference with the rights of other marine users by restricting access to the marine environment within the Operational Area.				
Impact / Risk Assessment				
Australian Commercial Fisheries				
<p>The Operational Area is located within the Australian territorial seas, however is outside the Australian EEZ as amended by the 1997 Perth Treaty (Section 5.6.1). The Treaty has not been signed by the Indonesian Government, however Australian fisheries act consistently with the Treaty (AFMA, 2014). Therefore, Australian commercial fishing activities are not expected to be impacted by the continued temporary suspension of the wellheads or ROV inspection activities.</p> <p>It is acknowledged that over the medium-long term this situation may change and commercial fisheries may be permitted to fish over the wellheads. However, such changes are not anticipated over the timeframe of this EP. If the situation were to change over this timeframe, the change to the overall impact to commercial fishing would be negligible since no Commonwealth or State fisheries use trawling methods near the wellheads. The Northern Demersal Scalefish Fishery is the closest active fishery to the Operational Area and primarily uses fish traps (Newman et al., 2019). During stakeholder consultation, AHO confirmed the activity will be assessed in preparation for updating AHO’s navigational charts. In a follow-up call, AHO confirmed the Oliver-1 ST1, Oliver-2 or Tenacious West-1 ST1 wellheads are not currently marked on their electronic navigation charts (ENCs) and noted wellheads are generally not included on charts as they are not a (a) conspicuous object that can be used for navigation, or (b) present a hazard to navigation. AHO advised hazards to navigation generally include features less than 20 m deep, or present a risk to submarines or trawlers.</p>				

### Physical Presence: Disturbance to Other Marine Users

Permanent plug and abandonment of the wells will be subject to a separate EP, (Section 1.3).

#### Indonesian Commercial Fisheries

Under the 1997 Perth Treaty, there is an area of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights (the Perth Treaty Area) (Section 5.6.3). All three wellheads are located within the area of overlapping jurisdiction (Figure 5-8); however, the Timor Sea is currently closed to trawling by Indonesian vessels with no immediate prospect for this to change (Section 5.6.3). Analysis of vessel tracks and ship identification data since 2013 using publicly available VMS data suggests that vessels  $\geq 30$  GT operating in the Timor Sea mostly comprise of basic longline vessels and occasional handline vessels (Section 5.6.3) (Global Fishing Watch, 2020). Vessels less than 30 GT that are not equipped with VMS may also operate in the Timor Sea; however, due to distance offshore these types of vessels are not expected to be common.

Based on the type of vessels operating in the Timor Sea and low intensity of fishing relative to other parts of Indonesian waters, impacts to Indonesian commercial fisheries from the continued suspension of the three wellheads are not expected. The potential for interference as result of the physical presence of the project vessel while conducting the ROV inspection will be limited to highly localised displacement/avoidance, with no significant impact on fishing activities.

#### Traditional Indonesian Fishers

The MoU Box is located about 123 km west of the Operational Area, within which Indonesian traditional fishers may fish using “methods which have been the tradition over decades of time” (refer Section 5.6.3). Traditional Indonesian fishers are therefore not expected to fish within the Operational Area or be impacted by the activity.

#### Shipping

The Operational Area is located outside of any major shipping channels and commercial shipping activity is expected to be light (Section 5.6.9). No anchoring is expected to take place at the depths of the Operational Area and therefore no impact to commercial shipping from the continued suspension of the wellheads is expected. Due to the remote location, duration of the activity and size of the Operational Area, the impact of the ROV inspection to commercial shipping activities is considered negligible.

#### Other Oil and Gas Operators

A review of published EPs and EP summaries on NOPSEMA's website suggests that no other petroleum activities are planned to occur within, or adjacent to the Operational Area during the ROV inspection which is scheduled for Q1/Q2 2021.

An EP available on NOPSEMA's website exists for Sapura's Gem 3D MSS to occur over AC/RL4 and adjacent blocks between January 2020 and Q3 2020. However, on 17 March 2020 Sapura advised PTTEP AA that the Gem 3D MSS was completed on March 16<sup>th</sup> 2020 and demobilisation from the area occurred on 17 March 2020. No other planned petroleum activities are identified that coincide with the timing or location of the ROV inspection.

#### Tourism and Recreation

No tourism or recreational activities are known to take place specifically within the Operational Area (Section 5.6.7). Therefore, impacts to this receptor as a result of physical presence are not expected.

### Identification of Control Measures and Demonstration of ALARP

Control Measure	Adopted	Justification
<b>Inherent Design and Legislative Requirements</b>		
No inherent design or legislative requirements were identified.	N/A	N/A

Physical Presence: Disturbance to Other Marine Users				
Alternatives/Substitutes Considered				
No practicable alternative or substitutes to the above controls have been identified.		N/A	N/A	
Additional Controls Considered				
Australian Hydrographic Office (AHO) will be notified of activities and movements no less than four working weeks prior to the scheduled commencement date of the ROV activity.		Yes	Australian Notices to Mariners are published fortnightly by the AHO for the purposes of correcting paper navigational charts. Notifying AHO will contribute to safe interactions with other marine users.	
Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24-48 hours before operations commence for promulgation of Radio Navigation Warning.		Yes	Adherence to AMSA maritime navigation procedures will contribute to safe interactions with other marine users.	
Notification to stakeholders four weeks prior to the commencement of the ROV inspection.		Yes	Providing stakeholders with a notification four weeks prior to commencement of the ROV inspection is considered good practice and keeps stakeholders abreast of PTTEP AA's activities.	
Trawl protection structure installed to limit the potential for fishing gear to be snagged on the suspended wellheads.		No	Well suspension is an interim activity and the ROV inspection is proposed to inform future permanent plug and abandonment plans for the wells. The cost is greater than the benefit due to the interim nature of the activity, water depths and lack of trawling activity over the wellheads.	
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.		N/A	N/A	
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Physical presence of the wellheads	The wellheads could present a snag risk to fishing gear, in particular trawl nets.	Moderate (2)	Unlikely (B)	Low
Physical presence of the project vessel	Temporary disturbance of	Minor (1)	Unlikely (B)	Low

Physical Presence: Disturbance to Other Marine Users				
	other marine users.			
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"> <li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li> <li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the physical presence of the project vessel; and</li> <li>No objections, claims or concerns raised by relevant person(s),</li> </ul> <p>PTTEP AA consider all potential environmental impacts and risks associated with the physical presence of the wellheads and project vessel to be managed appropriately. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		
1. Residual risk from routine operations low or medium & ALARP and consequence ≤2		The residual risks associated with the physical presence of the wellheads and project vessel are low and ALARP and the greatest consequence is moderate (2).		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		<p>There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with physical presence of the wellheads and project vessel.</p> <p>There is no significant threat to biodiversity and ecological integrity associated with physical presence of the wellheads and project vessel.</p> <p>There is no serious threat to the quality of the environment available to future generations associated with physical presence of the wellheads and project vessel.</p>		
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species		<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from the physical presence of wellheads or project vessel.</p> <p>No specific plans, advice or guidelines have been identified.</p>		
4. Legislation & Other Requirements		No direct legislative controls have been identified relating to managing the disturbance to other marine users. Non-regulatory requirements that have been adopted include notification to AHO no less than four weeks prior to the ROV inspection and notification to JRCC 24-48 hours before the activity commences.		
5. Internal Context – PTTEP AA Requirements		There are no relevant internal PTTEP AA requirements.		
6. External Context – Stakeholder objects and claims addressed		There have been no objections or claims raised by relevant person(s) in relation to disturbance to other marine users.		

**Physical Presence: Disturbance to Other Marine Users**

**Acceptability Statement**

Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.

The impact assessment has determined that, given the adopted controls, disturbance to other marine users represents a low current risk rating that is unlikely to result in a potential impact greater localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of disturbance to other marine users to an acceptable level.

### 8.1.2 Physical Presence: Benthic Disturbance

Physical Presence: Benthic Disturbance				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	The presence of the three wellheads impacts the benthic environment by creating a hard substrate protrusion from the seabed.  Operating the ROV near the wellhead during the inspection may result in minor benthic disturbance from sediment resuspension.			
Receptors	<ul style="list-style-type: none"><li>Benthic habitat</li><li>Water quality</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Benthic disturbance from the wellheads remaining on the seabed.	Addition of hard substrate in an environment generally consisting of soft sediments	Minor (1)	Unlikely (B)	Low
Benthic disturbance from ROV activities, including water jetting to remove marine growth from the wellhead and ROV operation in proximity to the seabed.	Localised disturbance to, or loss of, benthic habitat and temporary reduction in water quality due to sediment resuspension.	Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
<p>The continued suspension of the wellheads retains a hard substrate protrusion from the seabed, altering the local benthic habitat, which generally consists of soft sediments (Section 5.5.2).</p> <p>An ROV will be deployed from the project vessel to help assess the integrity of the three suspended wells. A tether containing power and communication cables will physically connect the ROV to the project vessel. The ROV will carry several pieces of survey equipment, including a water jet and vacuum pump to clear away marine growth that may be present and inhibiting inspection activities.</p> <p>No anchoring is proposed as part of this activity. The project vessel will remain in position using dynamic positioning systems.</p>				
Impact / Risk Assessment				
The wellheads have remained on the seabed since the rig release date for each well (Oliver-1 ST1 since 1988; Oliver-2 since 2009; Tenacious West-1 ST1 since 1998). Given the length of time each wellhead has been suspended and the depths of the Operational Area, it is expected that some level of marine growth exists on the wellheads (McLean et al., 2018). Any marine growth on the wellheads is likely comprised of species that representative of the wider Timor Province marine region (Section 5.5.2). such as gorgonians,				

Physical Presence: Benthic Disturbance				
<p>sponges, ascidians and bryozoans. The contribution of benthic habitat from the wellheads is considered to be negligible in the context of the wider region.</p> <p>The use of water jetting to remove marine growth on the wellhead structures will result in temporary suspension of organic matter and localised increase in turbidity. Water jetting will be limited to what is necessary to perform an effective inspection.</p> <p>The use of an ROV to carry out visual inspections may result in temporary seabed disturbance and suspension of sediment causing increased turbidity as a result of working close to, or occasionally on, the seabed. The footprint of the ROV is relatively small in size and weight and any benthic disturbance will be minor and localised.</p>				
Identification of Control Measures and Demonstration of ALARP				
Control Measure		Adopted	Justification	
Inherent Design and Legislative Requirements				
No inherent design or legislative requirement were identified.		N/A	N/A	
Alternatives/Substitutes Considered				
Use divers instead of an ROV for survey inspections.		No	This control would eliminate benthic disturbance resulting from water propulsion from the ROV thrusters; however, due to the depth of the Operational Area it is not possible for a diver to complete the inspection.	
No removal of marine growth.		No	This control would prevent benthic disturbance resulting from water jetting activities, however the failure to remove marine growth means that visual inspections of the wells would be impeded.	
Additional Controls Considered				
Removal of marine growth via water jetting will be limited to what is necessary to perform an effective inspection.		Yes	This control limits unnecessary benthic disturbance resulting from water jetting activities.	
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.		N/A	N/A	
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Benthic disturbance from the wellheads remaining on the seabed.	Addition of hard substrate in an environment generally consisting of soft sediments	Minor (1)	Unlikely	Low

Physical Presence: Benthic Disturbance				
Benthic disturbance from ROV activities, including water jetting to remove marine growth from the wellhead and ROV operation in proximity to the seabed.	Localised disturbance to, or loss of, benthic habitat and temporary reduction in water quality due to sediment resuspension.	Minor (1)	Unlikely	Low
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"> <li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li> <li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the physical presence of the wellheads on the seabed; and</li> <li>No objections, claims or concerns raised by relevant person(s),</li> </ul> <p>PTTEP AA considers that all potential environmental impacts associated with benthic disturbance from the ROV surveys are appropriately managed. As no additional reasonable controls were identified that would further reduce the impacts and risks without jeopardising the objectives of the activity and safety of the crew, the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		
1. Residual risk from routine operations low or medium & ALARP and consequence ≤2		The residual risks associated with benthic disturbance are low and ALARP and the greatest consequence is Minor (1).		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		<p>There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with benthic disturbance.</p> <p>There is no significant threat to biodiversity and ecological integrity associated with benthic disturbance.</p> <p>There is no serious threat to the quality of the environment available to future generations associated with benthic disturbance.</p>		
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species		<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from benthic disturbance.</p> <p>No specific recovery/conservation management plans, advice or guidelines have been identified that are relevant to benthic communities.</p>		
4. Legislation & Other Requirements		No legislative or other requirements were identified.		
5. Internal Context – PTTEP AA Requirements		There are no relevant internal requirements.		
6. External Context – Stakeholder objects and claims addressed		There has been no objections or claims raised by relevant stakeholders in relation to benthic disturbance.		

**Physical Presence: Benthic Disturbance**

**Acceptability Statement**

Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.

The impact assessment has determined that, given the adopted controls, benthic disturbance represents a low current risk rating that is unlikely to result in a potential impact greater than localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of benthic disturbance to an acceptable level.

### 8.1.3 Anthropogenic Noise: Project Vessel and Equipment

Anthropogenic Noise: Project Vessel and Equipment				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Generation of noise from the project vessel and equipment			
Receptors	<ul style="list-style-type: none"><li>Marine fauna</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Generation of noise from the project vessel (including DP systems) during the ROV survey	Avoidance or behavioural changes in marine fauna	Minor (1)	Unlikely (B)	Low
Generation of noise from the ROV equipment (sonar)		Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
<p>A single project vessel will be used to carry crew and an ROV to the Operational Area. Accordingly, during the wellhead inspections, noise emissions may be generated by the project vessel and associated machinery/equipment. The activity is expected to take less than three days.</p> <p>ROV-mounted sonar may be utilised if the wellheads cannot initially be found using visual methods. The sonar head can operate at a frequency between approximately 650 kHz and 1,350 kHz (lower range operating frequencies are expected to be approximately 650-720 kHz and upper range frequencies are expected to be approximately 900-1,350 kHz). If required, sonar will be used within approximately 75 m of the seabed and may be operated for between approximately 12 and 24 hours at each wellhead location; approximately 6-12 hours of this time is likely to be spent with the sonar operating at the lower-range operating frequencies of 650-720 kHz, while locating the metal wellhead structure.</p> <p>Noise produced from the ROV during inspections is associated only with the motors and is considered negligible.</p>				
Impact / Risk Assessment				
Generation of noise from the project vessel (including DP systems)				
<p>During the ROV inspection, continuous noise will be generated by the project vessel engines, propeller rotations and dynamic positioning (DP) thrusters. Vessel noise emissions varies with the size, speed, and engine type and the activity being undertaken. Noise levels for a range of vessels have been measured at 164-182 dB re <math>\mu</math>Pa at 1 m (SPL) at dominant frequencies between 50 Hz and 7 kHz (Simmonds et al., 2004). Noise levels are generally greater for larger vessels (reflecting engine size and power), as well as being greater with increased speed or when operating DP thrusters (Salgado Kent et al. 2016; Jiménez-Arranz et al. 2017).</p> <p>Elevated underwater noise from the project vessel will be sub-lethal, but could affect marine fauna, including cetaceans, fish, turtles, shark and rays through disturbance leading to behavioural changes or areas avoidance of the area (Richardson et al., 1995; Simmonds et al., 2004). Cetaceans have been observed to exhibit behavioural responses to underwater sounds ranging from, for example, momentary pauses in vocalisations and changes in body orientation, to changes in travel direction and behavioural avoidance</p>				

### Anthropogenic Noise: Project Vessel and Equipment

between approximately 120 dB re 1  $\mu$ Pa and >180 dB re 1  $\mu$ Pa (Southall et al. 2007; Gomez et al. 2016). Behavioural responses to noise are highly variable and context-specific; higher received levels are not always associated with stronger behavioural responses (Southall et al. 2007; Gomez et al. 2016). It is reasonable to expect that significant behavioural responses such as avoidance are more likely to occur in response to higher sound levels. Based on the above and assuming intermediate sound spreading (between spherical and cylindrical sound spreading), cetaceans may display some level of avoidance within approximately 1 or 2 km of the project vessel, beyond which, sound levels approach ambient levels. Any significant avoidance response is likely to be limited to within a few hundred metres. Popper et al. (2014), a working group of leading experts, suggested that behavioural responses in turtles and fish, which are less sensitive to noise, are more likely to occur within tens or hundreds of metres from vessels and other continuous noise sources. While fish may show an initial behavioural response, fish are known to quickly habituate to continuous noise sources such as vessel noise (Smith et al., 2004; Wysocki et al. 2006; Spiga et al., 2012; Nichols et al., 2015; Holmes et al., 2017). Given the highly localised extent of disturbance to marine fauna, the absence of significant habitat or known aggregation sites within the Operational Area, and the fact that marine fauna will be transient within the Operational Area, such disturbances are not of any ecological significance to individual fauna or to any populations.

#### Sonar

Single-beam sonar is a very high-frequency and high resolution system that produces sound between 650 kHz and 1,350 kHz. The sound beam width is very narrow, ranging between cones of approximately 1-2° depending on the operating frequency. The sonar head emits very short duration pulses of between a few microseconds and a millisecond. Sonar pulses of such short duration result in relatively low acoustic energy and consequently low sound exposure levels (SELs) despite having high peak (PK) source pressures (Salgado Kent et al. 2016). The high frequencies of these systems also result in rapid attenuation of sound within a short distance of the primary beam (Salgado Kent et al. 2016; Jiménez-Arranz et al. 2017).

Other high-frequency single beam sonar systems have been the subject of modelling and measurement studies (Chorney et al. 2011; Martin et al. 2012; Zykov, 2013; Austin et al. 2013; Jiménez-Arranz et al. 2017). These include high-frequency single-beam sonar and echo sounder systems with high source levels (200-245 dB re dB re  $\mu$ Pa at 1 m PK), operating frequencies of between approximately 100 kHz and 400 kHz, as well as similar pulse durations to the proposed sonar for this activity. The SELs and PK levels from these studies indicate that impacts such as hearing impairment (permanent or temporary threshold shift [PTS/TTS]) in cetaceans are not predicted to occur and behavioural impacts are likely limited to within metres or tens of metres of the beam. Therefore, the sound levels produced by the proposed sonar system for this activity are unlikely to result in PTS or TTS impacts and, given that the operating frequencies for the proposed sonar system are even higher than the systems considered in the studies, sound attenuation is expected to occur even more rapidly.

Importantly, however, the very high operating frequencies of the proposed sonar system are not actually relevant to marine fauna because the auditory ranges of all marine fauna species are at significantly lower frequencies. For example, even mid-frequency and high-frequency hearing cetaceans have a generalised hearing range of up to a maximum of 160 kHz, and low-frequency cetaceans have a hearing range of up to 35 kHz, with peak hearing ranges at even lower frequencies (NMFS 2018). Marine turtles and fish species also have low-frequency hearing ranges of up to approximately 1-2 kHz (Ladich 2000; Bartol & Musick 2003; Popper et al. 2014). Therefore, the sound emitted by the sonar will not be audible to marine fauna and behavioural impacts are not expected.

Consequently, the very high frequencies and short pulse, low acoustic energy produced by the sonar are not expected to result in behavioural disturbance or other impacts to marine fauna.

Potential impacts from anthropogenic noise are likely to be restricted to temporary avoidance behaviour to individuals transiting through the Operational Area in response to vessel noise, and are therefore considered localised with no lasting effect.

### Identification of Control Measures and Demonstration of ALARP

Control Measure	Adopted	Justification
-----------------	---------	---------------

Anthropogenic Noise: Project Vessel and Equipment		
Inherent Design and Legislative Requirements		
Vessel engines and DP system maintained in accordance with vessel's planned maintenance system and manufacturers' recommendations.	Yes	Maintaining engines and DP system in accordance with manufacturer specifications reduces noise levels as worn out or faulty parts can be replaced.
In accordance with Part 8 of EPBC Regulations (Vessels), the vessel must travel at less than 6 knots within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area. The vessel will approach no closer than 100 m from a whale and 50 m from a dolphin.	Yes	Control based on legislative requirements – must be adopted.  This control measure is primarily intended for managing vessel movements in proximity to cetaceans and reducing the potential for collisions. However, the control measure also provides some indirect benefit to managing vessel noise, as a slow moving vessel will emit lower sound levels than if it were moving at speed. This control is practicable to implement given that the vessel will already be transiting slowly or will be stationary when conducting the petroleum activity in the Operational Area.
Alternatives/Substitutes Considered		
Vessel crew inductions completed by all personnel to ensure understanding of reporting requirements and EPBC regulations.	Yes	By ensuring crew are appropriately trained in the requirements of the EPBC regulations, the likelihood of impacts to marine fauna is reduced. No change in consequence will occur.
Additional Controls Considered		
Management of vessel noise by varying the timing of the activity to avoid migration periods.	No	Variation of timing of specific activities is not feasible as activity is subject to schedule constraints and vessel availability. Significant cost and schedule impacts if activities avoid specific timeframes and not proportionate given the assessment demonstrates no significant impacts to marine fauna.
Management of vessel noise by powering down or shutting off vessel DP systems if marine fauna are observed in close proximity.	No	While stationed over the wellheads and with the ROV deployed, DP is required to maintain position and conduct ROV inspections safely. Powering down or turning off DP would mean losing control of the vessel and potentially drifting off station,

Anthropogenic Noise: Project Vessel and Equipment				
			ROV cable entanglements, etc. Therefore, this option is not safe or practicable.	
Manage sound produced from the ROV mounted sonar system (e.g. precaution zones, soft-starts, shut down procedures).	No	The very high frequencies and short pulse, low acoustic energy produced by the sonar is not expected to result in disturbance or other impacts to marine fauna.  Mitigation such as observations at the sea surface for the purpose of triggering shut-downs for activities conducted on the seabed are not practicable. Soft-starts are also not possible with the type of sonar instrument that will be used. Given that no impacts are predicted to occur from the use of sonar, there is no environmental benefit provided by implementing these measures.		
Confirm that sonar will operate at frequencies that will not be audible to marine fauna	Yes	PTTEP AA will review the operating frequency of the selected sonar system at the time of contracting to confirm that it is above the auditory range of marine fauna (> 160 kHz).		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Generation of noise from the project vessel and machinery/equipment	Avoidance or behavioural changes in marine fauna	Minor (1)	Unlikely (B)	Low
Generation of noise from the ROV equipment (sonar)		Minor (1)	Unlikely (B)	Low
ALARP Statement				
Given the decision context is 'Type A', and: <ul style="list-style-type: none"><li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li><li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with anthropogenic noise from the project vessel; and</li><li>there have been no objections or claims raised by relevant person(s) in relation to underwater noise,</li></ul> PTTEP AA considered that all potential environmental impacts and risks associated with anthropogenic noise from the project vessel are appropriately managed. As no reasonable additional or alternative controls				

<b>Anthropogenic Noise: Project Vessel and Equipment</b>	
were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.	
<b>Demonstration of Acceptability</b>	
<b>Acceptable Level Criteria</b>	<b>Statement of how the acceptable level criteria has been met</b>
1. Residual risk from routine operations low or medium & ALARP and consequence $\leq 2$	The residual risks associated with anthropogenic noise from the project vessel are low and ALARP and the consequence is minor (1).
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	<p>There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with anthropogenic noise.</p> <p>There is no significant threat to biodiversity and ecological integrity associated with anthropogenic noise.</p> <p>There is no serious threat to the quality of the environment available to future generations associated with anthropogenic noise.</p>
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from anthropogenic noise.</p> <p>The activity will be undertaken in a manner consistent with the applicable objectives and actions of the following species conservation or recovery plans, threat abatement plans, and conservation advice: Conservation Management Plan for the Blue Whale; Approved Conservation Advice for Megaptera novaeangliae (humpback whale); Conservation Advice for sei and fin whales; Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017); and Whale shark – wildlife management program no. 57 (DPaW 2013).</p> <p>The level of impact is considered to be acceptable.</p>
4. Legislation & Other Requirements	<p>PTTEP AA will advise the project vessel operator of their obligations under:</p> <ul style="list-style-type: none"> <li>• Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act); and</li> <li>• EPBC Regulations 2000, specifically Part 8 (Division 8.1)</li> </ul>
5. Internal Context – PTTEP AA Requirements	There are no relevant PTTEP AA internal requirements.
6. External Context – Stakeholder objects and claims addressed	No stakeholder objections or claims have been raised in relation to anthropogenic noise generation during the ROV inspection.
<b>Acceptability Statement</b>	

### **Anthropogenic Noise: Project Vessel and Equipment**

Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.

The impact assessment has determined that, given the adopted controls, anthropogenic noise from the project vessel and associated equipment represents a low current risk rating that is unlikely to result in a potential impact greater than localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of anthropogenic noise from a project vessel to an acceptable level.

### 8.1.4 Routine Discharges to the Marine Environment: Project Vessel

Routine Discharges to the Marine Environment: Project Vessel				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Routine discharges to the marine environment from the project vessel.			
Receptors	<ul style="list-style-type: none"><li>Species</li><li>Water quality</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Routine discharge of sewage, grey water and food wastes to the marine environment from the project vessel.	Local decline in water quality. Secondary impacts including: <ul style="list-style-type: none"><li>toxicity to marine fauna</li><li>change in fauna behaviour.</li></ul>	Minor (1)	Unlikely (B)	Low
Routine discharge of deck and bilge water to the marine environment from the project vessel.		Minor (1)	Unlikely (B)	Low
Routine discharge of cooling water or brine to the marine environment from the project vessel.		Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
Project vessels generate and routinely discharge the following: <ul style="list-style-type: none"><li>Small volumes of treated sewage and food wastes to the marine environment. The impact assessment is based on a maximum approximate discharge of 100 L of sewage/greywater, and approximately 1 – 2kg of food waste, per person per day.</li><li>Routine/periodic discharge of relatively small volumes of bilge water. Bilge tanks receive fluids from many parts of a vessel. Bilge water can contain water, oil, detergents, solvents, chemicals and other liquids, solids or chemicals.</li><li>Variable water discharge from vessel decks directly overboard or via deck drainage systems. Water sources could include rainfall events and/or deck activities such as cleaning/wash-down of equipment/decks.</li><li>Cooling water from machinery engines and brine produced during the desalination process of reverse osmosis to produce potable water on board the project vessel.</li></ul>				
Impact / Risk Assessment				
Sewage, Grey Water and Food Waste				
Sewage, grey water and food waste discharge is routinely carried out as a standard practice during maritime activities and is permitted (and regulated) under the MARPOL Annexes IV (Prevention of pollution – sewage) and V (Prevention of pollution by garbage), as appropriate for vessel class.				

### Routine Discharges to the Marine Environment: Project Vessel

Such wastes discharged to the marine environment may result in a localised, temporary reduction in water quality, namely increased turbidity and nutrient availability. Increased water column turbidity can temporarily inhibit photosynthesis by plankton and benthic primary producers by decreasing light availability in the surface waters. Sewage and putrescible wastes can result in eutrophication in the surrounding waters resulting in changes to plankton in the immediate area.

Ingestion of sewage discharges by fish, cetaceans, marine turtles or foraging seabirds could result in bioaccumulation of contaminants. In general, dilution after discharge at sea is rapid with results showing 1 in 1000 dilution within 30 minutes (Costello & Read, 1994). Based on this, toxicity effects are unlikely to occur at ecologically significant or detectable levels at discharge sites.

About 50 crew will be aboard the project vessel. Using this number, approximate maximum discharges for the project vessel equate to 5000 L of sewage/greywater and 100 – 200 kg of solid food waste per day.

Because of the small volumes generated and the well mixed surface waters in the defined area, no significant impacts from routine discharges of sewage, grey water and food wastes from the project vessel are expected.

#### Deck and Bilge Water

The potential sources of oily water from the project vessel include bilge water and deck wash down water. Once discharged into the marine environment, oily water may result in a localised, temporary decrease in water quality and toxicity to marine organisms in the immediate vicinity of the discharge point. Oily water discharged from the project vessel will be treated to a concentration of <15 parts per million (ppm) or contained and not discharged to sea. The potential for impact is therefore low. Dispersion and biodegradation of potentially contaminated oily water drainage is expected to be rapid and highly localised, particularly given the strong tidal movements experienced in the region, resulting in no long-term or adverse effects on water quality or marine ecology.

#### Cooling Water and Brine

Discharges of cooling water and brine may alter water quality in the immediate area of discharge, by changing the water temperature and salinity, respectively. Dispersion of cooling water and brine is expected to be rapid and highly localised resulting in no long-term or adverse effects on water quality or marine ecology.

Due to the intermittent nature of these routine discharges, impacts to water quality and marine fauna within the Operational Area are expected to be localised within the immediate vicinity of the source with minor environmental impacts.

### Identification of Control Measures and Demonstration of ALARP

Control Measure	Adopted	Justification
<b>Inherent Design and Legislative Requirements</b>		
<p>Marine Order 91 - marine pollution prevention-oil (as relevant to vessel class) requirements, which includes mandatory measures for processing oily water prior to discharge:</p> <ul style="list-style-type: none"> <li>Machinery space bilge/oily water shall have IMO approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure Oil in Water (OIW) content to be less than 15 Parts per Million (ppm) prior to discharge.</li> <li>IMO approved oil filtering equipment shall also have an alarm and an automatic stopping device or be capable of recirculating if OIW concentration exceeds 15 ppm.</li> </ul>	Yes	Control based on legislative requirements – must be adopted.

Routine Discharges to the Marine Environment: Project Vessel		
<ul style="list-style-type: none"> <li>A deck drainage system shall be capable of controlling the content of discharges for areas of high risk of fuel/oil/grease or hazardous chemical contamination.</li> <li>There shall be a waste oil storage tank available, to restrict oil discharges.</li> <li>If machinery space bilge discharges cannot meet the oil content standard of &lt;15 ppm without dilution or be treated by an IMO approved oil/water separator, they will be contained on-board and disposed onshore.</li> <li>Valid International Oil Pollution Prevention Certificate.</li> </ul>		
<ul style="list-style-type: none"> <li>Marine Order 95 – marine pollution prevention—garbage (as appropriate to vessel class) which requires putrescible waste and food scraps to pass through a macerator so it is capable of passing through a screen with no opening wider than 25 mm.</li> </ul>	Yes	Control based on legislative requirements – must be adopted.
<p>Marine Order 96 - marine pollution prevention-sewage (as appropriate to vessel class) which includes the following requirements:</p> <ul style="list-style-type: none"> <li>a valid International Sewage Pollution Prevention Certificate, as required by vessel class</li> <li>a sewage treatment plant approved by AMSA or an issuing body</li> <li>a sewage comminuting and disinfecting system</li> <li>a sewage holding tank sized appropriately to contain all generated waste (black and grey water)</li> <li>discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land</li> <li>discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant will only occur at a distance of more than 3 nm from the nearest land</li> <li>discharge of sewage will occur at a moderate rate while support vessel is proceeding (&gt; 4 knots), to avoid discharges in environmentally sensitive areas.</li> </ul>	Yes	Control based on legislative requirements – must be adopted.
Where there is potential for loss of primary containment of oil and chemicals on the project vessels, deck drainage must be collected via a closed drainage system.	Yes	A closed drainage system will reduce the likelihood of contaminated deck drainage water being discharged to the marine environment.
Alternatives/Substitutes Considered		
Storage, transport and treatment/disposal onshore of sewage, greywater, putrescible and bilge wastes.	No	Not feasible. Would present additional safety and hygiene

Routine Discharges to the Marine Environment: Project Vessel				
		hazards resulting from the storage, loading and transport of the waste material.  Distance of activity offshore also makes implementing this control not feasible.		
Additional Controls Considered				
No further controls have been identified.	N/A	N/A		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Routine discharge of sewage, grey water and food wastes to marine environment from the project vessel	Local decline in water quality. Secondary impacts including: <ul style="list-style-type: none"><li>toxicity to marine fauna</li><li>change in fauna behaviour</li></ul>	Minor (1)	Unlikely (B)	Low
Routine discharge of deck and bilge water to marine environment from the project vessel		Minor (1)	Unlikely (B)	Low
Routine discharge of cooling water or brine to marine environment from the project vessel		Minor (1)	Unlikely (B)	Low
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"><li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures to ensure the predicted level of impact to the marine environment from planned discharges is equal to or a lesser level of impact than the acceptable level;</li><li>all relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the planned discharges; and</li><li>there have been no objections or claims raised by relevant stakeholders,</li></ul> <p>PTTEP AA considers that all potential environmental impacts and risks associated with routine discharges from the project vessel are appropriately managed. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria	Statement of how the acceptable level criteria has been met			

Routine Discharges to the Marine Environment: Project Vessel	
1. Residual risk from routine operations low or medium & ALARP and consequence $\leq 2$	The residual risks associated with the routine discharges are low and ALARP and the greatest consequence associated with potential impacts on marine fauna and water quality is minor (2).
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	<p>There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with routine discharges.</p> <p>There is no significant threat to biodiversity and ecological integrity associated with routine discharges.</p> <p>There is no serious threat to the quality of the environment available to future generations associated with routine discharges.</p>
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from routine discharges from the project vessel.</p> <p>Minimising chemical discharge is an action identified by the Recovery Plan for Marine Turtles in Australia 2017-2027. This requires that best practice industrial management is implemented to minimise impacts to marine turtle health and habitats. The nearest habitat critical to the survival of marine turtles is located over 140 km south-west of the Operational Area and outside the EMBA , therefore no relevant management requirements.</p>
4. Legislation & Other Requirements	<p>The Activity will comply with the following MARPOL Annexes and associated Marine Orders:</p> <ul style="list-style-type: none"> <li>• MARPOL 73/78 Annex V (Garbage)</li> <li>• MARPOL 73/78 Annex IV (Sewage)</li> <li>• MARPOL 73/78 Annex I – Oil</li> </ul>
5. Internal Context – PTTEP AA Requirements	<p>PTTEP AA considers the application of the following internal requirements to represent industry 'Good Practice':</p> <ul style="list-style-type: none"> <li>• Oil-water systems will be maintained and oil-in-water meters calibrated.</li> <li>• Sewage treatment plan will be maintained.</li> </ul>
6. External Context – Stakeholder objects and claims addressed	There has been no objections or claims raised by relevant stakeholders in relation to the routine discharges.
Acceptability Statement	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that routine discharges to the marine environment from the project vessel represent a low current risk rating that is unlikely to result in a potential impact greater than localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA</p>	



<b>Routine Discharges to the Marine Environment: Project Vessel</b>
---

considers the adopted controls appropriate to manage the impacts and risks from routine discharges from the project vessel to an acceptable level.
--

### 8.1.5 Artificial Light Emissions

Artificial Light Emissions				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	The project vessel will be lit using lights that meet required navigational and occupational safety standards.			
Receptors	<ul style="list-style-type: none"><li>Species</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Artificial light emissions emitted from the project vessel	Change in fauna behaviour, disorientation of marine fauna	Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
The project vessel has external lighting to facilitate navigation and safe operations at night in accordance with the Navigation Act 2012.				
Impact / Risk Assessment				
<p>Light emissions can affect fauna in two main ways:</p> <ul style="list-style-type: none"><li>Behaviour: Many organisms are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the night-time phase of the moon. Artificial lighting has the potential to create a constant level of light at night that can override these natural levels and cycles.</li><li>Orientation: organisms such as marine turtles and birds may also use lighting from natural sources to orient themselves in a certain direction at night. In instances where an artificial light source is brighter than a natural source, the artificial light may act to override natural cues, leading to disorientation.</li></ul> <p>The Operational Area may be occasionally visited by migratory and oceanic birds; however, does not contain any emergent land that could be used as roosting or nesting habitat (Section 5.5.3). Given the Operational Area lies offshore, seabirds are likely to only transit through the Operational Area when travelling between emergent land and important habitats. Migratory shorebirds may be present in or fly through the region between July and December and again between March and April as they complete migrations between Australia and offshore locations (DSEWPac, 2012). The risk associated with behavioural disturbance to seabirds attracted to the light is considered to be low due to the scale of the activity (single project vessel) and short duration.</p> <p>Marine turtles may transit the Operational Area in low numbers; however, the nearest nesting beach is located at Ashmore Reef and Cartier Island (Commonwealth of Australia, 2017), over 190 km and 160 km from the Operational Area respectively. Impacts to marine turtles from vessel lighting are therefore not expected.</p> <p>Lighting from the presence of a vessel may result in the localised aggregation of fish below the vessel. These aggregations of fish are considered localised and temporary and any long term changes to fish species composition or abundance is considered highly unlikely.</p>				

Artificial Light Emissions				
External light emissions from the project vessel are typically managed to maintain good night vision for crew, as well as to communicate the vessel's presence and activities to other marine users (i.e. navigation lights). Lighting is required for operations and cannot reasonably be eliminated.				
The ROV is also equipped with lights to ensure safe navigation in deep waters and to enable visual inspection of the wells. Any potential impact to marine fauna from light emitted from the ROV is considered to be negligible.				
Overall impacts to marine fauna from artificial light emissions are considered to be highly localised and temporary in nature.				
Identification of Control Measures and Demonstration of ALARP				
Control Measure		Adopted	Justification	
Inherent Design and Legislative Requirements				
No inherent design or legislative requirement were identified.		N/A	N/A	
Alternatives/Substitutes Considered				
No practicable alternative or substitutes to the above controls have been identified.		N/A	N/A	
Additional Controls Considered				
Reduction of vessel lighting below levels required for navigation and vessel safety.		No	This control would result in a slight reduction in light emissions, however there would be little benefit given relatively low numbers of sensitive receptors such as marine turtles in Operational Area and surrounding waters. The control introduces unacceptable safety risks to crew and other marine users and would not meet legislative requirements.	
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.		N/A	N/A	
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Routine external light emissions on board the project vessel	Change in fauna behaviour, disorientation of marine fauna	Minor (1)	Unlikely (B)	Low
ALARP Statement				
Given the decision context is 'Type A', and the residual risk has been determined to be low. PTTEP AA considers that all potential environmental impacts associated with light emissions from the project vessel are appropriately managed. As no reasonable controls were identified that would further reduce the impacts and risks without jeopardising the objectives of the activity and safety of the crew, the impacts and risks are considered to be ALARP.				

Artificial Light Emissions	
Demonstration of Acceptability	
Acceptable Level Criteria	Statement of how the acceptable level criteria has been met
1. Residual risk from routine operations low or medium & ALARP and consequence $\leq 2$	The residual risks associated with artificial light generated from the project vessel are low and ALARP and the greatest consequence is minor (1).
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	<p>There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with artificial light emissions.</p> <p>There is no significant threat to biodiversity and ecological integrity associated with artificial light emissions.</p> <p>There is no serious threat to the quality of the environment available to future generations associated with artificial light emissions.</p>
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from artificial light generated from the project vessel.</p> <p>Recovery Plan for Marine Turtles in Australia 2017-2027 identifies light pollution as a threat to all five marine turtle species identified to potentially occur within the Operational Area (Section 5.5.3). The plan identifies light as a threat to nesting females and turtle hatchlings; therefore, threats from artificial light generated from the project vessel are not considered relevant in the context of the open water environment of the Operational Area.</p>
4. Legislation & Other Requirements	No direct legislative controls have been identified relating to artificial light generated from the project vessel.
5. Internal Context – PTTEP AA Requirements	There are no relevant internal PTTEP AA requirements.
6. External Context – Stakeholder objects and claims addressed	There have been no objections or claims raised by relevant person(s) in relation to potential impacts from artificial lighting.
Acceptability Statement	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that artificial light from project vessels represents a low current risk rating that is unlikely to result in a potential impact greater than localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The potential impacts and risks are considered acceptable without implementing any additional controls.</p>	

### 8.1.6 Atmospheric Emissions: Power Generation and Incineration

Atmospheric Emissions: Power Generation and Incineration				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Atmospheric emissions from the routine operation of internal combustion engines and incinerators on project vessels			
Receptors	<ul style="list-style-type: none"><li>Air quality</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Atmospheric emissions from the routine operation of internal combustion engines and incinerators on the project vessel.	Local decline in air quality.	Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
Relatively small amounts of atmospheric emissions will be produced from the project vessel throughout the duration of the ROV inspections due to power generation and incineration.				
Impact / Risk Assessment				
<p>During the ROV inspection, atmospheric emissions will be generated by the project vessel from internal combustion engines (including all equipment and generators) and incineration activities (including on-board incinerators). Emissions will include sulphur dioxide (SO<sub>2</sub>), nitrogen oxide (NO<sub>x</sub>), ozone-depleting substances, carbon dioxide (CO<sub>2</sub>), particulates and volatile organic compounds (VOCs). Accordingly, fuel combustion and incineration has the potential to result in a localised, temporary reduction in air quality.</p> <p>Potential impacts include a localised reduction in air quality, generation of dark smoke and contribution to greenhouse gas emissions. Given the exposed location of the Operational Area, which will lead to the rapid dispersion of the low volumes of atmospheric emissions, the potential impacts are expected to have no lasting effect, with no cumulative impacts when considered in the context of existing commercial shipping operations in the wider region.</p>				
Identification of Control Measures and Demonstration of ALARP				
Control Measure	Adopted		Justification	
Inherent Design and Legislative Requirements				
Marine Order 97 (marine pollution prevention—air pollution) which details requirements for: <ul style="list-style-type: none"><li>International Air Pollution Prevention Certificate, required by vessel class</li><li>use of low sulphur fuel when available</li><li>Ship Energy Efficiency Management Plan, where required by vessel class</li><li>onboard incinerator to comply with Marine Order 97.</li></ul>	Yes		Control based on legislative requirements – must be adopted.	

Atmospheric Emissions: Power Generation and Incineration				
Alternatives/Substitutes Considered				
No practicable alternative or substitutes to the above controls have been identified.		N/A	N/A	
Additional Controls Considered				
No practicable additional controls considered		N/A	N/A	
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.		N/A	N/A	
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Atmospheric emissions from the routine operation of internal combustion engines and incinerators on the project vessel.	Local decline in air quality.	Minor (1)	Unlikely (B)	Low
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"><li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li><li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the project vessel positioning; and</li><li>There have been no objections or claims raised by relevant person(s),</li></ul> <p>PTTEP AA considers that all potential environmental impacts and risks associated with atmospheric emissions from the project vessel are appropriately managed. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		
1. Residual risk from routine operations low or medium & ALARP and consequence ≤2		The residual risks associated with atmospheric emissions from power generation are low and ALARP and the greatest consequence is minor (1).		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with atmospheric emissions.  There is no significant threat to biodiversity and ecological integrity associated with atmospheric emissions.		

<b>Atmospheric Emissions: Power Generation and Incineration</b>	
	There is no serious threat to the quality of the environment available to future generations associated with atmospheric emissions.
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from atmospheric emissions.</p> <p>No specific plans, advice or guidelines have been identified.</p>
4. Legislation & Other Requirements	<p>With the application of the 'Good Practice' control measures identified, PTTEP AA will comply with:</p> <ul style="list-style-type: none"> <li>• MARPOL 73/78 (Annex VI, regulation 14), administered under AMSA Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution – Division 7</li> <li>• MARPOL 73/78 (Annex VI, regulation 16) – Shipboard incineration, administered under AMSA Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution – Division 4</li> <li>• MARPOL 73/78 (Annex VI, regulation 9) – Duration and Validity of certificate</li> <li>• AMSA Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution – Division 2</li> </ul>
5. Internal Context – PTTEP AA Requirements	There are no relevant internal PTTEP AA requirements.
6. External Context – Stakeholder objects and claims addressed	There has been no objections or claims raised by relevant stakeholders in relation to the atmospheric emissions from power generation.
<b>Acceptability Statement</b>	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that atmospheric emissions generated from the project vessel represent a low current risk rating that is unlikely to result in a potential impact greater than localised temporary reduction in air quality. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of atmospheric emissions generated from the project vessel to an acceptable level.</p>	

## 8.2 UNPLANNED RISKS

### 8.2.1 Physical Presence: Collision with Marine Fauna

Physical Presence: Collision with Marine Fauna				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Accidental collision between project vessel and protected marine fauna.			
Receptors	<ul style="list-style-type: none"><li>Species</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Accidental collision between project vessel and protected marine fauna.	Injury / mortality to protected marine fauna	Moderate (2)	Unlikely (B)	Low
Source of Impact / Risk				
<p>A project vessel operating in and around the Operational Area may present a potential hazard to protected marine fauna, including cetaceans, whale sharks and marine turtles. Vessel movements can result in collisions between the vessel (hull and propellers) and marine fauna, potentially resulting in superficial injury, serious injury that may affect life functions (e.g. movement and reproduction) and mortality. Factors that contribute to the frequency and severity of impacts due to collision vary greatly due to vessel type, vessel operation (specific activity, speed), physical environment (e.g. water depth), the type of animal potentially present and their behaviours.</p>				
Impact / Risk Assessment				
<p>The likelihood of a vessel collision with marine fauna being lethal is influenced by vessel speed; the greater the speed at impact, the greater the risk of mortality (Jensen and Silber, 2004; Laist et al., 2001). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale as a result of a vessel strike increases from about 20% at 8.6 knots to 80% at 15 knots. At a speed of four knots, the risk was estimated to be less than 10%.</p> <p>The project vessel is likely to be travelling less than eight knots within the Operational Area; therefore, the chance of a vessel collision with protected species resulting in a lethal outcome is significantly reduced. No BIAs or known key aggregation areas (resting, breeding or feeding) for protected species are located within or immediately adjacent to the Operational Area (Section 5.5.4.3). However, the wider EMBA overlaps with the pygmy blue whale migration BIA and a whale shark foraging BIA, suggesting that individuals of these species could occasionally transit the Operational Area, although this is unlikely. In addition, whales, whale sharks and turtles typically display avoidance behaviour when in close proximity to vessels.</p> <p>It is unlikely that vessel movement associated with the activity will have a significant impact on marine fauna populations, given:</p> <ul style="list-style-type: none"><li>the low presence of transiting individuals;</li><li>avoidance behaviour commonly displayed by whales, whale sharks and turtles;</li><li>low operating speed of the project vessel (generally less than eight knots or stationary in the Operational Area, unless operating in an emergency); and</li><li>the short duration (up to three days) of the activity.</li></ul>				

Physical Presence: Collision with Marine Fauna		
Identification of Control Measures and Demonstration of ALARP		
Control Measure	Adopted	Justification
Inherent Design and Legislative Requirements		
<p>EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures:</p> <ul style="list-style-type: none"> <li>Project vessel will not travel faster than six knots within 300 m of a cetacean or turtle (caution zone) and not approach closer than 100 m from a whale.</li> <li>Project vessel will not approach closer than 50 m for a dolphin or turtle and/or 100 m for a whale (with the exception of animals bow riding).</li> <li>If the cetacean or turtle shows signs of being disturbed, the project vessel will immediately withdraw from the caution zone at a constant speed of less than six knots.</li> <li>Project vessel will not travel faster than eight knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.</li> </ul>	Yes	Control based on legislative requirements – must be adopted.
Alternatives/Substitutes Considered		
No practicable alternative or substitutes to the above controls have been identified.	N/A	N/A
Additional Controls Considered		
All collisions with cetaceans in Commonwealth waters will be reported to the National Ship Strike Database.	Yes	Reporting ship strikes with cetaceans is requested by the DoAWE's Australian Antarctic Division and allows the Australian Government and International Whaling Commission (IWC) to collate scientific data on vessel strike locations, frequencies and timings so that further research and mitigation can be considered.
Vessel crew induction completed by all personnel to ensure understanding of environmental reporting requirements and EPBC regulations.	Yes	By ensuring crew are appropriately trained in the requirements of the EPBC regulations, the risk of impacts to marine fauna is reduced.
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)		
No further practicable improvements to the above controls have been identified.	N/A	N/A
Residual Risk Analysis and Ranking		

Physical Presence: Collision with Marine Fauna				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Accidental collision between project vessel and protected marine fauna.	Injury / mortality to fauna	Moderate (2)	Unlikely (B)	Low
<b>ALARP Statement</b>				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"> <li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li> <li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the project vessel; and</li> <li>There have been no objections or claims raised by relevant person(s),</li> </ul> <p>PTTEP AA considers the adopted control measures appropriate to manage the risks of an accidental collision between a project vessel and protected marine fauna. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.</p>				
<b>Demonstration of Acceptability</b>				
<b>Acceptable Level Criteria</b>		<b>Statement of how the acceptable level criteria has been met</b>		
1. Residual risk is low or medium & ALARP and the consequence from an unplanned risk is ≤4		The residual risks associated with the accidental collision between project vessel and protected marine fauna is low and ALARP and the greatest consequence is moderate (2).		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		<p>The project vessel will be moving at approximately eight knots during the activity and will comply with the requirements of the EPBC Regulations 2000 (Part 8 Division 8.1 'Interacting with cetaceans'). The potential interactions between vessels are well understood and the proposed controls meet established industry management measures that are designed to reduce the risk of collisions with marine fauna. Therefore, marine fauna injury or mortality is not expected and there is no risk of population level impacts or threats of serious or irreversible environmental damage.</p> <p>PTTEP AA considers the level of risk to protected marine fauna to be acceptable, given there is no risk of population level impacts and displacement from critical foraging habitats are not likely to occur.</p>		
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species		<p>Due to the distance from an AMP, the presence of a project vessel does not pose a risk to an AMP, therefore management plans are not applied.</p> <p>The project vessel will comply with the specified speed limits and approach distances for cetaceans and whale sharks, as per the EPBC Regulations 2000.</p> <p>Any collisions with whales will be reported to the National Ship Strike Database, as per the Conservation Management Plan for the Blue Whale (2015-2025) and</p>		

Physical Presence: Collision with Marine Fauna	
	<p>Threatened Species Scientific Committee Approved Conservation Advice for <i>Megaptera novaeangliae</i> (TSSC, 2015).</p> <p>The Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017) applies to the slowing of marine vessels only in shallow waters, and is therefore not applicable to this activity.</p>
4. Legislation & Other Requirements	The requirements of the EPBC Regulations 2000 (Part 8 Division 8.1 'Interacting with cetaceans') will be implemented.
5. Internal Context – PTTEP AA Requirements	There are no internal PTTEP AA requirements.
6. External Context – Stakeholder objects and claims addressed	There have been no objections or claims raised by relevant person(s) in relation to vessel collision with marine fauna.
Acceptability Statement	
<p>Criteria (1-7) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that, given the adopted controls, vessel collision with marine fauna represents a low current risk rating that is unlikely to result in a potential impact greater than a negligible disruption to a small proportion of the population and no impact on critical habitat or activity. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet the requirements of Part 8 (Division 8.1) of the EPBC Regulations 2000. The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of vessel collision with marine fauna to a level that is broadly acceptable.</p>	

## 8.2.2 Unplanned Discharge: Loss of Hazardous or Non-Hazardous Solid Wastes

Unplanned Discharge: Loss of Hazardous or Non-Hazardous Solid Wastes				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Accidental loss of hazardous or non-hazardous solid wastes to the marine environment			
Receptors	<ul style="list-style-type: none"><li>Water quality</li><li>Species</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Accidental loss of hazardous or non-hazardous solid wastes to the marine environment	Changes to water quality  Injury / mortality to marine fauna	Minor (1)	Possible (C)	Low
Source of Impact / Risk				
The project vessel will generate a variety of solid wastes including packaging and domestic wastes such as aluminium cans, bottles, paper and cardboard and hazardous wastes such as aerosols, batteries and paints and solvents. Hence, there is the potential for solid wastes to be lost overboard to the marine environment. Loss of solid wastes has potential to occur during periods of adverse weather and of due to incorrect waste storage.				
Impact / Risk Assessment				
The potential impacts of solid wastes accidentally discharged to the marine environment include impacts to water quality from direct pollution and contamination of the environment and secondary impacts relating to potential contact of marine fauna with wastes, resulting in entanglement or ingestion and leading to injury and death of individual animals. Impacts to water quality and protected species in the event of accidental solid waste loss is very unlikely, given the duration (up to three days) of vessel-based activities. The temporary or permanent loss of waste materials into the marine environment is expected to have a negligible environmental impact, based on the open water, offshore location of the Operational Area, the types, size and frequency of wastes that could occur and species present.				
Identification of Control Measures and Demonstration of ALARP				
Control Measure	Adopted	Justification		
Inherent Design and Legislative Requirements				
Marine Order 95 – pollution prevention – garbage (as appropriate to vessel class), prescribes matters necessary to give effect to Annex V of MARPOL, which prohibits the discharge of all garbage into the sea, except as provided otherwise.	Yes	Control based on legislative requirements – must be adopted.		
Alternatives/Substitutes Considered				

Unplanned Discharge: Loss of Hazardous or Non-Hazardous Solid Wastes				
No practicable alternative or substitutes to the above controls have been identified.		N/A	N/A	
Additional Controls Considered				
Project vessel waste arrangements, which require: <ul style="list-style-type: none"><li>dedicated waste segregation bins</li><li>records of all waste to be disposed, treated or recycled</li><li>waste streams to be handled and managed according to their hazard and recyclability class</li></ul>		Yes	Bins will be used to segregate wastes on vessels and covered bins will be used to prevent wind-blown waste.  Non-hazardous solid waste generated on board the vessel will either be recycled where practical or re-used.  The control is considered good practice, is well defined and established standard practice by the offshore petroleum sector.	
Solid waste generated during the activity on board the vessel will be minimised where practical.		Yes	Solid waste generated on board the vessels will be minimised wherever possible and practical.  Good industry practice.	
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.		N/A	N/A	
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Accidental loss of hazardous or non-hazardous solid wastes/ equipment to the marine environment	Changes to water quality  Injury / mortality to marine fauna	Minor (1)	Unlikely (B)	Low
ALARP Statement				
Given the decision context is 'Type A', and: <ul style="list-style-type: none"><li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li><li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with hazardous and non-hazardous solid wastes; and</li><li>There have been no objections or claims raised by relevant person(s),</li></ul> PTTEP AA considers the adopted control measures appropriate to manage the risks of accidental loss of hazardous or non-hazardous solid wastes to the marine. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		

<b>Unplanned Discharge: Loss of Hazardous or Non-Hazardous Solid Wastes</b>	
1. Residual risk is low or medium & ALARP and the consequence from an unplanned risk is $\leq 4$	The residual risks associated with the accidental loss of hazardous or non-hazardous solid wastes to the marine environment is low and ALARP and the greatest consequence is Minor (1).
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	Solid waste discharge will be managed in accordance with the requirements of MARPOL 73/78, to prevent serious or irreversible ecological damage in the marine environment. The residual risks to water quality and marine biota are low given the proposed controls meet the requirements of MARPOL 73/78. Impacts are expected to be negligible with no lasting, serious or irreversible ecological damage. The aspect and potential interactions are well understood and managed according to internationally adopted standards.
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	<p>The Operational Area is not located within any AMPs, management of discharges is in accordance with the requirements of MARPOL.</p> <p>Marine debris causing entanglement and ingestion was recognised in 2003 as a key threatening process for marine vertebrates under the EPBC Act. Pollution generally is also identified as a threat in several conservation advices / recovery plans for EPBC-listed species potentially occurring within the Operational Area. PTTEP AA has reduced and, where possible, eliminated any adverse impacts of marine debris from the activity on turtles, cetaceans, sharks and birds, noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life (Commonwealth of Australia, 2018).</p>
4. Legislation & Other Requirements	The proposed controls meet or exceed the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and associated AMSA Marine Orders made under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 for the management of discharges at sea.
5. Internal Context – PTTEP AA Requirements	There are no relevant internal PTTEP AA requirements.
6. External Context – Stakeholder objects and claims addressed	N/A – Stakeholders have not raised any specific concerns relating to solid waste management and accidental loss from vessels.
<b>Acceptability Statement</b>	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that, given the adopted controls, accidental discharge of hazardous and non-hazardous solid wastes represents a low current risk rating that is unlikely to result in a potential impact above localised impacts on water quality and marine fauna species. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field</p>	



Unplanned Discharge: Loss of Hazardous or Non-Hazardous Solid Wastes
practice/industry best practice and meet legislative requirements (Marine Order 95). Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of these unplanned discharges to a level that is acceptable.

### 8.2.3 Dropped Objects: Benthic Disturbance

Dropped Objects: Benthic Disturbance				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Dropped objects resulting in seabed disturbance			
Receptors	Ecosystems/habitats			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Dropped objects resulting in seabed disturbance	Disturbance to benthic habitat and communities	Minor (1)	Possible (C)	Low
Source of Impact / Risk				
There is the potential for objects to be dropped overboard from the project vessel to the marine environment. Objects that have been dropped during previous offshore projects include small numbers of personnel protective gear (e.g. glasses, gloves, hard hats), small tools (e.g. spanners) and hardware fixtures.				
Impact / Risk Assessment				
<p>In the unlikely event of a dropped object to the marine environment, potential environmental effects would be limited to localised physical impacts on benthic habitats and communities. As a result of recovery of any dropped objects, this impact will be temporary in nature. However, if the object cannot be recovered due to health and safety, operational constraints and other factors (locating dropped objects at depth) then the minor impact will be long-term.</p> <p>The temporary or permanent loss of dropped objects into the marine environment is not likely to have a significant environmental impact, as the benthic communities associated with the Operational Area are of low sensitivity and are broadly represented throughout the region (Section 5.5.2). No KEFs have been identified as overlapping the Operational Area, as described in Section 5.3.3. Given the low sensitivity of the receiving environment and the nature and scale of impacts and risks from dropped objects, seabed sensitivities will not be significantly impacted. Further, considering the types, size and frequency of dropped objects that could occur, it is unlikely that a dropped object would have a significant impact on any benthic community.</p>				
Identification of Control Measures and Demonstration of ALARP				
Control Measure	Adopted	Justification		
Inherent Design and Legislative Requirements				
All lifting gear used for deployment and retrieval of equipment over the vessel shall be load rated for the working load.	Yes	Ensuring lifting gear is load rated for the working load will reduce the chance of dropped equipment.		
Alternatives/Substitutes Considered				
No practicable alternative or substitutes to the above controls have been identified.	N/A	N/A		

Dropped Objects: Benthic Disturbance				
Additional Controls Considered				
Project vessel inductions include control measures and training for crew in dropped object prevention.	Yes	By ensuring crew are appropriately trained in dropped object prevention, the likelihood of a dropped object event is reduced. No change in consequence will occur.		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Dropped objects resulting in seabed disturbance	Disturbance to benthic habitat and communities	Minor (1)	Unlikely (B)	Low
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"><li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li><li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with dropped objects; and</li><li>There have been no objections or claims raised by relevant person(s),</li></ul> <p>PTTEP AA considers the adopted control measures appropriate to manage the risks of a dropped object. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria	Statement of how the acceptable level criteria has been met			
1. Residual risk is low or medium & ALARP and the consequence from an unplanned risk is ≤4	The residual risks associated with the dropped objects is low and ALARP and the greatest consequence is minor (1).			
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	The potential consequences of dropped objects do not have the potential to result in serious or irreversible environmental damage. Therefore, the activity and risk is considered to be consistent with the principles of ecologically sustainable development.			
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	Marine debris causing entanglement and ingestion was recognised in 2003 as a key threatening process for marine vertebrates under the EPBC Act. Pollution generally is also identified as a threat in several conservation advices / recovery plans for EPBC-listed species potentially occurring within the Operational Area. PTTEP AA has reduced and, where possible, eliminated any adverse impacts of			

Dropped Objects: Benthic Disturbance	
	marine debris from the activities of the activity on turtles, cetaceans, sharks and birds, noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life (Commonwealth of Australia 2018).
4. Legislation & Other Requirements	N/A – No legislative requirements were identified
5. Internal Context – PTTEP AA Requirements	There are no relevant internal PTTEP AA requirements.
6. External Context – Stakeholder objects and claims addressed	There have been no objections or claims raised by relevant person(s) in relation to dropped objects.
Acceptability Statement	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that, given the adopted controls, dropped objects resulting in seabed disturbance represents a low current risk rating that is unlikely to result in a potential impact above localised impacts on benthic habitats. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of dropped objects from a project vessel to an acceptable level.</p>	

## 8.2.4 Hydrocarbon Spill: Vessel Tank Failure

### 8.2.4.1 Credible Spill Scenarios

There is potential for a marine hydrocarbon spill to occur in the Operational Area as a result of the temporary presence of a project vessel during the ROV inspection activity. Credible hydrocarbon spill scenarios include the following:

- Single point failure as a result of mechanical/ structural failure, human error or poor housekeeping. Should a spill occur on deck, controls such as equipment bunds, scupper plugs and on-board clean up should prevent the spilt material reaching the marine environment. However, in the event these controls fail, or are not implemented, spill volumes released to the environment are likely to be less than 1 m<sup>3</sup> based on the inventory used on deck.
- Vessel fuel tank rupture as a result of a collision between the project vessel and a third party vessel has the potential to result in the breach of the hull and subsequent rupture of a fuel tank. A major spill to sea as a result of vessel collision is only likely to occur under exceptional circumstances in the event conditions result in significant damage to one or more of the fuel tanks in the hull of the vessel. If a collision involving the project vessel occurred, the worst case credible scenario would be the loss of the largest single fuel tank volume (consistent with AMSA (2013a) guidelines). This is conservatively estimated to be up to 250 m<sup>3</sup> of marine diesel oil (MDO) based on the type of vessel that may be contracted for the ROV inspection activity.

This section addresses potential impacts and risks from a vessel fuel tank rupture as the worst-case credible spill scenario. Potential impacts and risks associated with a single point failure would be considerably less and are assessed in Section 8.2.5 below.

It is important to note that the worst-case vessel collision scenario is considered to be conservative and unlikely to occur, as:

- The project vessel will generally be moving at low speed in the Operational Area and is unlikely to have sufficient speed or mass required to breach a tank. It is therefore more likely that a large

passing vessel is the only source able to breach a tank and the Operational Area is located in an area of relatively low shipping traffic (refer to Section 5.6.9);

- Collisions assume that all standard vessel navigation and collision avoidance controls fail;
- Loss of full tank capacity is unlikely to occur unless there is significant structural damage to the hull and tank, and in many cases a tank is unlikely to be full to capacity.

To understand the fate and trajectory of a potential spill associated with the vessel activity, existing hydrocarbon spill modelling available for the area of the wells was assessed (refer to Section 8.2.4.2).

#### 8.2.4.2 Spill Modelling Methodology

Modelling of a 1,527 m<sup>3</sup> surface release of MDO was conducted for PTTEP AA in 2018 for a location in proximity to the wells, with a release point approximately 35 km south-west of the Tenacious West-1 ST1 Operational Area (see coordinates in Table 8-1). The modelled spill volume of 1,527 m<sup>3</sup> is considerably greater than the worst-case credible release volume of 250 m<sup>3</sup> for this EP. However, the 2018 modelling is considered suitable to use as a surrogate for this activity due to the following:

- proximity of the modelled release location to the Operational Area (about 35 km from Tenacious West-1 ST1 and about 61 km from Oliver-2);
- similarities in fuel type (MDO);
- similar remote, open-water locations influenced by the same large scale oceanographic processes; and
- the results of the modelling were able to be used to demonstrate that a much larger spill in proximity to the Operational Area has an EMBA that is not predicted to include any surface slicks above threshold volumes entering WA or NT waters.

Basing the impact assessment for a vessel collision scenario on this modelling is considered highly conservative and consequently, the EMBA for a 250 m<sup>3</sup> surface release of MDO within the Operational Area would be considerably smaller than the EMBA described in this EP.

The spill modelling was conducted by RPS on behalf of PTTEP AA in 2018 using a three-dimensional hydrocarbon spill trajectory and weathering model (SIMAP, Spill Impact Mapping and Analysis Program) (RPS 2018). The SIMAP model calculates two components: (i) the transport, spreading, entrainment, evaporation and decay of surface oil slicks and, (ii) the entrained and dissolved hydrocarbons released from the slicks into the water column. Input specifications for oil types include the density, viscosity, pour point, distillation curve (volume lost versus temperature) and the aromatic/aliphatic component ratios within given boiling point ranges.

The SIMAP trajectory model separately calculates the movement of the material that: (i) is on the water surface (as surface slicks), (ii) in the water column (as either entrained whole oil droplets or dissolved hydrocarbons), (iii) has stranded on shorelines, or (iv) that has precipitated out of the water column onto the seabed. The model calculates the transport of surface slicks from the combined forces exerted by surface currents and wind acting on the oil. Transport of entrained oil (oil that is below the water surface) is calculated using the currents only.

Inputs for the modelling are summarised in **Table 8-1**. A total of 300 simulations were modelled (100 simulations per season). This ensured that each simulation was subject to different wind and current conditions and, in turn, movement and weathering of the oil. It is noted that the stochastic model output does not represent the extent of any one spill trajectory (which would be significantly smaller) but rather provides a combined summary of all 300 trajectories run for the scenario.

To assess the potential impacts to environmental values and sensitive receptors, the modelling results were reported against a series of defined exposure thresholds relevant to sea surface, shoreline contact, entrained and dissolved hydrocarbons, as outlined in Section 8.2.4.4.

It is noted that the modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that are proposed. The modelling makes no allowance for intervention following a spill to reduce volumes and/or prevent hydrocarbons from reaching sensitive areas.

**Table 8-1 Spill Modelling Inputs**

Parameters	Modelling Inputs
Spill release location	12° 1' 29.26" S; 124° 37' 16.04" E
Spill volume	1,527 m <sup>3</sup>
Hydrocarbon type	MDO
Release type	Surface
Spill duration	6 hours
Simulation duration	40 days
No. of simulations	100 randomly selected trajectories modelled per season (3) using a range of wind and current conditions. 300 simulations in total
Modelled seasons	Summer (September to March) Transitional (April and August) Winter (May to July)

#### 8.2.4.3 Hydrocarbon Properties and Weathering Behaviours

MDO is a mixture of volatile and persistent hydrocarbons with a low viscosity (Group II). Diesels vary in their properties, but have a density in the range 840-880 kg/m<sup>3</sup> (API gravity of 30-32). When MDO is released onto the sea surface it can spread quickly and thin out to low thickness levels, thereby increasing the rate of evaporation (due to the increased surface area). Up to 40% of MDO may evaporate over the first two days after being spilled, depending upon the prevailing conditions (i.e. wind speed) and spill volume. Only 5% of MDO are considered “persistent hydrocarbons”, which are unlikely to evaporate, but will decay over time.

MDO typically has a strong tendency to entrain into the upper water column in the presence of moderate winds and breaking waves. Once the prevailing conditions are calm, entrained MDO can re-surface.

#### 8.2.4.4 Hydrocarbon Exposure Thresholds

For the purposes of the spill modelling, exposure thresholds were defined for hydrocarbons on the sea surface (i.e. a surface slick), entrained or dissolved in the water column, and stranded on shorelines based on available scientific literature on the tolerance of different types of environmental receptors. The thresholds adopted are outlined in Table 8-2.

**Table 8-2 Hydrocarbon Exposure Thresholds**

Threshold	Description
<p>Surface hydrocarbon exposure:</p> <p>10 g/m<sup>2</sup> (ecological receptors)</p> <p>1 g/m<sup>2</sup> (socio-cultural receptors)</p>	<p>Surface oil has the potential to impact fauna that swim or forage at the sea surface. The surface oil threshold of 10 g/m<sup>2</sup> is based on research by French-McCay (2009) who have reported the minimum oil thickness (0.01 mm) required to impact on thermoregulation of marine species, predominantly seabirds and furred mammals. Seabirds are particularly vulnerable to oil spills because their feathers easily become coated and they feed in the upper water column. Other tropical marine megafauna species are unlikely to suffer from comparable physical oil coating because they have smooth skin.</p> <p>While significant ecological impacts are not expected below this 10 g/m<sup>2</sup> threshold, it is recognised that a light sheen may be visible at the surface beyond the defined EMBA for surface hydrocarbons. Surface exposures below the 10 g/m<sup>2</sup> threshold are not expected to cause environmental harm but are indicative of areas that may be perceived to be affected due to the visibility of a sheen on the sea surface and potential to trigger temporary closures of areas (i.e. fishing grounds) as a precautionary measure. This broader area therefore provides a conservative extent of potential impacts to socio-economic receptors associated with visual amenity (i.e. fisheries, tourism and recreation and indigenous heritage). A surface exposure threshold of 1 g/m<sup>2</sup> is considered to represent the extent of potentially visible sheen on the sea surface.</p> <p>These thresholds are consistent with the 'moderate' and 'low' exposure thresholds for floating hydrocarbons recommended by NOPSEMA in the Bulletin #1 "Oil spill modelling" April 2019 (NOPSEMA 2019a).</p>
<p>Dissolved hydrocarbon exposure:</p> <p>6 ppb (or 576 ppb.hrs)</p>	<p>The thresholds for hydrocarbons in the water column consider toxicity to sensitive species such as fish and invertebrates in the water column and benthic organisms.</p> <p>Impacts are related to both water column concentrations and the duration of exposure (French McCay 2016). The threshold value for species toxicity from dissolved aromatic hydrocarbons in the water column is based on global data from French et al. (1999) and French-McCay (2002, 2003), which shows that fish and invertebrate sensitivity to exposure to dissolved aromatics over 4 days (96 hours) varied from 6 – 400 ppb, with an average of 50 ppb. This included species during their most sensitive life stages (eggs and larvae). French-McCay (2002) indicates that an average 96-hour LC50 of 50 ppb and 400 ppb could serve as an acute lethal threshold to 5% and 50% to biota, respectively. 6 ppb resulting from a 96-hour exposure (and an equivalent dosage of dissolved aromatics of 576 ppb.hrs) was selected as the lowest and most conservative threshold value, which accounts for potential acute lethal impacts to all sensitive species, including invertebrate plankton (French McCay 2016). Actual exposures to dissolved aromatics in the water column during a spill are typically shorter (i.e. less than a day) than those tested in the 96-hour exposure laboratory experiments (French McCay 2002; French McCay 2016), therefore, the 6 ppb threshold is conservatively low.</p> <p>This threshold is consistent with the 'low' exposure threshold for dissolved hydrocarbons recommended by NOPSEMA in the Bulletin #1 "Oil spill modelling" April 2019 (NOPSEMA 2019a).</p>
<p>Entrained hydrocarbon exposure:</p> <p>700 ppb (or 67,200 ppb.hrs).</p>	<p>Entrained hydrocarbons represent the dispersed insoluble oil droplets phase and pose a hazard to marine life (i.e. juvenile fish, larvae, and plankton) that become entrained with the oil plume, or via direct ingestion or the consumption of contaminated prey. As the toxic dissolved aromatics component of oil is accounted for by the dissolved hydrocarbon exposure above, the environmental effects of undissolved droplets require different exposure levels. Considering entrained oil has undergone processes similar to weathering (many of the toxic soluble aromatics will have been removed through dissolution and degradation in the water column or evaporation at the surface), dispersed oil thresholds are used to represent the potential for environmental effects.</p>

Threshold	Description
	<p>Utilising methodologies contained in ANZECC (2000), which is based upon US EPA Guidelines, predicted no-effect concentrations (PNEC) were calculated to determine LC50 values by applying a factor of 100 to the PNEC values. This approach is supported by assessment factor criteria contained within the European Chemicals Agency (2008) and the OECD Existing Chemicals Programme 2002 (OECD, 2002). Employing these criteria, the LC50 for 99% species protection of 700 ppb (with an equivalent dosage over 96 hours of 67,200 ppb.hrs) was applied as the threshold value for potential lethal and sub-lethal impacts of entrained hydrocarbons to the most sensitive life stages in all marine organisms. For comparison, French McCay (2016) recommends an exposure concentration of 1,000 ppb as a conservative and low level of concern for marine organisms.</p> <p>It is noted that this threshold is higher than the exposure threshold for entrained hydrocarbons more recently recommended by NOPSEMA in the Bulletin #1 "Oil spill modelling" April 2019 (NOPSEMA 2019a) (moderate: 100 ppb; high: 500 ppb). However, this is offset by the larger spill volume of 1,527 m<sup>3</sup> modelled, which is considerably greater than the worst-case credible release volume of 250 m<sup>3</sup> for this EP. The EMBA used for the purposes of this spill assessment is therefore considered sufficiently conservative to identify potential impacts to environmental values and sensitive receptors from entrained hydrocarbons.</p>
<p>Shoreline accumulation: 100 g/m<sup>2</sup> (ecological receptors)</p>	<p>French et al. (1996) and French-McCay (2009) have defined an oil exposure threshold for shorebirds and wildlife (fur-bearing aquatic mammals and marine reptiles) on or along the shore at 100 g/m<sup>2</sup>, which is based on studies for sub-lethal and lethal impacts. The 100 g/m<sup>2</sup> level is also proposed by French McCay (2016) for potential lethal impacts to invertebrates in intertidal habitats, with higher levels of 1,000 to 5,000 g/m<sup>2</sup> representative of potential lethal and sub-lethal impacts to intertidal vegetation. These thresholds have been used in previous environmental risk assessment studies (see French-McCay, 2003; French-McCay et al., 2004; French-McCay et al., 2011; NOAA, 2013).</p> <p>The 100 g/m<sup>2</sup> threshold is also recommended in the Australian Maritime Safety Authority's (AMSA) foreshore assessment guide as the acceptable minimum thickness that does not inhibit the potential for recovery and is best remediated by natural coastal processes alone (AMSA, 2007).</p> <p>Therefore, the 100 g/m<sup>2</sup> threshold has been selected to represent potential impacts to ecological receptors on shorelines.</p> <p>A more conservative threshold of 10 g/m<sup>2</sup> is used to define the extent of potential impacts to socio-economic receptors associated with visual amenity and perceived impacts. However, it is considered too low for the purposes of ecological impact assessment.</p> <p>This threshold is consistent with the 'moderate' exposure threshold for shoreline hydrocarbons recommended by NOPSEMA in the Bulletin #1 "Oil spill modelling" April 2019 (NOPSEMA 2019a).</p>

#### 8.2.4.5 Summary of Hydrocarbon Spill Modelling Results

The following provides a summary of the potential magnitude, extent, probability and timeframes of hydrocarbon exposures from the modelling outputs, based on the 1,527 m<sup>3</sup> release located 35 km south-west of the Tenacious West-1 ST1 Operational Area.

The largest area of potential contact with hydrocarbons results from the surface slick, which has been used to define the EMBA. The EMBA is based on the modelled contours for the surface hydrocarbon exposure thresholds of 10 g/m<sup>2</sup> and 1 g/m<sup>2</sup>. However, for the purposes of the assessment of potential impacts in Section 8.2.4.6 below, the EMBA has been broadened to identify if any additional values and sensitivities could be contacted should the spill occur at a different location within the Operational

Area. The Oliver-2 well was selected as it is the furthest well from the modelled location. This was achieved by translocating the spill contours from the modelling to the Oliver-2 location to define a broader overall buffer. The EMBA is illustrated in Figure 8-1 and shows the extent of the 'ecological EMBA' (based on the 10 g/m<sup>2</sup> exposure threshold) and the 'socio-cultural EMBA' (based on the 1 g/m<sup>2</sup> exposure threshold). The original spill modelling contours are also shown in Figure 8-1 for context. Broadening the EMBA provides a highly conservative identification of potential values and sensitivities that could be contacted in the event of a vessel diesel spill during the ROV inspection, particularly as it is based on a spill release volume of 1,527 m<sup>3</sup>.

A summary of modelling results for the different hydrocarbon phases (surface, entrained, dissolved and shoreline accumulation) is outlined below, with further details provided in the spill assessment in Section 8.2.4.6.

The modelling results for **sea surface** hydrocarbon exposures are summarised as follows:

- The maximum extent of potential sea surface exposure greater than the ecological threshold of 10 g/m<sup>2</sup> is approximately 44 km (east-northeast) for the summer period, 116 km (north) for the winter period, and 64 km (southwest) for the transitional period (Figure 8-1).
- There is a 100% probability of sea surface exposure greater than 10 g/m<sup>2</sup> in the whale shark BIA within 1 hour of the release during all seasons.
- In the pygmy blue whale BIA there is a 4% to 10% probability of sea surface exposure above 10 g/m<sup>2</sup> during the winter and transitional periods respectively. The minimum time for exposure is 14 to 40 hours depending on the season.
- No exposure above 10 g/m<sup>2</sup> occurs in the pygmy blue whale BIA during the summer season.
- No other receptors were predicted to be contacted by surface hydrocarbons above exposure thresholds in any season.

The modelling results for **entrained** and **dissolved** hydrocarbon exposures are summarised as follows:

- No entrained or dissolved aromatic hydrocarbons were predicted below 10 m of the surface above the exposure thresholds.
- There is a 1 to 5% probability of entrained hydrocarbon exposure above the 700 ppb threshold at the whale shark foraging BIA.
- There is a 1 to 7% probability of dissolved hydrocarbon exposure above the 6 ppb threshold at the whale shark foraging BIA.
- No other receptors were predicted to be contacted by entrained or dissolved hydrocarbons above exposure thresholds in any season.

The modelling results for **shoreline** contact are summarised as follows:

- No shoreline contact is predicted under summer or winter conditions.
- During the transitional period, there is a 1% probability of shoreline contact at Ashmore Reef above the 100 g/m<sup>2</sup> threshold. The maximum length of shoreline contacted above the threshold is 4 km, and the peak volume is approximately 16 m<sup>3</sup>. The minimum time before shoreline accumulation above the 100 g/m<sup>2</sup> threshold is 6.8 days.

Based on the following reasons it is not considered credible for shoreline accumulation to occur above the 100 g/m<sup>2</sup> threshold from a vessel fuel tank rupture on the project vessel, shoreline contact is therefore not considered further in this assessment:

- the probability of shoreline contact from the modelling is low (1%) and only occurs during transitional season conditions;
- the modelled location is 34 km to the south-west of the Operational Area and therefore closer to Ashmore Reef; and
- the modelled spill volume of 1,527 m<sup>3</sup> is highly conservative compared to the credible spill volume of 250 m<sup>3</sup> for the activity.

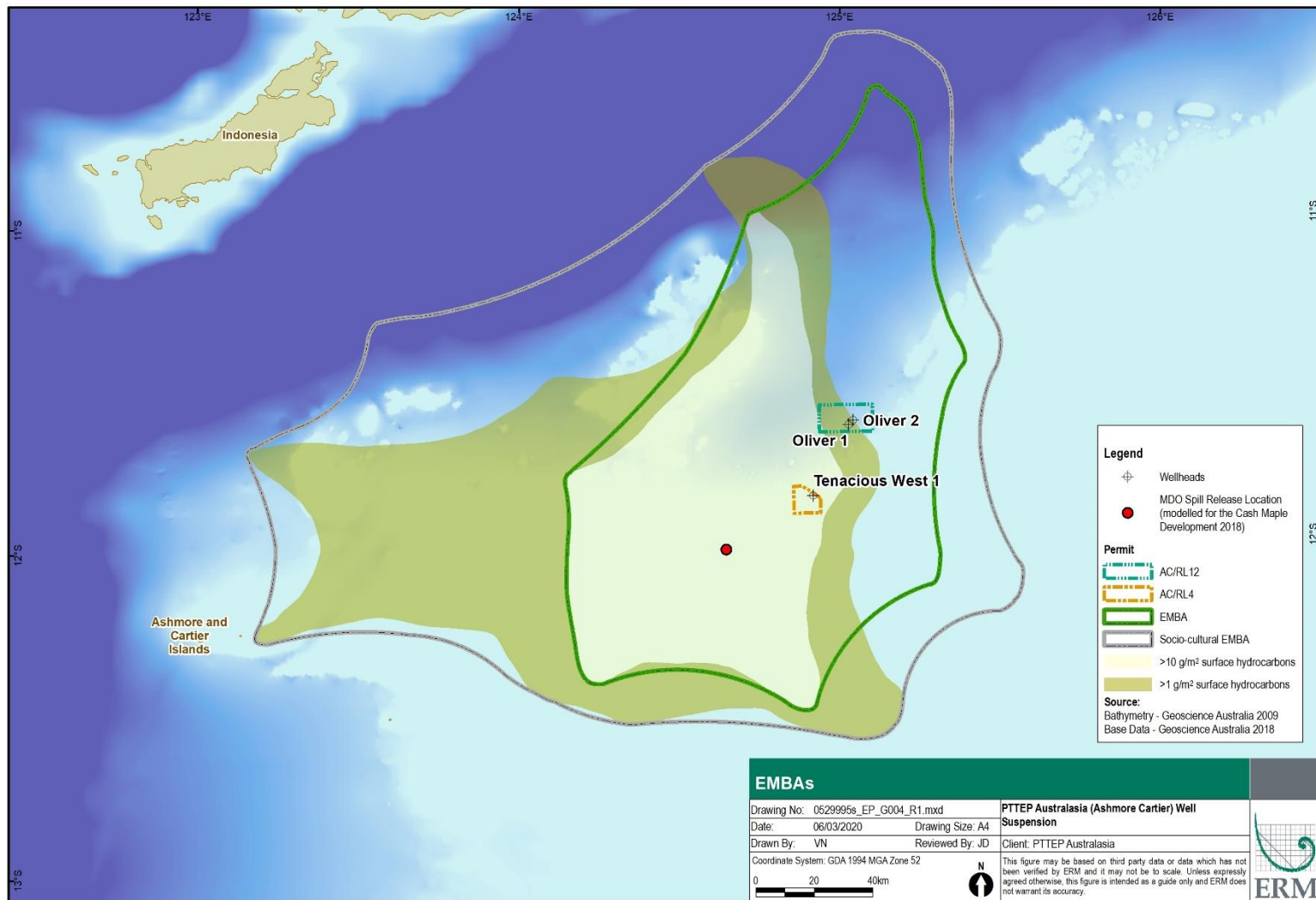


Figure 8-1 Modelled surface hydrocarbon contours and the ecological and socio-cultural EMBA used for the spill assessment (surface hydrocarbons represent 300 spill trajectories)

#### 8.2.4.6 Assessment of Impacts and Risks

Hydrocarbon Spill: Vessel Tank Failure				
Aspects / Events	Hydrocarbon spill from a vessel fuel tank rupture			
Receptors	Marine fauna (cetaceans, marine reptiles, fish, sharks and rays, seabirds, planktonic communities) Water quality Marine protected areas Commercial fisheries Tourism and recreation.			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Potential vessel collision resulting in a fuel tank rupture and loss of the largest single fuel tank volume, conservatively estimated to be up to 250 m <sup>3</sup> .	Temporary reduction in water quality and toxicity effects to marine biota.	Significant (3)	Rare (A)	Low
Source of Impact / Risk				
<p>An accidental hydrocarbon release to the marine environment could result from a vessel fuel tank failure, following a vessel collision. In the event of a collision involving the project vessel resulting in a fuel tank rupture, the worst case credible scenario would be the loss of the largest single fuel tank volume (consistent with AMSA (2013a) guidelines), which is conservatively estimated to be up to 250 m<sup>3</sup> of MDO.</p> <p>The potential impacts associated with the accidental release of diesel fuel to surface waters are:</p> <ul style="list-style-type: none"><li>• Potential deterioration in water quality within the vicinity of the project vessel resulting in behavioural change in marine species;</li><li>• Potential toxic effects to marine fauna; and</li><li>• Localised avoidance of waters by fishing vessels due to the presence of visible hydrocarbons on the sea surface.</li></ul>				
Impact / Risk Assessment				
<b>Marine Fauna</b>				
<i>Cetaceans</i>				
<p>The maximum predicted extent of surface hydrocarbons greater than 10 g/m<sup>2</sup> is approximately 116 km from the release site. The pygmy blue whale BIA is located about 26 km north of the Operational Area and various other species of whales and dolphins may be transient in the area, as outlined in Section 5.5.4.</p> <p>Modelling indicates that sea surface exposures above the threshold of 10 g/m<sup>2</sup> have a low probability of reaching the pygmy blue whale BIA within a minimum of about 14 hours (1-10% probability) depending on the season. However, it is noted that no exposure above 10 g/m<sup>2</sup> is predicted to occur in the pygmy blue whale BIA during the summer season when the ROV inspection activity is expected to be carried out (Q1/Q2 2021).</p> <p>Air-breathing marine fauna such as marine mammals are primarily affected by fouling from surface oil exposures (French McCay 2016). However, whales and dolphins are smooth-skinned, and hydrocarbons do not tend to stick to their skin. They are therefore not expected to be sensitive to the physical effects of oiling, except for possible irritation to eyes and other soft tissues. Cetaceans are also susceptible to</p>				

### Hydrocarbon Spill: Vessel Tank Failure

breathing of volatile hydrocarbons evaporating from fresh oil on the surface and therefore are more vulnerable to fresh oil rather than weathered oil (French McCay 2016).

In addition to the inhalation of vapours, ingestion of hydrocarbons, particularly dissolved aromatics can be toxic to marine mammals as they can remain within the gastro-intestinal tract and be absorbed into the bloodstream and thus irritate and/or destroy epithelial cells in the stomach and intestine. Physiological effects of ingesting weathered hydrocarbon residues are unknown however are expected to be less severe than those attributed to dissolved aromatics given the lower levels of toxicity.

The way in which whales and dolphins consume food may influence the likelihood of hydrocarbon ingestion. Baleen whales, which may skim or gulp at or near the surface, are more likely to ingest surface hydrocarbons than toothed whales, which target specific prey items throughout the water column. Spilled hydrocarbon may also foul the baleen fibres of baleen whales, thereby impairing food-gathering efficiency or resulting in the ingestion of hydrocarbon or hydrocarbon-contaminated prey (IPIECA-IOGP 2017). Weathered oil residues from an oil spill event may persist, causing a potential risk to baleen whales' feeding systems.

Studies of bottlenose dolphins found that they can detect and actively avoid a surface slick after a few brief contacts and that there were no observed adverse effects with the surface slick (Smith et al., 1983). It is not known if other marine mammals likely to be in the area are able to similarly detect and avoid hydrocarbon slicks.

The potential for significant impacts to cetaceans as a result of ingestion of hydrocarbons or inhalation of vapour is expected to be limited to low numbers of transient cetaceans that may pass through the Operational Area, including occasional migratory pygmy blue whales. Due to the rapid dispersal and weathering of MDO, the potential for lethal impacts are expected to be limited to the immediate proximity of the release site and are considered unlikely. A range of sub-lethal impacts are possible where animals are exposed to the surface slick up to approximately 116 km from the release location. The consequence is conservatively assessed as significant.

#### *Marine Reptiles*

There is limited information regarding the effects of hydrocarbons on marine reptiles. Should marine reptiles come into contact with hydrocarbons, potential impacts include oiling of the body as well as irritations caused by contact with eyes, nasal and other body cavities and possibly ingestion or inhalation of toxic vapours (IPIECA-IOGP 2017). Marine reptiles may also be susceptible to indirect toxic effects through ingestion of contaminated prey.

Turtles can be exposed to hydrocarbons if they surface within the spill, resulting in direct contact with the skin, eyes, and other membranes, as well as the inhalation of vapours or ingestion (Milton et al. 2003). Other aspects of turtle behaviour, including a lack of avoidance behaviour, indiscriminate feeding in convergence zones, and large, pre-dive inhalations, make them vulnerable (Milton et al. 2003; IPIECA-IOGP 2017). The areas where oiled and injured turtles have previously been recovered during spills have been in surface exposures greater than 10 g/m<sup>2</sup> (French McCay 2016).

The ecological EMBA does not overlap with any turtle BIAs, however, transient marine turtles are still expected to occur. Turtles may also be present at shallow banks and shoals in the EMBA, where the water depths may provide suitable foraging habitat, and within the Carbonate bank and terrace system of the Sahul Shelf KEF.

The maximum predicted extent of surface hydrocarbons greater than 10 g/m<sup>2</sup> is approximately 116 km from the release site. The area of potential lethal effects from surface hydrocarbons is in immediate proximity to the release location, with potential for sub-lethal effects over a wider area where hydrocarbons would be more dispersed and subject to weathering.

Marine turtle populations have the potential to be indirectly affected by the loss of seagrasses, algae and other food sources impacted by entrained or dissolved hydrocarbons. However, given the limited area of exposure to entrained and dissolved hydrocarbons (approximately 30 km from the release location), within the top 10 m of the water column, no impacts to food sources are expected.

Limited information is available regarding the susceptibility or sensitivity of sea snakes to hydrocarbon spills, however given they spend time at the sea surface to bask in the sun and the fact that they are air breathers, sea snakes may be vulnerable to surface slicks. Sea snakes may occur occasionally in the open waters of

### Hydrocarbon Spill: Vessel Tank Failure

the EMBA but impacts are likely to be limited to sub-lethal effects on transient individuals that may pass in close proximity to the release location.

It is anticipated that in the unlikely event of a vessel diesel spill, turtles and sea snakes may be impacted by exposure to surface, entrained and/or dissolved hydrocarbons, but significant population level effects are not expected from such exposures

#### *Fish, Sharks and Rays*

A range of EPBC Act listed fish, sharks and rays may occur in the EMBA, as outlined in Section 5.5.4. There is a whale shark foraging BIA in the EMBA and as whale sharks are filter feeders they are expected to be highly vulnerable to entrained hydrocarbons (Campagna et al. 2011). This makes whale sharks susceptible to hydrocarbons in a similar manner to baleen whales.

Hydrocarbon droplets can physically affect fish, sharks and rays. Smothering through coating of gills can lead to the lethal and sub-lethal effects of reduced oxygen exchange, and coating of body surfaces may lead to increased incidence of irritation and infection. Hydrocarbon droplets or contaminated food may also be ingested.

Sea surface exposures greater than 10 g/m<sup>2</sup> are predicted to occur within the whale shark foraging BIA within approximately one hour of a release from the modelled location (about 35 km south-west of the Operational Area). The maximum predicted extent of surface hydrocarbons greater than 10 g/m<sup>2</sup> is approximately 116 km from the release site. Dissolved and entrained hydrocarbons above the exposure thresholds are predicted to have a 1 to 7% probability of extending into the whale shark foraging BIA, depending on the season. Individual whale sharks may occur in the impacted area due to their widespread distribution and highly migratory nature, albeit in low numbers as there are no whale shark aggregations (such as the Ningaloo Reef aggregation) in the region. Based on the modelled exposures, it is possible that transient whale shark individuals may feed within the surface slick during a spill, potentially resulting in a range of lethal or sub-lethal impacts if hydrocarbons are ingested.

Pelagic fish, such as tuna and mackerel, sharks and rays in offshore waters are highly mobile. Due to their mobility, it is unlikely they would be exposed to toxic components for long periods of time. The more toxic components would also rapidly evaporate and concentrations would significantly diminish with distance from the spill site, limiting the potential area of impact. Near the sea surface, pelagic fishes are able to detect and avoid contact with surface slicks and as a result, fish mortalities rarely occur in open waters from surface spills (Kennish 1997; Scholz et al. 1992). Pelagic fish species are therefore generally not highly susceptible to impacts from hydrocarbon spills.

Due to the rapid dispersal and weathering of MDO, the potential for lethal impacts to fish, sharks and rays are expected to be limited to the immediate proximity to the release site and are considered unlikely. A range of sub-lethal impacts are possible where individuals are exposed to the surface slick up to approximately 116 km from the release location, or entrained/dissolved hydrocarbons up to approximately 30 km from the release location. The overall consequence of to fish, sharks and rays, particularly to whale sharks, is assessed as significant.

#### *Avifauna*

Numerous species of birds frequent the Timor Sea area or fly through the area on annual migrations. Ashmore Reef and Cartier Island are the nearest emergent land to the EMBA and support internationally significant numbers of breeding seabirds and migratory shorebirds with all species variously listed under the EPBC Act. Ashmore Reef is also a Ramsar wetland of international importance. It is expected that a number of migratory bird species may pass through the Operational Area and EMBA during their annual migrations. However, there is no overlap of BIAs for seabirds within the ecological EMBA, and surface concentrations above the impact threshold of 10 g/m<sup>2</sup> are not predicted to reach the waters surrounding Ashmore Reef and Cartier Island.

Birds foraging at sea have the potential to directly interact with oil on the sea surface some considerable distance from terrestrial habitats in the course of normal foraging activities. Diving species and species that readily rest on the sea surface are most at risk. Direct contact with surface hydrocarbons is likely to foul feathers and may result in hypothermia, drowning, dehydration and starvation (IPIECA-IOGP 2017).

### Hydrocarbon Spill: Vessel Tank Failure

Impacts may include damage to external tissues, including skin and eyes, and internal tissue irritation in lungs and stomachs (Clark 1984).

Toxic effects may also result where hydrocarbons are ingested, as birds attempt to preen their feathers (Jenssen 1994). Weathering of hydrocarbons on the sea surface will reduce the levels of toxicity that seabirds may be exposed to and, over time, the hydrocarbons on the surface will become patchy rather than continuous. Foraging birds may also be susceptible to indirect toxic effects through ingestion of contaminated prey, such as fish exposed to in-water hydrocarbons.

Based on the exposures predicted by the modelling, a number of bird species may be impacted in open waters. The consequence is therefore assessed as significant.

#### *Plankton*

As a consequence of their presence in the upper water column, phytoplankton and zooplankton may be entrained within the hydrocarbon plume and, therefore, subject to prolonged exposures to entrained/dissolved hydrocarbons. There is potential for localised mortality of plankton due to reduced water quality and toxicity from entrained and dissolved hydrocarbons. Effects are predicted to be limited to the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest. Following release, the marine diesel will rapidly evaporate and disperse in the offshore environment, reducing the concentration and toxicity of the spill. Given the quick evaporation and dispersion of marine diesel, impacts to plankton are not expected to be significant.

Any planktonic communities impacts by entrained and dissolved hydrocarbons are expected to recover quickly (weeks/months) due to fast population turnover (ITOPF 2011), and high rates of natural mortality. Given the relatively small EMBA and the fast population turnover of open water planktonic populations it is considered that any potential impacts will be minor and temporary in nature.

#### **Benthic Habitats and Communities (including KEFs)**

Banks and shoals within a maximum distance of approximately 30 km from the wells may be exposed to dissolved and/or entrained hydrocarbons following vessel diesel spill. These include Jabiru shoals, Pee Shoal and Mangola Shoal, located nearest to the Operational Area (Section 5.4.4 and Section 5.5.2.2). However, the modelling predicts no dissolved aromatic or entrained hydrocarbons above the exposure thresholds below 10 m of the water surface. Therefore, banks and shoals at depths greater than 10 m are not likely to be impacted, with only the shallowest areas of the shallowest shoals being exposed.

In the event of exposure, filter feeders and corals present at submerged banks and shoals may ingest entrained hydrocarbons and absorb dissolved aromatics with potential lethal and various sub-lethal effects. The latter include alteration in respiration rates, decreases in filter feeding activity, reduced growth rates, biochemical effects, increased predation, reproductive failure and mechanical destruction by waves due to inability to maintain a hold on substrate (Ballou et al. 1989; Connell and Miller 1981). However, in reality, based on monitoring of historical spill events, it is unusual for high concentrations of hydrocarbons to remain over a particular patch of seabed for long and many organisms will be relatively insensitive to even high concentrations because the duration of exposure is typically short (IPIECA-IOGP 2015).

The Montara Environmental Monitoring Program included a study to determine the level of impact of the loss of well control event on the marine life of various submerged banks, shoals and coral reefs in the region of the EMBA (Heyward et al. 2010, 2011a). Key findings of this study identified that shoal and reef communities showed no obvious signs of recent disturbance (Heyward et al 2010, 2011a).

The consequence of potential sub-lethal and lethal impacts to some sensitive benthic organisms at individual banks and shoals is assessed as moderate, based on the relatively localised area of potential impact and effects limited to the top 10 m of the water column.

The EMBA has a minor overlap with the Carbonate banks and terrace system of the Sahul Shelf KEF. The spill modelling predicts that the KEF may be exposed to surface hydrocarbons above the 10 g/m<sup>2</sup> exposure threshold, but not entrained or dissolved hydrocarbons in the water column. There is therefore no potential for impact to the submerged bank and shoal habitats that define the values and sensitivities of the KEF. Potential impacts to marine fauna in open waters, including those of the KEF, from a surface slick are assessed above. The consequence to the ecological functioning of the KEF is assessed to be minor.

## Hydrocarbon Spill: Vessel Tank Failure

### Protected Areas

The Ashmore Reef AMP overlaps with the socio-cultural EMBA as described in Section 5.3.1, with a 1% probability of exposure during the transitional season only. The minimum time to contact is predicted to be 156 hours (6.5 days). There is no overlap with other protected areas. Impacts to the ecological values of the AMP are not expected as there is no overlap with the ecological EMBA. Socio-economic values associated with Ashmore Reef AMP include tourism, recreation and scientific research activities. The consequence of hydrocarbons contacting Ashmore Reef AMP at concentrations of 1 g/m<sup>2</sup> is considered to be minor.

### Socio-Economic

#### *Commercial and traditional fisheries*

The values and sensitivities associated with commercial fisheries (seafood quality and employment) could be impacted due to the presence of entrained, dissolved and surface hydrocarbons and associated exclusion or avoidance by fishing vessels during the response, which may impede access to fishing areas for a short to medium term, and nets and lines could become oiled (ITOPF 2011). Fisheries may experience loss of financial revenue in the unlikely event of a vessel diesel spill.

The only active commercial fishery to overlap the EMBA is the Northern Demersal Scalefish Fishery, which uses demersal traps to catch demersal snappers, emperors, groupers and rock cods, including goldband snapper and red emperor (Section 5.6.2).

Commercially targeted fish stocks are not expected to experience a significant decline from the spill. Assessment of the potential impacts to fish provided above indicates that impacts to fish are mainly expected to be sub-lethal. Assessment of the potential impacts to plankton communities (including fish eggs and larvae) provided above indicates that impacts are expected to be temporary and recoverable, without serious consequence to fish stocks, particularly compared with significantly larger losses through predation and other natural processes.

The MoU Box, within the Australian Fishing Zone, overlaps the socio-cultural EMBA near Ashmore Reef. Under the MoU, Indonesian and Timorese fishermen are legally permitted to harvest targeted marine species using traditional methods. The peak fishing season is between August and October with fishers departing the region at the onset of the northwest monsoon season.

The consequence of potential exclusion from the spill area and potential loss of some revenue to commercial and traditional fisheries is considered to be moderate due to the localised and temporary nature of the spill.

#### *Industry and Shipping*

During a hydrocarbon spill a surface slick has the potential to oil and coat petroleum exploration and drilling equipment. Should other petroleum titleholders submit plans to undertake petroleum activities within AC/RL4 or AC/RL12 at the same time as the ROV inspection, they will be contacted as part of a notification to stakeholders four weeks prior to the inspection to confirm the status of the survey should there be potential for the activities to overlap.

Shipping in and around the EMBA is sparse, with the Operational Area located outside of any major shipping routes. The closest major port is Darwin Port, located over 650 km east of the Operational Area. Thus, a low level of commercial shipping activity is expected. In the event of a hydrocarbon spill, surface slicks have the potential to oil and coat vessel hulls. Implementing an exclusion zone during the response operation may alter routes for some vessel, however the consequence of this is considered to be minor.

#### *Tourism*

The Operational Area is located in offshore waters, approximately 240 km north of the mainland coastline in an area not likely to be accessed for tourism activities (Section 5.6.7). Tourism and recreation activities such as recreational fishing and cruises tend to be concentrated around nearshore waters, islands and coastal areas. They will therefore not occur within the EMBA. Some bird watching activity may occasionally occur at Ashmore Reef, within the wider socio-cultural EMBA. The consequence is considered to be minor.

### **Identification of Control Measures and Demonstration of ALARP**

Control	Adopted	Justification
---------	---------	---------------

Hydrocarbon Spill: Vessel Tank Failure		
Inherent Design and Legislative Requirements		
<p>Marine Order 30 (prevention of collisions) 2016, including:</p> <ul style="list-style-type: none"> <li>adherence to steering and sailing rules including maintaining lookouts (e.g. visual, hearing, radar, etc.), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar)</li> <li>adherence to navigation light display requirements, including visibility, light position/shape appropriate to activity</li> <li>adherence to navigation noise signals as required.</li> </ul>	Yes	Control based on legislative requirements – must be adopted.
<p>Marine Order 21 (safety and emergency arrangements) 2016, including:</p> <ul style="list-style-type: none"> <li>adherence to minimum safe manning levels</li> <li>maintenance of navigation equipment in efficient working order (compass/radar)</li> <li>navigational systems and equipment required are those specified in Regulation 19 of Chapter V of Safety of Life at Sea</li> <li>Automatic Identification System (AIS) that provides other users with information about the vessel's identity, type, position, course, speed, navigational status and other safety-related data.</li> </ul>	Yes	Control based on legislative requirements – must be adopted.
<p>Marine Order 91 (marine pollution prevention—oil) 2014, requires Shipboard Oil Pollution Emergency Plan (SOPEP) (as appropriate to vessel class).</p>	Yes	Under Marine Order 91 (Marine pollution prevention — oil) 2014, made under the Navigation Act 2012 and the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, vessels will have a SOPEP (as appropriate to vessel class).
<p>In the event of a spill to the marine environment, the OPEP presented in Section 10.5.3 will be followed.</p>	Yes	In accordance with the requirements of the OPGGS (E) Regulations 2009, an OPEP is established in Section 10.5.4, which details the spill preparedness and response arrangements that will be implemented in the event of a spill.
Alternatives/Substitutes Considered		
No practicable alternative identified	N/A	N/A
Additional Controls Considered		
<p>Australian Hydrographic Office (AHO) will be notified of activities and movements no less than four working weeks prior to the scheduled commencement date of the ROV activity.</p>	Yes	<p>Australian Notices to Mariners are published fortnightly by the AHO for the purposes of correcting paper navigational charts. Notifying AHO will contribute to</p>

Hydrocarbon Spill: Vessel Tank Failure				
		safe interactions with other marine users. Good industry practice.		
Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities and movements 24-48 hours before operations commence for promulgation of Radio Navigation Warning.	Yes	Adherence to AMSA maritime navigation procedures will contribute to safe interactions with other marine users. Good industry practice.		
Notification to stakeholders four weeks prior to the commencement of the ROV inspection.	Yes	Providing stakeholders with a notification four weeks prior to commencement of the ROV inspection is considered good practice and keeps stakeholders abreast of PTTEP AA's activities.		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Potential vessel collision resulting in a fuel tank rupture and loss of the largest single fuel tank volume, conservatively estimated to be up to 250 m <sup>3</sup> .	Temporary reduction in water quality and toxicity effects to marine biota.	Significant (3)	Rare (A)	Low
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"> <li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures to ensure the predicted level of impact to the marine environment from an MDO spill from the project vessel is equal to or a lesser level of impact than the acceptable level;</li> <li>all relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the MDO spill; and</li> <li>there have been no objections or claims raised by relevant stakeholders,</li> <li>PTTEP AA considers that all potential environmental impacts and risks associated with an MDO spill from the project vessel are appropriately managed. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity the impacts and risks are considered to be ALARP.</li> </ul>				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		
1. Residual risk is low or medium & ALARP and the consequence from an unplanned risk is ≤4		The residual risks associated with an MDO spill from the project vessel are low and ALARP and the consequence is significant (3).		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		There is no threat of serious or irreversible environmental damage to any matters of national		

<b>Hydrocarbon Spill: Vessel Tank Failure</b>	
	<p>environmental significance associated with an MDO spill from the project vessel.</p> <p>There is no threat to biodiversity and ecological integrity associated with an MDO spill from the project vessel.</p> <p>There is no threat to the quality of the environment available to future generations associated with an MDO spill from the project vessel.</p>
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	<p>Ashmore Reef AMP is located within the socio-cultural EMBA that may be exposed to hydrocarbons from an MDO spill from the project vessel. Relevant values and sensitivities are listed in Section 5.3. The North-west Marine Parks Network Management Plan requests the development of procedures for minimising release of oil into AMPs and for responding to pollution events.</p> <p>Creating and/or updating an oil spill response plan is also an action identified by the Conservation Management Plan for the Blue Whale (2015 – 2025). Minimising chemical discharge is an action identified by the Recovery Plan for Marine Turtles in Australia 2017-2027. This requires that best practice industrial management is implemented to minimise impacts to marine turtle health and habitats. The Whale Shark Wildlife Management Program no. 57 states that the effects of oil pollution on whale sharks is poorly understood, and so recommends a precautionary approach.</p> <p>The requirements of these management plans are addressed through the control measures adopted in this assessment and the OPEP outlined in Section 10.5.3.</p>
4. Legislation & Other Requirements	<p>PTTEP AA will meet all relevant 'Good Practice' industry requirements for the prevention and response to a potential hydrocarbon spill during the ROV inspection through complying with the controls adopted in this assessment and the OPEP outlined in Section 10.5.3.</p>
5. Internal Context – PTTEP Requirements	<p>The OPEP provided in Section 10.5.3 meets PTTEP AA's internal requirements and expectations for this activity</p>
6. External Context – Stakeholder objects and claims addressed	<p>No stakeholder objections or claims have been raised in relation to the risk of an MDO spill from the project vessel during the ROV inspection.</p>
<b>Acceptability Statement</b>	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that, given the adopted controls, the risk of an MDO spill from the project vessel represents a low current risk rating that is unlikely to result in a potential impact greater than</p>	



Hydrocarbon Spill: Vessel Tank Failure
--

significant. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of an MDO spill from the project vessel to a level that is broadly acceptable.
--

## 8.2.5 Deck and Subsurface Spill

Deck and Subsurface Spill				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Accidental discharge to the ocean of other hydrocarbons/ chemicals from project vessel deck activities and equipment (e.g. cranes), including subsea spills from subsea equipment including the ROV.			
Receptors	<ul style="list-style-type: none"><li>Water quality</li><li>Species</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Accidental discharge to the ocean of hydrocarbons/ chemicals from project vessel deck activities and equipment (e.g. cranes), including subsea spills from the ROV.	Changes to water quality  Injury / mortality to fauna	Minor (1)	Possible (C)	Low
Source of Impact / Risk				
<p>Deck spills can result from spills from stored hydrocarbons/chemicals or equipment. A project vessel can typically store hydrocarbon/chemicals in various volumes and storage areas are typically set up with effective primary and secondary bunding to contain any deck spills. Releases from equipment are predominantly from the failure of hydraulic hoses, which can either be located within bunded areas or outside of bunded or deck areas (e.g. over water on cranes).</p> <p>Subsea spills could result from a loss of containment of fluids from the ROV. The ROV hydraulic fluid is supplied through hoses containing about 20 L of fluid. Hydraulic lines to the ROV arms may become caught, resulting in minor leaks to the marine environment.</p>				
Impact / Risk Assessment				
<p>Accidental deck or subsurface spills of hydrocarbons or chemicals would decrease the water quality in the immediate area of the spill; however, the impacts would be expected to be temporary and highly localised due to the volumes, dispersion and dilution in the open ocean environment.</p> <p>Given the offshore/open water location, receptors such as marine fauna would only be affected if they come in direct contact with a release (i.e. by traversing the immediate spill area). If marine fauna come into contact with a release they could suffer fouling, ingestion, inhalation of toxic vapours, irritation of sensitive membranes in the eyes, mouth, digestive and respiratory tracts and organ or neurological damage (refer Section 8.2.4). Given the small area of the potential spill and the rapid dilution and weathering of any spill, the likelihood of ecological impacts to marine fauna (protected species), other communities and habitats is unlikely.</p> <p>No impacts on socio-economic receptors are expected due to the low levels of fishing activity in the Operational Area, the small volumes of hydrocarbons/chemicals that could be accidentally spilled, and the localised and temporary nature of the impacts.</p>				
Identification of Control Measures and Demonstration of ALARP				

Deck and Subsurface Spill				
Control Measure		Adopted	Justification	
Inherent Design and Legislative Requirements				
Marine Order 91 (marine pollution prevention—oil) 2014, requires Shipboard Oil Pollution Emergency Plan (SOPEP) (as appropriate to vessel class).		Yes	Under Marine Order 91 (Marine pollution prevention — oil) 2014, made under the Navigation Act 2012 and the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, vessels will have a SOPEP (as appropriate to vessel class).	
In the event of a spill to the marine environment, the OPEP presented in Section 10.5.3 will be followed.		Yes	In accordance with the requirements of the OPGGS (E) Regulations 2009, an OPEP is established in Section 10.5.3, which details the spill preparedness and response arrangements that will be implemented in the event of a spill.	
Alternatives/Substitutes Considered				
No practicable alternative or substitutes to the above controls have been identified.		N/A	N/A	
Additional Controls Considered				
Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily.		Yes	Good industry practice.	
All chemicals stored in accordance with the product safety data sheet (SDS).		Yes	Storage and handling in accordance with SDS, reduces the potential for deck spills.	
Spill kits positioned in high risk locations around the vessel (near potential spill points such as transfer stations).		Yes	Should a spill occur on deck, spill kits can prevent the spill from entering the marine environment.	
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.		N/A	N/A	
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Accidental discharge to the ocean of other hydrocarbons/ chemicals from project vessel deck activities and equipment (e.g. cranes), including	Changes to water quality  Injury / mortality to fauna	Minor (1)	Unlikely (B)	Low

Deck and Subsurface Spill				
subsea spills from the ROV.				
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"> <li>PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li> <li>PTTEP AA are able to monitor the effectiveness of the proposed control measures;</li> <li>All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with accidental deck and subsea spills; and</li> <li>There have been no objections or claims raised by relevant person(s).</li> </ul> <p>The residual risk has been determined to be Low. PTTEP AA considers the adopted control measures appropriate to manage the risks of a deck or subsea spill. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		
1. Residual risk is low or medium & ALARP and the consequence from an unplanned risk is $\leq 4$		The residual risks associated with deck and subsurface spills is low and ALARP and the greatest consequence is minor (1).		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		The potential consequences of a deck or hydraulic fluid spill (< 10 L) or other general-purpose chemicals are not expected to result in any serious or irreversible environmental damage. With the proposed preventative and mitigative controls in place, the likelihood of such a spill occurring, and resulting in the impacts described above is considered unlikely.		
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species		<p>The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from deck and subsea spills.</p> <p>Oil spills are recognised as a threat in several Conservation Advices for threatened bird species (Australian lesser noddy, red knot, curlew sandpiper, eastern curlew, Abbott's booby). The project vessel will follow OPEP arrangements in the event of a spill (Section 10.5.3).</p>		
4. Legislation & Other Requirements		<p>The SOPEP and OPEP controls are consistent with the requirements of AMSA Marine Orders made under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 and also fulfil PTTEP AA's obligations under the OPGGS (E) Regulations and the National Plan for Maritime Environmental Emergencies, which in turn provides for Australia's obligations under the International Convention on Oil Pollution Preparedness, Response and Co-operation 1990.</p>		

Deck and Subsurface Spill	
5. Internal Context – PTTEP AA Requirements	The controls adopted are consistent with PTTEP AA internal requirements for handling and storage of chemicals and hydrocarbons on deck.
6. External Context – Stakeholder objects and claims addressed	There have been no objections or claims raised by relevant person(s) in relation to deck and subsurface spills.
Acceptability Statement	
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that, given the adopted controls, an accidental deck or subsea spill represents a low current risk rating that is unlikely to result in a potential impact above localised impacts on water quality and protected marine fauna. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of an accidental deck or subsea spill to an acceptable level.</p>	

## 8.2.6 Invasive Marine Species

Invasive Marine Species				
Decision Type	Type A: <ul style="list-style-type: none"><li>risks are well understood; the potential risk is low and/or the potential consequence is minor;</li><li>uncertainty is minimal; and</li><li>there has been little or no stakeholder interest.</li></ul>			
Aspects / Events	Accidental introduction and establishment of invasive marine species (IMS)			
Receptors	<ul style="list-style-type: none"><li>Ecosystems/ Habitats</li><li>Species</li><li>Socio-economic</li></ul>			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Inherent Risk
Accidental introduction of IMS	Changes to the quality of: <ul style="list-style-type: none"><li>Benthic habitats and communities.</li></ul> Impacts including: <ul style="list-style-type: none"><li>injury / mortality to fauna</li><li>out-competing of native flora and fauna</li><li>changes to the functions, interests or activities of other users</li></ul>	Significant (3)	Unlikely (B)	Medium
Source of Impact / Risk				
<p>IMS are a subset of Non-indigenous Marine Species (NIMS) that have been introduced into a region beyond their natural biogeographic range, resulting in impacts to social/cultural, human health, economic and/or environmental values. NIMS are species that have the ability to survive, reproduce and establish founder populations. However, not all NIMS introduced into an area will thrive or cause demonstrable impacts. The majority of NIMS around the world are relatively benign and few have spread widely beyond sheltered ports and harbours.</p> <p>During the activity, the project vessel will transit to and from the Operational Area. There is the potential for the project vessel to transfer IMS from either international waters or Australian waters into the Operational Area. All vessels are subject to some level of marine fouling. Organisms attach to the vessel hull, particularly in areas where organisms can find a good attachment surface (e.g. seams, strainers and unpainted surfaces) or where turbulence is lowest (e.g. niches, sea chests, etc.). Commercial vessels typically maintain anti-fouling coatings to reduce the build-up of fouling organisms. Organisms can also be drawn into ballast tanks during onboarding of ballast water required to maintain safe operating conditions.</p> <p>During the activity, the project vessel has the potential to introduce IMS to the Operational Area through biofouling (containing IMS) on vessels, as well as ballast water exchange.</p>				
Impact / Risk Assessment				
Potential IMS have historically been introduced and translocated around Australia by a variety of natural and human means including biofouling and ballast water. Potential IMS vary from one region to another depending on various environmental factors such as water temperature, salinity, nutrient levels and habitat				

### Invasive Marine Species

type, which dictate their survival and invasive capabilities. IMS typically require hard substrate in the photic zone, therefore requiring shallow waters to become established. Highly-disturbed, shallow-water environments such as shallow coastal waters, ports and marinas are more susceptible to IMS colonisation, whereas IMS are generally unable to successfully establish in deep water ecosystems and open-water environments where the rate of dilution and the degree of dispersal are high (Williamson and Fitter, 1996; Paulay et al., 2002; Geiling, 2014). The undisturbed, deep water, offshore location of the Operational Area is therefore unlikely to represent suitable habitat for the establishment of IMS.

Once introduced, IMS may pose a considerable threat to the Australian marine environment, including commercial fisheries. IMS may prey on local species (which had previously not been subject to this kind of predation and therefore have not evolved protective measures), they may outcompete indigenous species for food, space or light, and can also interbreed with local species, creating hybrids such that the endemic species is lost. These changes to the local marine environment result in changes to the natural ecosystem.

IMS have also proven economically damaging to areas where they have been introduced and established. Such impacts include direct damage to assets (fouling of vessel hulls and infrastructure) and depletion of commercially harvested marine life (e.g. shellfish stocks). IMS have proven particularly difficult to eradicate from areas once established. If the introduction is detected early, eradication may be effective but is likely to be expensive, disruptive and, depending on the method of eradication, harmful to other local marine life.

While the project vessel and ROV equipment have the potential to introduce IMS into the Operational Area, the deep offshore open waters of the Operational Area (> 150 m) are not conducive to the settlement and establishment of IMS. Furthermore, the Operational Area is away from shorelines and/or critical habitat. In addition, there will only be one project vessel operating in the Operational Area at any given time, therefore no interaction between vessels will occur and hence no potential for the transfer of marine pests between project vessels within the Operational Area. The nearest sensitive receptor is Mangola Shoal and adjacent unnamed shoals, located about 6 km south-east of the Oliver-2 wellhead. It is not expected that settlement and establishment of IMS within the shoals could occur as a result of the activity. With the controls in place as outlined below, the likelihood of IMS being introduced and establishing viable populations within the Operational Area or surrounds is considered Rare.

### Identification of Control Measures and Demonstration of ALARP

Control Measure	Adopted	Justification
<b>Inherent Design and Legislative Requirements</b>		
Department of Agriculture biosecurity approvals prior to mobilisation, including Pre-Arrival Report clearance for vessels entering Australian territorial waters.	Yes	Vessel is required to submit a Pre-Arrival Report prior to entering Australian territorial waters, and obtain Department of Australia biosecurity clearance. Clearance confirms that the vessel meets the requirements of the <i>Biosecurity Act 2015</i> for entry into Australian waters, including review of a ballast water report by a biosecurity officer. Mobilisation of the vessel to the Operational Area will only occur after clearance is confirmed. Clearance confirms that the vessel does not present a high risk to the marine environment in Australian waters and therefore reduces the likelihood of IMS being translocated to the

Invasive Marine Species		
		Operational Area. The Ballast Water Report provided during reporting identifies if the vessel has or intends to discharge internationally sourced ballast water.
A current anti-fouling coating in place 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.	Yes	<p>Vessels will have an anti-fouling system that is compliant with the International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001, the requirements of the Protection of the Sea (Harmful Antifouling Systems) Act 2006 and Marine Order 98 (Marine pollution - anti-fouling systems) 2013.</p> <p>An anti-fouling coating provides a level of protection to reduce the establishment of marine organisms on hulls and in niches, and therefore reduces the likelihood of IMS being introduced through biofouling.</p>
Exchange of ballast water will occur > 12 nm from land and in water depths of > 50 m in accordance with the Australian Ballast Water Management Requirements (Commonwealth of Australia, 2020).	Yes	<p>Regulation D-2 of the Ballast Water Management Convention as implemented through the Australian Ballast Water Management Requirements (Commonwealth of Australia, 2020) requires vessels to have an IMO approved Ballast Water Management System or use one of the other approved methods of management, which includes the requirement for ballast water exchange to occur in areas at least 12 nm from the nearest land and in water at least 50 m deep.</p> <p>The project vessel will not exchange ballast water within 12 nm from the nearest land or in water less than 50 m deep during the activity.</p>
Ballast Water Management Plan, a valid Ballast Water Management Certificate and a ballast water record system/book in place, consistent with the Australian Ballast Water Management Requirements (Commonwealth of Australia, 2020).	Yes	In accordance with the Australian Ballast Water Management Requirements (Commonwealth of Australia, 2020), the vessel will have a Ballast Water Management Plan, a valid Ballast Water Management Certificate and maintain complete and accurate

Invasive Marine Species				
		records of ballast water exchange.		
Alternatives/Substitutes Considered				
No exchange of ballast water	No	This control would potentially reduce the risk of introduction of marine species via ballast water exchange, however could potentially have a significant impact on the vessels stability. It is impractical to have no exchange of ballast water, introducing additional health and safety risks to personnel.		
Additional Controls Considered				
All vessels will comply with the following key requirements of the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009) of which key requirements are: <ul style="list-style-type: none"><li>Maintenance of a biofouling electronic records outlining marine fouling management actions</li><li>Completion of an IMS risk assessment prior to vessel entry into Australian waters which concludes a low risk of IMS presence</li><li>In-water equipment free of marine fouling prior to the commencement of the activity.</li></ul>	Yes	The project vessel will comply with the key requirements of National Biofouling Management Guidance for the Petroleum Production and Exploration Industry, including risk assessment.		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	Environmental Impact	Consequence	Likelihood	Residual Risk
Accidental introduction of IMS	Changes to the quality of: <ul style="list-style-type: none"><li>Benthic habitats and communities.</li></ul> Impacts including: <ul style="list-style-type: none"><li>injury / mortality to fauna</li><li>out-competing of native flora and fauna</li><li>changes to the functions, interests</li></ul>	Significant (3)	Rare (A)	Low

Invasive Marine Species				
	or activities of other users			
ALARP Statement				
<p>Given the decision context is 'Type A', and:</p> <ul style="list-style-type: none"><li>• PTTEP AA has a high degree of certainty of effectiveness of well-established control measures;</li><li>• All relevant 'Good Practice' control measures have been adopted by PTTEP AA to manage the potential impacts and risks associated with the introduction of IMS; and</li><li>• There have been no objections or claims raised by relevant person(s),</li></ul> <p>PTTEP AA considers the adopted control measures appropriate to manage the risks of IMS. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.</p>				
Demonstration of Acceptability				
Acceptable Level Criteria		Statement of how the acceptable level criteria has been met		
1. Residual risk is low or medium & ALARP and the consequence from an unplanned risk is ≤4		The residual risks associated with the accidental introduction of IMS is low and ALARP and the greatest consequence is Significant (3). PTTEP AA considers the Significant (3) consequence level acceptable, given the rare likelihood of IMS establishing in the Operational Area.		
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met		Prevention of IMS within the Operational Area will ensure there is no threat of serious or irreversible environmental damage or significant impact to biological diversity and ecology integrity as a result of the activity.		
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species		The Operational Area is not located within any AMPs.  IMS is identified as a key threat in several conservation management plans, with actions focusing on the prevention of their introduction. The proposed control measures are consistent with these actions.		
4. Legislation & Other Requirements		The proposed controls meet the requirements of the <i>Biosecurity Act 2015</i> and the Australian Ballast Water Management Requirements.		
5. Internal Context – PTTEP AA Requirements		The controls adopted are consistent with PTTEP AA internal requirements for IMS management.		
6. External Context – Stakeholder objects and claims addressed		There have been no objections or claims raised by relevant person(s) in relation to IMS.		
Acceptability Statement				
<p>Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level.</p> <p>The impact assessment has determined that, given the remote location of the Operational Area, short duration of the activity, only one vessel in operation and the adopted controls, the accidental introduction of IMS represents a low current risk rating. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of IMS to an acceptable level.</p>				

## **9 ENVIRONMENTAL PERFORMANCE OBJECTIVES, STANDARDS AND MEASUREMENT CRITERIA**

This section outlines the environmental performance outcomes (EPOs), environmental performance standards (EPSs) and measurement criteria (MC) in place to manage the potential environmental risks and impacts to ALARP and acceptable levels. EPOs, EPSs and MC are defined in Section 7.2.6.

The EPOs, EPSs and MC relating to the continued suspension of the wellheads are presented in Table 9-1. The measurement criteria for an EPS also acts as a measurement criteria for the relevant EPOs. Table 9-1 is structured in accordance with each aspect identified in Section 8, allowing linkage from the control measures identified in Section 8 to the related EPSs. In the event of a non-compliance with an EPO, incident reporting will be performed as described in Section 10 and the incident records will provide further evidence that the EPO has been implemented.

**Table 9-1: Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria**

EPO #	EPO	EPS #	EPS	MC	Responsibility
Planned Impacts					
Physical Presence: Disturbance to Other Marine Users					
1	No significant disruption or interference with other marine users in the Operational Area during the activity.	1.1	Notification to AHS of activities and movements to allow generation of navigation warnings (Maritime Safety Information Notifications (MSIN) and NTM (including AUSCOAST warnings where relevant)).	Consultation records demonstrate that AHS has been notified before commencing an activity to allow generation of navigation warnings (MSIN and NTM (including AUSCOAST warnings where relevant)).	PTTEP AA CEO
		1.2	Notification to AMSA JRCC to prevent activities interfering with other marine users. AMSA's JRCC will require the project vessel's details (including name, call sign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end.	Consultation records demonstrate that AMSA JRCC has been notified before commencing the activity within required timeframes.	PTTEP AA CEO
		1.3	Notification to stakeholders is sent four weeks prior to the commencement of the ROV inspection.	Consultation records demonstrate stakeholder have been notified four weeks prior to commencing the activity.	PTTEP AA CEO
Physical Presence: Benthic Disturbance					
2	Benthic disturbance during the activity is restricted to what is necessary to sufficiently complete the inspection.	2.1	Removal of marine growth via water jetting is limited to what is necessary to perform an effective inspection.	ROV inspection plan identifies specific sites on wellheads to be targeted for marine growth removal.  Video logs and the ROV inspection report confirms locations targeted by marine growth removal and provide	PTTEP AA Offshore Representative

EPO #	EPO	EPS #	EPS	MC	Responsibility
				identifies the extent of any benthic disturbance.	
<b>Anthropogenic Noise: Vessel</b>					
3	Potential disturbance to EPBC Act listed marine fauna from underwater noise during the activity is limited to vessel noise, and vessel interactions comply with regulatory requirements.	3.1	Vessel engines and DP system maintained in accordance with vessel's planned maintenance system and manufacturers' recommendations.	Maintenance records indicate vessel engines and DP system maintained in accordance with vessel's planned maintenance system and manufacturers' recommendations.	Vessel Owner/Master  Vessel Inspector
		3.2	Contractor procedures reviewed to ensure vessels adhere to EPBC Regulations (Part 8) during activity to reduce potential for impacts to cetaceans prior to mobilisation. Specifically, Part 8 (Division 8.1 'Interacting with Cetaceans'):  <ul style="list-style-type: none"> <li>The project vessel will not travel greater than 6 knots within 300 m of a cetacean and approach no closer than 100 m from a whale and 50 m from a dolphin.</li> </ul>	Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.	PTTEP AA Offshore Representative
		3.3	Vessel crew induction carried out for all personnel which includes requirements of EPBC Regulations (Part 8).	Induction records show all personnel travelling offshore have received a site Induction including environmental requirements of EPBC Regulations (Part 8).	PTTEP AA Offshore Representative

EPO #	EPO	EPS #	EPS	MC	Responsibility
				<p>Sightings and details of fauna interactions documented in daily operational logs.</p> <p>Daily operational log confirm that interactions between the project vessel and cetaceans were managed in accordance with Part 8 of the EPBC Regulations.</p>	
		3.4	Contractor sonar system operating frequency is >160 kHz.	Records demonstrate that the contractor sonar system operating frequency is >160 kHz.	<p>PTTEP AA CEO</p> <p>ROV Contractor</p>
<b>Atmospheric Emissions: Power Generation and Incineration</b>					
4	Fuel combustion and incineration during the activity is restricted to what is necessary to perform the activity.	4.1	<p>Project vessel compliant with Marine Order 97 to restrict emissions to those necessary to perform the activity.</p> <p>Vessel marine assurance process conducted prior to contracting vessels, to ensure suitability and compliance with vessel combustion certification/ Marine Order requirements.</p>	Inspection records demonstrate compliance with Marine Order 97.	<p>Vessel Owner/Master</p> <p>Vessel Inspector</p>
<b>Routine Discharges to the Marine Environment from the Project Vessel</b>					
5	No impact to water quality greater than a consequence level of Minor from discharge of sewage, greywater, putrescible wastes, bilge and deck drainage to the marine environment during the activity.	5.1	Project vessel compliant with Marine Order 91. Discharge of machinery space bilge/oily water will meet oil content standard of <15 ppm without dilution.	Records demonstrate discharge specification met for project vessel.	Vessel Master Vessel Inspector
		5.2	Project vessel compliant with Marine Order 95. Putrescible waste and food scraps to pass through a macerator so it is capable of passing through a screen with no opening wider than 25 mm.	Records demonstrate project vessel is compliant with Marine Order 95 (as appropriate to vessel class).	Vessel Master Vessel Inspector

EPO #	EPO	EPS #	EPS	MC	Responsibility
		5.3	Project vessel compliant with Marine Order 96 (as appropriate to vessel class) to manage sewage discharge from the vessel.	Records demonstrate project vessel is compliant with Marine Order 96 (as appropriate to vessel class).	Vessel Master Vessel Inspector
		5.4	Contaminated drainage contained, treated and/or separated prior to discharge.	Records demonstrate project vessel has a functioning deck drainage water management system.	Vessel Master
Unplanned Impacts					
Physical Presence: Collision with Marine Fauna					
6	No vessel strikes with protected marine fauna (whales, whale sharks, turtles) during the ROV inspection activity.	6.1	Contractor procedures reviewed to ensure compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans to minimise potential for vessel strike prior to mobilisation. Specifically, Part 8 (Division 8.1 ‘Interacting with Cetaceans’): <ul style="list-style-type: none"><li>The project vessel will not travel greater than 6 knots within 300 m of a cetacean and approach no closer than 100 m from a whale and 50 m from a dolphin.</li></ul>	Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.	Vessel Master
		6.2	All vessel strike incidents with cetaceans are reported in the National Ship Strike Database (as outlined in the Conservation Management Plan for the Blue Whale Commonwealth of Australia, 2015).	Communication records confirming ship strikes with cetaceans have been reported to the National Ship Strike Database. Reports to include vessel strike locations, frequencies and timings.	Vessel Master

EPO #	EPO	EPS #	EPS	MC	Responsibility
		6.3	Vessel crew induction carried out for all personnel which includes requirements of EPBC Regulations (Part 8).	Training records show all personnel travelling offshore have received an Environmental Awareness Induction including environmental requirements of EPBC Regulations (Part 8).  Sightings and details of fauna interactions documented in daily operational logs.  Daily operational log confirm that interactions between the project vessel and cetaceans were managed in accordance with Part 8 of the EPBC Regulations.	PTTEP AA Offshore Representative
Discharge: Loss of Hazardous and Non-hazardous Solid Wastes					
7	Management of solid waste (hazardous and non-hazardous) to meet or exceed the requirements of MARPOL Annex V and AMSA Marine Order 95.	7.1	Project vessels compliant with Marine Order 95 – pollution prevention – garbage.	Inspection records demonstrate project vessels are compliant with Marine Order 95 – pollution prevention (as appropriate to vessel class).	Vessel Master
		7.2	Hazardous and non-hazardous waste will be managed in accordance with the project vessel waste arrangements.	Inspection records demonstrates compliance against the project vessel waste arrangements.	Vessel Master
		7.3	Solid waste generated during the activity on board the vessel are minimised where practical, as identified during the pre-activity environmental checklist.	Completed pre-activity environmental checklist demonstrates compliance.	Vessel Master
Discharge: Dropped Objects					
8	No incidents of dropped objects to the marine environment greater than	8.1	All lifts conducted in accordance with applicable project vessel work procedures to limit potential for dropped objects.	Records show lifts conducted in accordance with the applicable project vessel work procedures.	Vessel Master



EPO #	EPO	EPS #	EPS	MC	Responsibility
	a consequence level of Minor during the activity	8.2	Crew awareness of requirements for dropped object prevention.	Records show dropped object prevention training is provided to the project vessels.	PTTEP AA Offshore Representative
Deck and Subsurface Spill: ROV					
9	No unplanned spills to the marine environment from deck activities greater than a consequence level of Minor during the activity.	9.1	Appropriate initial responses prearranged and drilled in case of a hydrocarbon spill, as appropriate to vessel class.	Inspection records demonstrate compliance with Marine Order 91.	PTTEP AA Offshore Representative Vessel Master
		9.2	OPEP to be available on project vessel and utilised in the event of a spill.	Vessel crew induction materials include an overview of the OPEP providing roles and responsibilities in the event of a hydrocarbon spill.	Vessel Master
		9.3	Failure of primary containment in storage areas does not result in loss to the marine environment.	Records confirms all liquid chemicals and fuel are stored in bunded/ secondarily contained areas when not being handled/moved temporarily.	Vessel Master
		9.4	SDS to be available on project vessel where relevant.	Inspection records demonstrate chemicals stored in accordance with SDS.	Vessel Master
		9.5	Spill kits to be available for use to clean up deck spills.	Records confirms spill kits are present, maintained and suitably stocked.	Vessel Master
Invasive Pests: Marine					
10	No introduction and establishment of invasive marine species into the Operational Area as a result of the activity.	10.1	Project vessel 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.	Record of pre-activity environmental checklist confirms the project vessel has Department of Agriculture and Water Resources biosecurity clearance.	Vessel Master

EPO #	EPO	EPS #	EPS	MC	Responsibility
				Record of compliance audit during the activity confirms that any conditions imposed by the Department of Agriculture and Water Resources clearance are being complied with.	
		10.2	Project vessel 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.	Record of pre-activity environmental checklist confirms vessels have current anti-fouling certification that complies with the stated convention and Act.	Vessel Master
		10.3	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 (DAWR 2017).	In the event that a ballast water exchange is required, daily operational log and ballast water management log confirm the position of the vessel is >12 nm from nearest land and in water depths > 50 m when exchanging water taken up in a foreign port or coastal waters.  Induction materials include a summary of IMS and ballast water management.  Induction attended by all crew, demonstrated by induction records.	Vessel Master
		10.4	Project vessel will have a Ballast Water Management Plan and a ballast water record system/book, consistent with the Australian Ballast Water Management Requirements (DAWR, 2017).	Record of pre-activity environmental checklist confirms the vessel has a Ballast Water Management Plan and ballast water record system/book,	Vessel Master

EPO #	EPO	EPS #	EPS	MC	Responsibility
				<p>consistent with the Australian Ballast Water Management Requirements.</p> <p>Record of compliance audit during the activity (Section 10.7.1.3) confirms that the vessel has a Ballast Water Management Plan and ballast water record system/book, consistent with the Australian Ballast Water Management Requirements.</p>	
		10.5	<p>Vessel 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:</p> <ul style="list-style-type: none"> <li>• Maintenance of biofouling electronic records outlining marine fouling management actions.</li> <li>• Completion of an IMS risk assessment prior to vessel entry into Australian waters which concludes a low risk of IMS presence.</li> <li>• In-water equipment free of marine fouling prior to the commencement of the activity.</li> </ul>	<p>Record of pre-activity environmental checklist confirms:</p> <ul style="list-style-type: none"> <li>• Biofouling Record Book is current and management actions are up to date;</li> <li>• IMS risk assessment has been completed prior to the vessel's entry into Australia and the risk has been determined as low; and</li> <li>• Equipment maintenance records confirm that in-water equipment is free of</li> </ul>	Vessel Master

EPO #	EPO	EPS #	EPS	MC	Responsibility
				marine fouling prior to activity commencement.	
<b>Hydrocarbon Spill: Vessel Tank Failure</b>					
11	No hydrocarbon spills to the marine environment. Reduce impacts to the marine environment through appropriate spill preparedness and response.	11.1	<p>Marine Order 30 (prevention of collisions) 2016, including:</p> <ul style="list-style-type: none"> <li>adherence to steering and sailing rules including maintaining lookouts (e.g. visual, hearing, radar, etc.), proceeding at safe speeds, assessing risk of collision and taking action to avoid collision (monitoring radar)</li> <li>adherence to navigation light display requirements, including visibility, light position/shape appropriate to activity</li> <li>adherence to navigation noise signals as required.</li> </ul>	No records of project vessel failing to comply with appropriate navigation, lighting and communication requirements under the Navigation Act 2012 or its associated Marine Orders.	Vessel Master
		11.2	<p>Marine Order 21 (safety and emergency arrangements) 2016, including:</p> <ul style="list-style-type: none"> <li>adherence to minimum safe manning levels</li> <li>maintenance of navigation equipment in efficient working order (compass/radar)</li> <li>navigational systems and equipment required are those specified in Regulation 19 of Chapter V of Safety of Life at Sea</li> <li>Automatic Identification System (AIS) that provides other users with information about the vessel's identity, type, position, course, speed, navigational status and other safety-related data.</li> </ul>	No records of project vessel failing to comply with appropriate navigation, lighting and communication requirements under the Navigation Act 2012 or its associated Marine Orders.	Vessel Master



EPO #	EPO	EPS #	EPS	MC	Responsibility
		11.3	Shipboard Oil Pollution Emergency Plan (SOPEP) (as appropriate to vessel class) is followed in the event of a spill	Record of compliance audit during the activity confirms a copy of the SOPEP is held on board the vessel.	Vessel Master
		11.4	The OPEP presented in Section 10.5.3 is followed in the event of a spill.	Record of compliance audit during the activity confirms a copy of the OPEP is held on board the vessel.	Vessel Master
		11.5	Notice to Mariners issued prior to commencement of activities.	Consultation records confirms that AHS has been notified of ROV inspection commencement at least three weeks prior to ROV inspection commencement and within two weeks of demobilisation.	PTTEP AA CEO
		11.6	Notification of activity commencement and movements to JRCC 24-48 hours before operations commence for promulgation of Radio Navigation Warning.	Consultation records confirm that AMSA JRCC have received notification of ROV inspection commencement at least 24-48 hours prior to commencement.	PTTEP AA CEO
		11.7	Notification to stakeholders four weeks prior to the commencement of the ROV inspection.	Consultation records confirm that relevant stakeholders were notified four weeks prior to ROV inspection commencement and within two weeks of cessation of activities.	PTTEP AA CEO

## 10 IMPLEMENTATION STRATEGY

This section details the Safety, Security, Health and Environment Management System (SSHE MS) which will support the implementation of the environmental performance objectives and environmental performance standards in this EP, as required under Regulation 14 of the OPGGS (E) Regulations.

### 10.1 SSHE MANAGEMENT SYSTEM OVERVIEW

The PTTEP corporate SSHE MS is the foundation for operational and risk control of activities conducted by PTTEP AA and is aligned with ISO 14001 (Environmental Management Systems), ISO 18001 (Health and Safety Management Systems), and the International Association for Oil and Gas Producers (IOGP) international standards.

This management system outlines PTTEP's SSHE requirements and consists of seven key interrelated elements, which are supported by Management Standards and procedures. The seven key elements of the SSHE MS are:

1. **Leadership and commitment:** addressing the requirement for 'top-down' commitment and developing a SSHE culture.
2. **Policy and strategic objectives:** addressing PTTEP's intentions, principles of action and aspirations with respect to SSHE.
3. **Organisation, resources and documentation:** addressing organisational requirements for sound SSHE performance, including people, training and competence, contractor management, and management of documentation for sound SSHE performance and regulatory compliance.
4. **Evaluation and risk management:** addressing identification and evaluation of SSHE risks for all activities, products and services, including measures to reduce environmental impacts and risks to ALARP and an acceptable level.
5. **Planning and operational control:** planning the conduct of work activities, including the SSHE aspects of work activities, planning for changes and emergency response.
6. **Implementation and monitoring:** addressing the implementation and monitoring of work activities and environmental performance from a SSHE perspective, and how corrective action is to take place.
7. **Audit and review:** addressing the periodic assessment of the performance, effectiveness and fundamental suitability of measures implemented under this EP, as well as the performance, effectiveness and fundamental suitability of SSHE MS.

PTTEP AA commits to operate the business conscientiously and responsibly towards society and environment through adhering to the PTTEP SSHE Policy (Section 2), which includes the commitment to environmental protection. Company personnel, business partners as well as contractors working for or on behalf of the company must comply with the SSHE Policy and SSHE MS.

### 10.2 LEADERSHIP, COMMITMENT, POLICY AND STRATEGIC OBJECTIVES

The PTTEP SSHE Policy is provided in Section 2. It provides the documented commitment of the PTTEP leadership team, company personnel at all levels, business partners and contractors to environmental performance.

## 10.3 ORGANISATION, RESOURCES AND DOCUMENTATION

### 10.3.1 Roles and Responsibilities

It is the responsibility of all PTTEP personnel and contractors to act in an environmentally sustainable manner and to follow the environmental procedures detailed within this EP. All project personnel will operate under the directive of this EP at all times.

Roles and responsibilities and the relevant technical discipline resources, as they relate to continued well suspension and integrity are outlined in the WOMP (WOMP Revision 3, PTTEP Technical Document HQ201907644.2). The key roles and responsibilities within PTTEP AA, PTTEP Bangkok, and contractors or consultants, as they relate to the implementation of this EP are summarised in Table 10-1 below.

Relevant PTTEP personnel and its consultants will be made aware of their roles and responsibilities under this section of the EP and the responsibilities outlined in Section 9:

- Upon acceptance of the EP by NOPSEMA; and
- Following each EP review (refer to Section 10.5.1); and
- Following a revision of the EP; and
- In the event of organizational changes where the roles or responsibilities detailed in this EP change, or the individual performing a role listed in Table 10-1 changes.

Contractors will be made aware of their responsibilities under this EP during the contracting process.

Roles and responsibilities are further outlined in PTTEP AA Responsible, Accountable, Consulted, and Informed (RACI) Chart (CORP-DR-D40-814045) (3), Appendix D.

**Table 10-1: Roles and Responsibilities**

Role	Responsibility
Chief Executive Officer (CEO) (PTTEP AA)	<ul style="list-style-type: none"> <li>• Overarching responsibility for the implementation of this EP.</li> <li>• Overarching responsibility for the timely execution of the well suspension activities, including the ROV inspection, covered under this EP.</li> <li>• Ensure that resources are available and directions are given in compliance with this EP.</li> <li>• Ensure the roles and responsibilities under this EP are communicated to the relevant personnel, and that personnel are competent to undertake their roles and responsibilities.</li> <li>• Ensure all relevant personnel are fully aware of the EPOs, EPSs and other requirements in this EP.</li> <li>• Ensure that environmental awareness and training materials required in this EP are developed and delivered to all relevant personnel.</li> <li>• Ensure an EP Environmental Commitments Register is developed and maintained.</li> <li>• Ensure reviews are undertaken at the required times to identify new information or legislation that may be relevant to the EP.</li> <li>• Ensure that Environmental Risk and Impact Assessments are completed as required for management of change and identify whether a resubmission of EP/OPEP is required.</li> <li>• Ensure incident reporting and investigation is completed as required.</li> </ul>

Role	Responsibility
	<ul style="list-style-type: none"> <li>Ensure that reportable and recordable incidents are reported to NOPSEMA.</li> <li>Ensure environmental performance reporting is completed and submitted to NOPSEMA.</li> <li>Ensure EP/OPEP assurance activities are implemented.</li> <li>Ensure that lessons learnt / corrective actions are executed.</li> </ul>
PTTEP AA Drilling and Well Services Manager (or the equivalent PTTEP position for periods this role is not filled within PTTEP AA)	<ul style="list-style-type: none"> <li>Ensure all members of the Drilling and Well Services Team are fully aware of the EPOs, EPSs and other requirements in this EP.</li> <li>Ensure effective communication and interface management with other technical disciplines in the execution of responsibilities as defined in the WOMP (WOMP Revision 3, PTTEP Technical Document HQ201907644.2).</li> <li>Conduct independent audits of the effectiveness of the WOMP (WOMP Revision 3, PTTEP Technical Document HQ201907644.2).</li> <li>Ensure adequate resources to maintain well integrity as required.</li> <li>Ensure a Well Integrity Technical Authority is appointed at all times.</li> <li>Monitor progress of contractors in closing out items in an Action Register.</li> </ul>
Specialist Process Safety (PTTEP)	<ul style="list-style-type: none"> <li>Provide PTTEP AA with technical expertise and advice on compliance with the PTTEP corporate SSHE MS and associated standards, plans and processes.</li> </ul>
Environmental Advisor (Consultant)	<ul style="list-style-type: none"> <li>Provide support to the PTTEP AA CEO and the PTTEP Specialist Process Safety to ensure implementation and compliance with this EP.</li> </ul>
PTTEP AA Offshore Representative (PTTEP AA)	<ul style="list-style-type: none"> <li>Ensure efficient and safe offshore operations, in accordance with PTTEP SSHE standards.</li> <li>Responsible for the implementation of this EP on the ROV inspection project vessel.</li> <li>Responsible for the delivery of environmental awareness inductions prior to vessel mobilisation.</li> <li>Conduct daily morning meeting (including SSHE topics) and supervise day-to-day offshore operations to ensure they are in compliance with this EP.</li> <li>Provide daily report of offshore operations including SSHE information.</li> <li>Focal point for communication with PTTEP AA in the event of an offshore emergency.</li> <li>Ensure key tasks identified in the OPEP are implemented offshore if required e.g. oil spill observation, deployment of spill tracker buoys.</li> </ul>
Vessel Inspector (Contractor)	<ul style="list-style-type: none"> <li>Inspection of the project vessel coming under contract to PTTEP and prior to mobilisation of the ROV inspection.</li> </ul>

Role	Responsibility
	<ul style="list-style-type: none"> <li>Ensure that the vessel, certification and systems are compliant with mandatory requirements and other requirements of this EP.</li> </ul>
Project Vessel Master (Contractor)	<ul style="list-style-type: none"> <li>Ensure that the requirements of this EP are met on board the project vessel.</li> </ul>
All ROV survey personnel and vessel crew (Contractor)	<ul style="list-style-type: none"> <li>Be aware of and carry out their day-to-day duties in compliance with this EP.</li> </ul>

### 10.3.2 Training and Competency

PTTEP AA will ensure all relevant personnel will be aware of the requirements of this EP and made aware of the specific environmental sensitivities, risks and management strategies.

All PTTEP employees are required to be competent on the basis of appropriate education, training and awareness.

PTTEP applies an online Competency Management System (iCMS) that is used to ensure employee competency. It is based on Job Families with defined competency elements and performance criteria. Annual self-assessments are made with verification by line management. Competency gaps are closed by an Individual Competency Development Plan (ICDP).

Contractor competency is determined during contractor pre-qualification in accordance with PTTEP SSHE Contractor Management Standard SSHE-106-STD-310.

#### 10.3.2.1 SSHE Training and Competence

SSHE Training and Competence Standard 11038-STD-SSHE-305-R05 gives details of specific SSHE training and competency requirements for PTTEP employees and contractors. This includes training matrices for different categories of personnel such as marine vessel crew (Category G personnel) which will be applied for the ROV survey. Personnel involved in the ROV survey will be competent to perform their roles safely.

#### 10.3.2.2 Environmental Awareness Induction

An 'Environmental Awareness' induction will be provided by the PTTEP AA Offshore Representative to PTTEP, PTTEP AA and contractor personnel who will be performing tasks offshore. The induction will be delivered prior to the ROV inspection. This induction forms part of an overall induction process and is based on consideration of the following:

- An overview of the EP and roles and responsibilities within the EP;
- Regulatory and procedural requirements;
- PTTEP SSHE Policy;
- Environmental and socio-economic sensitivities of the area;
- Relevant concerns/requests raised by stakeholders including:
  - Managing interactions with commercial fishing activities; and
  - No recreational fishing from the project vessel.
- Environmental management requirements including:
  - Marine fauna interaction;
  - Housekeeping;
  - Waste management;
  - Chemical management;

- Lighting
- Incident reporting; and
- Oil spill response.

### 10.3.3 Contractor Management

PTTEP SSHE Contractor Management Standard SSHE-106-STD-310 will be applied. This refers to SSHE aspects related to contractor pre-qualification, contract clauses, risk assessment, pre-mobilisation and mobilization, work execution and demobilisation.

The requirements of this EP will be rolled out to contractors through the following processes:

1. The requirement to comply with the EP will be included in contracts for the ROV and project vessel;
2. A copy of the approved EP and OPEP will be provided to the vessel operator.
3. Contractor personnel will be required to attend the Environmental Awareness Induction (refer to Section 10.3.2.2);
4. A review of contractor compliance with relevant environmental performance standards will be initiated prior to the mobilisation of the vessel and during the ROV inspection (refer to Section 10.7.1).

### 10.3.4 Document Management

PTTEP AA shall store and maintain the following documents or other records:

- (a) This EP;
- (b) Revisions to this EP;
- (c) Written reports (including monitoring, audit and review reports) about environmental performance, or about the implementation strategy, under this EP;
- (d) Records of emissions and discharges to the environment in accordance with this Plan;
- (e) Records and copies of reports under regulations 26 and 26A of the OPGGS (E) Regulations, relating to reportable incidents; and regulation 26B of the OPGGS (E) Regulations, relating to recordable incidents.

Records will also be kept, consistent with measurement criteria described in Section 9, to demonstrate compliance with environmental performance objectives and environmental performance standards.

All documents and records will be securely stored and maintained in a manner that makes retrieval of the documents or other records reasonably practicable. All applicable regulatory agencies requiring copies of documents and records shall be provided copies in a timely manner and in accordance with Regulation 28 ('Making records available') of the OPGGS (E) Regulations. Documents and records shall be stored and maintained for a minimum of five years from the making of the documents and records in accordance with OPGGS (E) Regulations.

## 10.4 EVALUATION AND RISK MANAGEMENT

The environmental risk assessment and evaluation process applied during the assessment of environmental risks and impacts is documented in detail in Section 6.

In addition, during the life of this EP, PTTEP AA will continue to identify and assess environmental impacts and risks of the activity, and ensure that control measures detailed in this EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level. This will be achieved through a risk assessment review, which may be triggered by one or a combination of the following:

- Review of new information or changes to legislation undertaken prior to the ROV inspection and annually during the life of this EP (Section 10.5.1);

- Any other change that triggers the management of change process (Section 10.5.2), including a change in the activity or any other change that may result in a new or increased impact or risk;
- Investigation of an incident or non-conformance that identifies the potential need to change or apply further control measures to manage impacts and risks (Section 10.6.5).

The potential impacts and risks will be assessed, and the outcomes recorded and implemented in accordance with the Management of Change procedure described in Section 10.5.2.

## **10.5 PLANNING AND OPERATIONAL CONTROL**

### **10.5.1 Environment Plan Reviews**

A review of the commitments and requirements of this EP will be undertaken:

- Prior to mobilisation of the ROV inspection; and
- Annually from the date of acceptance of the EP (taking into consideration the outcomes of assurance activities (Section 10.7) and annual environmental performance reporting (Section 10.6.2.1).

The purpose of the reviews is:

- to identify all commitments and requirements to be considered in the planning and implementation of the ROV inspection and the ongoing well suspension programme;
- to identify and assess if there are any changes in the activity, legislation, knowledge or other information; and
- to continue to identify the potential environmental impacts and risks of the activity and ensure they are managed to ALARP and an acceptable level.

To support this process, PTTEP AA has established a contract with an environmental consultancy to undertake reviews of new information that may be relevant to the activity and the EP, including:

- Changes to relevant legislation (Section 3), including environmental and petroleum legislation;
- Matters relating to the EPBC Act, including policy statements and conservation management documentation, achieved through subscription to automated email notifications provided by the Department of Agriculture, Water and the Environment;
- New scientific knowledge related to the existing environment; and
- Other changes that may be relevant to management measures for protected species or the environmental management of the activity.

Any changes identified will be assessed under the Management of Change process (Section 10.5.2).

### **10.5.2 Management of Change**

PTTEP Management of Change (MOC) Standard (11038-STD-SSHE-508-R06) will be applied to ensure that technical, administrative and organizational changes related to the suspension phase and ROV survey are recorded, assessed by competent personnel and authorized before implementation. This applies to both temporary and permanent changes.

PTTEP AA has identified that the following key steps must be in place when implementing the MOC process:

- Initiation – recognition of the need for change;
- Registration and tracking of change;
- Multi-discipline review and risk assessment;
- Approval and implementation of change; and
- Close out, review and feedback.

In conjunction with the Management of Change Standard the Environment Plan - Change of Environmental Risk and Impact Assessment Template (document # 590404) will be used to assess and record any change which may need to be made to an EP or OPEP, and identify when a resubmission of an EP may be required under Division 2.4 of the OPGGS (E) Regulations.

The Change of Environmental Risk and Impact Assessment Template includes requirements to:

- Document the nature of the change;
- Assess any change in risk rating (to be assessed in alignment with the methodology presented in Section 6 of this plan);
- Assess whether risks and impacts remain ALARP and at an acceptable level;
- Assess any potential impacts on stakeholders;
- Determine whether a change to the EP can be captured as an internal revision of the EP or if a resubmission of the EP is required under Division 2.4 of the OPGGS (E) Regulations;
- Identify any actions required to implement the change; and
- Have the change documentation approved by the Specialist Process Safety and relevant operational personnel (e.g. the Drilling and Well Services Manager).

Use of the Change of Environmental Risk and Impact Assessment Template could be triggered by:

- Changes to the SSHE management practices or operational management of the well suspension programme;
- Changes to corporate requirements, industry codes and standards;
- EP reviews (as described in Section 10.5.1), which may identify:
  - Changes to legislative and regulatory requirements, conservation management documents or guidance;
  - New information or scientific knowledge in relation to the environmental sensitivities in the Operational Area or EMBA;
- The introduction of new activities or changes to activities described within the scope of this EP;
- An emergency response exercise which indicates that modification to the OPEP is required;
- Lessons learnt from an actual hydrocarbon spill indicate that modification to the OPEP is required;
- Internal assurance activities that identify if an environmental performance outcome, environmental performance standard and/or a control measure must be improved; or
- The identification of ambiguous wording of environmental commitments within the EP that require clarification.

Changes made to the EP will be reflected in the EP Environmental Commitments Register (described further under Section 10.7.1).

Further information on when a change may require the EP to be revised and resubmitted to NOPSEMA under Division 2.4 of the OPGGS (E) Regulations is provided in Section 10.7.2.

### 10.5.3 Oil Pollution Emergency Plan

PTTEP AA has prepared the following OPEP to facilitate an effective response in the event of a hydrocarbon spill to the marine environment from the project vessel.

Given the nature of the activity, the credible hydrocarbon scenarios identified in Section 8.2 of this EP are associated with the project vessel. The wellheads are isolated from the hydrocarbon zone, risk assessed as having adequate tested temporary barriers, and a loss of well containment is not considered credible. Therefore, the OPEP addresses the potential loss of marine diesel from the project vessel.

Based on conservative hydrocarbon spill modelling presented in Section 8.2, no impacts are expected at any shorelines or in State coastal waters. Short-term exposures of marine diesel may occur on the sea surface or in the upper water column in Commonwealth waters.

The OPEP provides the following key information to be used in the event of a hydrocarbon spill to the marine environment:

- First strike actions covering key actions in the first 24 hours;
- Internal and external notification and reporting requirements;
- Structure and responsibilities, principally of the Vessel Master and external agencies;
- Identification of spill response strategies suitable for a marine diesel spill; and
- Training, competency and testing requirements.

Under the National Plan, AMSA is the Control Agency for vessel sourced pollution incident from vessels within Commonwealth waters. As advised by AMSA, any response undertaken by AMSA will be undertaken in consultation with the vessel owners/representatives. PTTEP AA / PTTEP is not required to have an Emergency Management Team, but will undertake incident reporting to the Jurisdictional Authority, NOPSEMA, as well as other external notifications to other government agencies and stakeholders as detailed in this OPEP.

#### **10.5.3.1 Relationship with Other Plans**

Oil spill response arrangements detailed in this OPEP are consistent with the arrangements detailed in the AMSA National Plan for Maritime Environmental Emergencies (National Plan) and integrate with the project vessel's Shipboard Oil Pollution Emergency Plan (SOPEP) / Shipboard Marine Pollution Emergency Plan (SMPEP).

##### **National Plan for Maritime Environmental Emergencies**

The National Plan (AMSA, 2019) sets out national arrangements, policies and principles for the management of maritime environmental emergencies. The National Plan integrates Commonwealth and State Government response oil spill response frameworks to facilitate effective response to marine pollution incidents. AMSA manages the National Plan, working with State Governments, the shipping, petroleum, chemical industries, and emergency services to maximise Australia's marine pollution response capability to incidents.

The National Plan applies to all hydrocarbon spills in Commonwealth waters seaward of the State waters limit.

##### **Vessel SOPEP/SMPEP**

As required under MARPOL 73/78 Annex I (Regulation 37), all ships greater than 400 gross tonnes must carry a shipboard oil pollution emergency plan (SOPEP), as required by the International Maritime Organisation (IMO). If the project vessel is less than 400 gross tonnes, it will have an equivalent Shipboard Marine Pollution Emergency Plan (SMPEP).

The SOPEP/SMPEP, the principal working document for vessel and crew in the event of a marine oil spill, provides for the following specific management response provisions to mitigate and combat oil spills originating from vessels:

- The procedure to be followed by the Vessel Master to report an oil spill incident, the list of authorities to be contacted (i.e. AMSA JRCC) and the oil spill details to be provided;
- A detailed description of action to be taken by the personnel on board to reduce or control the discharge (actual or probable) following the incident (i.e. operational spill prevention);
- Roles and responsibilities of all vessel personnel (Master, Chief Engineer, etc.,) with respect to the particular oil spill incident experienced;
- Procedures and point of contact on the ship for coordinating shipboard activities with National and Local Authorities;
- Details of spill equipment held on board the vessel;
- Vessel drawings (drainage and layout); and
- SOPEP/SMPEP testing and drill requirements.

The SOPEP/SMPEP also includes specific emergency procedures including steps to control discharges and manage hull damage, grounding and stranding, fire and explosions, collisions, tank failure, sinking and vapour release.

#### 10.5.3.2 Jurisdictional Authority and Control Agency

The National Plan defines two levels of authority:

- Jurisdictional Authority, having the jurisdictional or legislative responsibility to ensure there is adequate prevention of, preparedness for, response to and recovery from an oil spill incident; and
- Control Agency having the responsibility to take operational control and respond to an oil spill in the marine environment.

The Jurisdictional Authority and Control Agency with respect to a marine oil spill from vessels during petroleum activities in Commonwealth waters are as follows:

Spill Location	Spill Source	Jurisdictional Authority	Control Agency
Commonwealth waters	Offshore petroleum vessel-based incident (including seismic and support vessels)	NOPSEMA and AMSA *	AMSA
* NOPSEMA has legislative responsibilities for oversight of offshore petroleum activities. AMSA has legislated responsibility for all vessels in Commonwealth waters.			

#### 10.5.3.3 PTTEP and Contractor Roles and Responsibilities

In the event of a hydrocarbon spill from the project vessel during the ROV inspection, AMSA will be the relevant Control Agency and will implement their Incident Management Team (IMT) in accordance with the National Plan for Maritime Environmental Emergencies (AMSA, 2019).

##### Vessel Master

The vessel master is responsible for the safety of lives on board and source control.

The Vessel Master is responsible for the notification of the spill and ongoing direct communication with AMSA from offshore (e.g. pollution reports, situation reports), while safely able to do so.

##### Vessel Owner

The vessel owner / representative will be consulted by AMSA about incident response activities

##### PTTEP AA Offshore Representative

The PTTEP AA Offshore Representative will provide updates on the offshore situation to the PTTEP AA CEO.

##### PTTEP AA CEO

The PTTEP AA CEO is responsible for incident reporting and other notifications to government agencies and stakeholders, as detailed in the First Strike Response and Notifications (Section 10.5.3.5).

#### 10.5.3.4 Definition of Spill Levels

Under the National Plan arrangements, oil spills and their response requirements are categorised into three 'Levels'. The level, location and trajectory of the spill influences the resources required in the spill response.

**Level 1 – A small spill requiring a local response:** Generally be able to respond to utilising local resources (e.g. first strike capacity).

**Level 2 – A medium spill requiring a regional response and/or national assistance:** More complex in size, duration, resource management and risk. The Control Agency may require national or State resources.

**Level 3 – A large spill requiring national or international assistance:** Generally characterised by a degree of complexity that requires local, regional, national and possibly international assistance.

A spill from the project vessel will be classed as either a Level 1 or a Level 2 incident.

### 10.5.3.5 First Strike Response and Notifications

Response Action		
Action	Responsibility	Timing
<b>Initial Emergency Actions (Level 1 or Level 2 Spill)</b>		
Sound relevant alarm. Vessel Master is notified of spill in accordance with SOPEP.	Crew member discovering leak	ASAP
Manage safety of all vessel personnel. Secure sources of ignition and alert all personnel (appropriate to level of spill). Implement the relevant emergency response procedures to protect human life and equipment and in particular, those procedures focused at reducing the risk of fire or explosion (refer SOPEP/ERP)	Vessel Master	ASAP
If safe, stop spill through source control actions. Minimise loss overboard utilising available spill prevention/clean-up equipment on-board (refer SOPEP/ERP).	Vessel Master (or delegate)	ASAP
After safety measures have been implemented, identify the damage, location of incident, proximity to land, other navigational hazards, other traffic in the area, extent of spill (rate/volume) and the weather/current conditions in the area. Estimate the quantity of oil released and provide initial incident information.	Vessel Master (or delegate)	ASAP
Notify AMSA immediately and confirm response actions Phone +61 02 6230 6811 or freecall within Australia 1800 641 792 Fax +61 02 6230 6868 Email <a href="mailto:rccaus@amsa.gov.au">rccaus@amsa.gov.au</a> Inmarsat C using Special Access Code (SAC) 39 (note that Inmarsat-C Transceivers required to be logged in and reports sent via LES Codes 312 in IOR and 212 in POR) HF DSC MMSI 005030001. Issue pollution report (POLREP) to AMSA. <a href="https://www.amsa.gov.au/marine-environment/marine-pollution/mandatory-marpol-pollution-reporting">https://www.amsa.gov.au/marine-environment/marine-pollution/mandatory-marpol-pollution-reporting</a>	Vessel Master	ASAP
As appropriate, issue emergency call-out on marine radio VHF Channel 16 to warn other vessels in the immediate path of the spill. Warning should include the type of accident, such as collision or leak; where the accident has occurred; possible hazards such as risk of fire or explosion; where the slick is moving and recommended actions, for example leaving the area, staying 500m up-current, up-wind from the spill site and no naked flames.	Vessel Master	ASAP
Notify the PTTEP AA CEO with spill incident details	PTTEP AA Offshore Representative	ASAP

Response Action		
Action	Responsibility	Timing
<p>Notify NOPSEMA verbally WITHIN 2 HOURS of a reportable spill (Ph: (08) 6461 7090) and provide written record of notification to NOPSEMA, NOPTA and DMIRS.</p> <p>Notify Director of Marine Parks on Ph: 0419 293 465 (24 hr Marine Compliance Officer) if the spill is likely to impact on Australian Marine Parks.</p>	PTTEP AA CEO	Within 2 hrs
<b>Level 2 Spill:</b>		
On advice from AMSA, initiate response strategy.	Vessel Master	-
Deploy oil spill tracking buoy, if available. Provide data to AMSA (if required).	PTTEP AA Offshore Representative.	Within 30 minutes of spill or when instructed by AMSA.
As directed by AMSA, monitor leak size, changes to the physical/chemical character of the slick, direction, weather and sea-state conditions providing this information to AMSA. Formally log and record this data on a time basis.	Vessel Master	Ongoing
<p>As directed by AMSA, undertake spill surveillance from vessel (as appropriate). Continue to monitor the spill providing information on spill amount, trajectory, weather, area of coverage and spill appearance.</p> <p>Based on an agreed timeframe with AMSA forward regular SITREPs details to AMSA.</p>	Vessel Master	Ongoing
<p>Undertake other stakeholder notifications (as necessary):</p> <ul style="list-style-type: none"> <li>• WA DPIRD Fisheries;</li> <li>• AFMA;</li> <li>• Department of Agriculture – Fisheries;</li> <li>• Director of National Parks</li> <li>• WAFIC;</li> <li>• CFA;</li> <li>• Licence holders within the WA-managed Northern Demersal Scalefish Managed Fishery;</li> <li>• Other petroleum titleholders with facilities/operations nearby.</li> </ul> <p>Contact details are available in the Consultation Log.</p>	PTTEP AA CEO	Within 24 hours
Forward copies of SITREPs to NOPSEMA.	Vessel Master	Ongoing
If natural weathering strategy is determined as not effective, confirm with AMSA the revised response strategy based on environmental resources at risk (as appropriate). Provide support where directed.	Vessel Master	-

#### 10.5.3.6 Response Options and Most Likely Response Strategy

The response strategy will be selected and directed by the Control Agency, AMSA.

Based upon the outcome of the predictive spill modelling and the properties of marine diesel, the following spill response options are considered applicable for a potential marine diesel spill:

- Source control – in accordance with SOPEP/ERP;
- Natural weathering and dispersion;
- Monitor and evaluate; and
- Assisted dispersion using propeller wash, if advised by the Control Agency, AMSA, and deemed safe.

Marine diesel is not suitable for the application of chemical dispersants.

Protect and deflect / containment and recovery strategies are unlikely to be an option given the rapid weathering of marine diesel and the time it would take to mobilise boom and recovery equipment offshore.

No shoreline response is predicted to be required.

Oiled wildlife response is unlikely to be initiated given the rapid weathering of marine diesel, the time it would take to mobilise trained personnel offshore, and the inherent difficulties and H&S issues associated with personnel recovering/treating marine fauna in an offshore oceanic environment.

Given the offshore location of the Operational Area, the preferred response strategy for a marine diesel spill will be to allow spills to disperse and evaporate naturally, and monitor the position and trajectory of any surface slicks. Physical break up (assisted dispersion) by repeated transits through the slick may be considered for larger slicks (following consultation with the Combat Agency, AMSA).

#### **10.5.3.7 PTTEP Resources and Support**

If required to support the AMSA National Response Team, PTTEP has staff in Bangkok who are trained in incident response and IMO level 2 in response management.

PTTEP also has access to spill response resources and expertise through its membership with Oil Spill Response Ltd.

#### **10.5.3.8 Operational and Scientific Monitoring**

PTTEP AA has prepared a Timor Sea Operational and Scientific Monitoring Program (OSMP) (CORP-HSE-S60-837190) applicable to PTTEP AA's petroleum activities in the Timor Sea for use in the event of a significant oil spill (Level 2 or Level 3). The monitoring programs described within the OSMP may be conducted in both State and Commonwealth Waters.

#### **10.5.3.9 Testing of Emergency Response Arrangements**

Testing of this OPEP and the vessel SOPEP response arrangements will be conducted via a drill exercise prior to the commencement of the ROV inspection.

The objectives for testing of oil spill response arrangements include:

- Confirm alignment between the vessel SOPEP and this OPEP;
- To confirm activation and communication processes between internal and external stakeholders are timely and effective;
- To provide personnel experienced in the roles and functions that would be assigned during an oil spill response.

At the finalisation of the drill, opportunities for improvement will be discussed and recorded. In the event that response arrangements are significantly modified, an assessment will be made as to the benefit of performing additional testing and, where a material benefit is identified, additional drills will be performed to test the new arrangements.

## 10.6 IMPLEMENTATION AND MONITORING

Regulation 14(6) requires the implementation strategy to provide for sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the EP are being met.

### 10.6.1 Internal Monitoring, Recording and Reporting

#### 10.6.1.1 Monitoring and Recording of Emissions and Discharges

Regulation 14(7) requires the implementation strategy to provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the EP are being met.

The ROV inspection and leak test is expected to confirm that the three wellheads are not leaking and confirm well integrity in accordance with the WOMP (Revision 3, PTTEP Technical Document HQ201907644.2). Therefore, no planned or unplanned emissions or discharges are expected from the wells during the well suspension programme. The emissions and discharges that will be monitored and recorded are limited to those that may occur from the project vessel.

PTTEP AA will maintain records as outlined in Table 10-2.

**Table 10-2: Emissions and Discharges Monitoring Summary**

Discharge/Incident	Parameters	Record	Responsibility
<b>Planned Emissions and Discharges</b>			
<b>Atmospheric Emissions</b>			
Engine emissions	Quantity of marine diesel used by the seismic vessel	Engineers log	Vessel Master
<b>Discharges to Sea</b>			
Oily water discharges	Volume, location and concentration of oily water discharge from the project vessel.	Oil record book / oil usage management electronic records	Vessel Master
Food waste	Volume, location and type of food-scraps discharge from the project vessel	Garbage record book / waste management electronic records	Vessel Master
Sewage/grey water discharge	Volume, location and method/type of sewage discharge from the project vessel	Sewage record book / Engineers log	Vessel Master
Ballast water	Volume, location and method of ballast water discharge/exchange	Ballast Water Report	Vessel Master
<b>Disposal of Wastes</b>			
Hazardous wastes	Volume of hazardous wastes transferred onshore.	Garbage record book / waste management electronic records; or Oil record book / oil usage management electronic records	Vessel Master
Non-hazardous wastes	Volume of non-hazardous wastes transferred onshore	Garbage record book / waste management electronic records	Vessel Master
<b>Unplanned Emissions and Discharges</b>			

Discharge/Incident	Parameters	Record	Responsibility
Unplanned release of hydrocarbons or other pollution incident from the project vessel	<ul style="list-style-type: none"> <li>Type of substance</li> <li>Estimated volume / quantity</li> <li>Location</li> <li>Date and time</li> </ul>	Pollution report (POLREP), as submitted to AMSA	Vessel Master

#### 10.6.1.2 Environmental Reporting - ROV Inspection Performance

During the vessel-based ROV inspection activity, the PTTEP AA Offshore Representative will maintain a daily record of the following information:

- SSHE performance; and
- Daily operation summary.

Upon completion of the inspection activity, PTTEP AA will compile daily statistics and the outcomes of compliance reviews (Section 10.7.1.3), and will prepare an environmental performance report summarising the following:

- Environmental awareness inductions completed;
- Any SSHE related hazard cards raised, incidents and/or non-conformances;
- A summary of planned and unplanned emissions and discharges recorded during the ROV inspection (Section 10.6.1.1);
- Compliance against the environmental performance outcomes and environmental performance standards detailed in this EP and the Environmental Commitments Register.

The report will inform the external annual environmental performance report (Section 10.6.2.1) for year 1 of the well suspension programme.

### 10.6.2 External Routine Reporting

#### 10.6.2.1 Annual Environmental Performance Reporting

In accordance with Regulation 14(2) of the OPGGS (E) Regulations, an environmental performance report will be submitted to NOPSEMA annually. The reporting period will commence from the day of EP acceptance. Each environmental performance report will be submitted within 3 months of the end of the reporting period. Reports will meet the requirements of Regulation 26(C).

The reports will summarise the following information:

- Compliance with the environmental performance outcomes and environmental performance standards detailed in this EP and the Environmental Commitments Register;
- A summary of planned and unplanned emissions and discharges during the reporting period (Section 10.6.1.1);
- A summary of the ROV inspection and leak test findings (Year 1 report only);
- A summary of recordable and reportable incidents (Section 10.6.4);
- A summary of environmental assurance activities completed during the reporting period;
- Environmental assurance activities scheduled;
- Any other relevant observations or information.

An EP review (Section 10.5.1) and compliance review (Section 10.7.1.3) will be undertaken in parallel with annual environmental performance reporting to ensure continuous improvement through lessons learnt and environmental performance, as well as the identification of any new information of changes that may affect the ongoing well suspension programme.

#### 10.6.3 Internal Incident Reporting

All personnel are required to report all incidents regardless of the actual severity.

All environmental hazards and incidents are reported in accordance with The PTTEP Incident Management Standard (11038-STD-SSHE-600-011-R06). The Management Standard requires the following:

- All incidents are reported and investigated to the appropriate level;
- Operational non-compliances which require external reporting to be reported and investigated to the appropriate level;
- Recommendations to prevent recurrence are identified, shared and implemented;
- Legal reporting requirements in the countries where an incident occurs are met; and
- PTTEP incident reporting and management requirements are met.

Incidents, near misses and hazards that occur during the ROV inspection and have the potential to cause environmental damage shall be reported using the contractor and PTTEP AA Incident Report Forms available with the PTTEP AA Offshore Representative.

#### **10.6.4 External Incident Reporting**

##### **Recordable Incidents**

A recordable incident is one that breaches an environmental performance outcome or environmental performance standard of this EP and that is not a reportable incident, as per Regulation 4 of the OPPGS(E) Regulations.

NOPSEMA will be notified of all recordable incidents monthly (as soon as practicable after the end of the calendar month and in any case no later than 15 days after the end of the calendar month) in accordance with Regulation 26B of the OPPGS(E) Regulations.

##### **Reportable Incidents**

Reportable incidents are defined under the OPGGS (E) Regulations as “*an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage*”. Based on this, the potential impacts with a Moderate (2) consequence or above are those that are considered as requiring regulatory reporting as follows:

- Introduction of Invasive Marine Pest species;
- Vessel collision resulting in large hydrocarbon spill;
- Fauna collision incident with project vessel; and
- A moderate to significant impact to MNES.

Under the OPGGS (E) Regulations, NOPSEMA will be notified of all reportable incidents as soon as practicable, and in any case, within two hours of the incident first occurring (or of the time the titleholder first becomes aware of the incident). A written report will be provided to NOPSEMA as soon as practicable, and in any case not later than 3 days, after the first occurrence of a reportable incident.

Should an unforeseen event occur that has caused or has the potential to cause moderate to significant environmental damage this must also be reported to NOPSEMA in accordance with the above stated timelines.

Copies or written record of the reports must also be sent, as soon as practicable, to the titles administrator and to other regulatory authorities in accordance with Regulation 26A(5) of the OPPGS(E) Regulations.

#### **10.6.5 Management of Non-Conformance**

Should an incident or an assurance activity (Section 10.7.1) highlight any instances of non-conformance with this EP, the incident will be investigated and managed in accordance with the PTTEP Incident Management Standard (11038-STD-SSHE-600-011-R06). The PTTEP Incident Management Standard defines reporting, investigation and follow up requirements for incidents including near misses. An online system Incident Management System (IMS) is available for incident

reporting or email may be used if access to the IMS (e.g. offshore) is not practicable. Incident reports require details for each incident to be reported along with an assessment of real and potential severity which determines the investigation level. Minor incidents are investigated on-site and severe incidents may justify mobilization of an investigation team. A Cause Tree Analysis technique is used to identify root causes. Recommendations are made and tracked until closure.

PTTEP AA will work with the contractor to review relevant controls, systems and procedures in order to identify the source of the non-conformance and improve environmental performance.

As required, a register of actions assigned to contractors will be maintained and communicated to the relevant contractor or personnel, facilitating them to address and close out any items to an agreed timeframe.

## **10.7 AUDIT AND REVIEW**

### **10.7.1 Compliance Assurance Activities**

The PTTEP Audit and Review Standard (11038-STD-SSHE-701) applies to compliance assurance activities.

#### **10.7.1.1 EP Environmental Commitments Register**

To support assurance activities for this EP, an EP Environmental Commitments Register will be developed, identifying all environmental performance objectives and standards and any other commitment statements made within this EP. The register will include the identification of personnel responsible for the implementation of each commitment as well as the proposed assurance activity that will be used to confirm compliance with the commitments.

The register will be maintained up to date with any changes to commitments which have been documented through the requirements under management of change (Section 10.5.2).

#### **10.7.1.2 Vessel Inspection and Readiness Review**

An inspection of key documentation and equipment in relation to environmental performance will be confirmed up to date prior to the start of the ROV inspection. This includes:

- An inspection of key certification, documents and equipment on the project vessel (e.g. engines, pollution prevention equipment and certification, SOPEP); and
- A readiness review performed by PTTEP AA of the project vessel and contractor compliance with key relevant environmental performance standards that are required to be confirmed prior to mobilisation of the project vessel to the Operational Area.

Findings will be entered into the Action Tracking System (ATS) to track closure.

#### **10.7.1.3 Compliance Reviews**

PTTEP AA will undertake reviews of PTTEP and contractor compliance against the environmental performance outcomes, environmental performance standards and other commitments detailed in this EP and the Environmental Commitments Register in the following circumstances:

- At least once during the ROV inspection; and
- Annually (during environmental performance reporting; Section 10.6.2.1).

Findings will be entered into the Action Tracking System (ATS) to track closure.

#### **10.7.1.4 Audit**

Within the PTTEP assurance framework, an 'audit' category relates to an assurance activity performed by a completely independent external party. It is expected that NOSPEMA may perform an environmental inspection of the activity during the active life of the EP.

### 10.7.2 EP Revision and Resubmission

In addition to the requirement to make internal revisions to the EP and OPEP on an as needs basis due to management of change requirements (Section 10.5.2), the EP and OPEP may require resubmission to NOPSEMA under Division 2.4 of the OPGGS (E) Regulations.

In accordance with the regulations and sub regulations made under Division 2.4 of the OPGGS (E) Regulations, a resubmission is required in the following circumstances:

#### **New activity (sub regulation 17(1))**

A new activity is defined as a change to the extent that the regulatory levy category applied to the well suspension activity, as applied by NOPSEMA in accordance with sub-regulation 59C(7) of the Offshore Petroleum and Greenhouse Gas Storage (Regulatory Levies) Regulations 2004 would change:

- Regulatory levy category 14 – ‘Any other petroleum-related operations or works carried out under an instrument, authority or consent granted or issued under the OPGGSA’.

#### **Significant modification or new stage of activity (sub regulation 17(5)).**

A modification to the activity is considered to be significant if any of the following significance criteria are met:

- Well integrity inspection or maintenance activities are required in addition to the ROV inspection and leak testing described in this EP; or
- The fuel type used on the project vessel changes from that described and assessed in this EP.

A new stage of the activity is defined as either:

- A change to the spatial limits of the activity (an increase in the number of suspended wells or the size of the Operational Area boundary described in Section 4.4.2); or
- A change to the temporal limits of the activity (an extension to the timeframe of this EP).

#### **New or increased environmental impact or risk (sub regulation 17(6)).**

Only significant new or significant increased impacts or risks require resubmission of the EP to NOPSEMA.

A new impact or risk is considered to be significant if any of the following significance criteria are met:

- The impact or risk is classified as ‘Decision Type B’ or ‘Decision Type C’; or
- The residual impact or risk, after determining controls and environmental performance standards, is not deemed to have a low or medium ranking; or
- The impact or risk is not demonstrated to be ALARP and Acceptable.

An increase in an impact or risk is considered to be significant if any of the following significance criteria are met:

- The impact or risk decision context category increases; or
- The residual impact or risk, after reviewing and identifying controls and environmental performance standards, increases so that it is no longer deemed to have a low or medium ranking; or
- The impact or risk can no longer be demonstrated to be ALARP and Acceptable.

#### **Change in Titleholder (sub regulation 17(7))**

If a change in the titleholder will result in a change in the manner in which the environmental impacts and risks of the activity are managed, the new titleholder must submit a proposed revision of the EP for the activity to NOPSEMA as soon as practicable.

**Revision on request by the Regulator (regulation 18)**

A resubmission of the EP is required if requested by NOPSEMA.

**Revision at the end of each 5 years (regulation 19)**

A resubmission of the EP to NOPSEMA is required at least 14 days before the end of each period of 5 years, commencing from the date the existing EP was accepted by NOPSEMA.

Given the duration of this EP is up to three years, this requirement will not apply.

## 11 REFERENCES AND ABBREVIATIONS

- [ABC] Australian Broadcasting Corporation News, 2019. Indonesian fishing boat at Timor Sea. Retrieved from: <https://www.abc.net.au/news/2019-07-16/indonesian-fishing-boat-on-timor-sea/11283636>. Accessed on 11 March 2020.
- ANZECC & ARMCANZ. (2000). Australian guidelines for water quality monitoring and reporting. Volume 1, Chapter 1-7. October 2000. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
- [AFMA] Australian Fisheries Management Authority, 2014. Agreement between the Government of Australia and the Government of the Republic of Indonesia Establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries (Multiple Fishery (Closures) Direction No. 1 2014).
- [AFMA] Australian Fisheries Management Authority, 2017. Indonesian fishing vessel and crew apprehended. Retrieved from: <https://www.afma.gov.au/indonesian-fishing-vessel-crew-apprehended>. Accessed on 11 March 2020.
- [AMSA] Australian Maritime Safety Authority, 2020. Vessel Traffic Data January 2020. Available from: <https://www.operations.amsa.gov.au/Spatial/DataServices/DigitalData>. Accessed on 11 March 2020.
- Austin, A. McCrodan, J. Wladichuk, C.M. Reiser, K.B. Matthews, J.R. Brandon, K. Leonard, et al. (eds.). Marine mammal monitoring and mitigation during Shell's activities in the Chukchi Sea, July–September 2013: 90-Day Report. Report Number P1272D–2. Technical report by LGL Alaska Research Associates Inc., Anchorage, AK, USA and JASCO Applied Sciences, Victoria, BC, Canada for Shell Gulf of Mexico, Houston, TX, USA, National Marine Fisheries Service, and US Fish and Wildlife Services. 198 pp, plus appendices. [http://www.nmfs.noaa.gov/pr/pdfs/permits/shell\\_chukchi\\_openwater\\_90dayreport.pdf](http://www.nmfs.noaa.gov/pr/pdfs/permits/shell_chukchi_openwater_90dayreport.pdf)
- Bahmanpour, M.H., Pattiaratchi, C., Wijeratne, E.M.S, Steinbers, C., D'Adamo, N., n.d. The Holloway current along north-west Australia. Coastal Oceanography. Retrieved from: [http://imos.org.au/fileadmin/user\\_upload/shared/IMOS%20General/ACOMO/ACOMO\\_2014/presentations/posters/Holloway\\_ACOMO.pdf](http://imos.org.au/fileadmin/user_upload/shared/IMOS%20General/ACOMO/ACOMO_2014/presentations/posters/Holloway_ACOMO.pdf). Accessed on 11 March 2020.
- Bannister, J.L., C.M. Kemper & R.M. Warneke, 1996. The Action Plan for Australian Cetaceans. Canberra: Australian Nature Conservation Agency.
- Bartol, S.M. and Musick, J.A. 2003. 'Sensory biology of sea turtles', In: Lutz, PL, Musick, JA and Wyneken, J, The biology of sea turtles. CRC Press, Boca Raton, Florida, USA, vol. 2, pp. 79–102.
- Bruce, B.D., 2008. The Biology and Ecology of the White Shark, *Carcharodon carcharias*. In: Camhi, M.D, E.K. Pikitch and E.A Babcock, eds. Sharks of the Open Ocean. Page(s) 69-76. Oxford, UK: Blackwell Publishing.
- [BoM] Bureau of Meteorology, 2014. Climatology of Tropical Cyclones in Western Australia, Bureau of Meteorology.
- Chevron Australia Pty Ltd, 2015. Gorgon gas development and Jansz feed gas pipeline: Long-term marine turtle management plan (No. G1- NT-PLNX0000296). Chevron Australia Pty Ltd, Perth.
- Chin, A., 2005. Seagrasses, in: Chin A (ed), State of the Great Barrier Reef, Great Barrier Reef Marine Park Authority, Townsville. Available at: [http://www.gbrmpa.gov.au/\\_data/assets/pdf\\_file/0007/3976/SORR\\_SEAGRASS\\_June06.pdf](http://www.gbrmpa.gov.au/_data/assets/pdf_file/0007/3976/SORR_SEAGRASS_June06.pdf). Accessed: 17 April 2018.
- Chorney, N.E., G.A. Warner, J.T. MacDonnell, A. McCrodan, T.J. Deveau, C.R. McPherson, C. O'Neill, D.E. Hannay, and B. Rideout. 2011. Underwater Sound Measurements. In: Reiser, C.M., D.W. Funk, R. Rodrigues, and D.E. Hannay (eds.). Marine mammal monitoring and mitigation during marine geophysical surveys by Shell Offshore Inc. in the Alaskan Chukchi and Beaufort Seas, July-October 2010: 90-day report. LGL Report SO-00-BI-20001 - Rev Report from LGL Alaska Research Associates Inc. and JASCO Applied Sciences for Shell Offshore Inc., National Marine Fisheries Service (US), and US Fish and Wildlife Service. 240 pp plus appendices.

- Clarke, R.H., 2010. The Status of Seabirds and Shorebirds at Ashmore Reef and Cartier and Browse Islands: Monitoring Program for the Montara Well Release – Pre-Impact Assessment and First Post-Impact Field Survey. Prepared on behalf of PTTEP Australasia and the Department of the Environment, Water, Heritage and the Arts, Australia.
- Cogger, H.G., 1975. Sea Snakes of Australia and New Guinea. In: Dunson, W.A., ed. The Biology of Sea Snakes. University Park Press, Baltimore.
- Commonwealth of Australia, 2002. Ashmore Reef National Nature Reserve and Cartier Island Marine Reserve (Commonwealth Waters) Management Plans. Environment Australia, Canberra.
- Commonwealth of Australia, 2015. Conservation management plan for the blue whale: A recovery plan under the Environment Protection and Biodiversity Conservation Act 1999 2015-2025. Commonwealth of Australia.
- Commonwealth of Australia, 2017. Recovery Plan for Marine Turtles in Australia. Retrieved from: <https://www.environment.gov.au/system/files/resources/46eedcfc-204b-43de-99c5-4d6f6e72704f/files/recovery-plan-marine-turtles-2017.pdf>. Accessed on 11 March 2020.
- Commonwealth of Australia, 2018. Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life.
- [CSIRO] Commonwealth Scientific and Industrial Scientific Research Organisation, 2015. Marine Benthic Substrate Database – CAMRIS – Marsed v1. CSIRO. Data Collection. <https://doi.org/10.4225/08/551485612CDEE>
- Compagno, L.J.V., 1984. Part 1 - Hexanchiformes to Lamniformes. FAO Species Catalogue, Vol. 4., Sharks of the World. An Annotated and Illustrated Catalogue of Sharks Known to Date. FAO Fisheries Synopsis. 4(1):1-249.
- Costello, M.J. and Read, P., 1994. Toxicity of sewage sludge to marine organisms: a review. Marine Environmental Research, 37(1), pp.23-46.
- Couturier, L. I., Jaime, F. R., Townsend, K. A., Weeks, S. J., Richardson, A. J., and Bennett, M. B., 2011. Distribution, site affinity and regional movements of the manta ray, *Manta alfredi* (Krefft, 1868), along the east coast of Australia. Marine and Freshwater Research, 62(6): 628-637.
- [DoAWE] Department of Agriculture, Water and the Environment, 2020. Carbonate bank and terrace system of the Sahul Shelf. Retrieved from: <https://environment.gov.au/sprat-public/action/kef/view/3>. Accessed on 11 March 2020
- [DoAWE] Department of Environment and Energy, 2020. Species Profile and Threats (SPRAT) Database. Multiple species.
- [DBCA] Department of Biodiversity, Conservation and Attractions, 2019. Marine Parks and Reserves. Retrieved from: <https://www.dpaw.wa.gov.au/management/marine/marine-parks-and-reserves>. Accessed on 11 March 2020.
- [DoE] Department of the Environment, 2014a. Approved Conservation Advice for *Glyphis garricki* (northern river shark). Canberra: Department of the Environment.
- [DoE] Department of the Environment, 2014b. Approved Conservation Advice for *Pristis pristis* (largetooth sawfish). Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/60756-conservation-advice.pdf>. In effect under the EPBC Act from 11-Apr-2014.
- [DoE] Department of the Environment, 2015a. Sawfish and River Sharks Multispecies Recovery Plan: *Pristis pristis*, *Pristis zijsron*, *Pristis clavata*, *Glyphis glyphis* and *Glyphis garricki*. Retrieved from: <http://www.environment.gov.au/biodiversity/threatened/publications/recovery/sawfish-river-sharks-multispecies-recovery-plan>. Accessed on 11 March 2020. In effect under the EPBC Act from 11-Apr-2014.
- [DoE] Department of Environment, 2015b. Conservation advice *Calidris ferruginea curlew sandpiper*. Retrieved from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf>. Accessed on 11 March 2020.

- [DoE] Department of Environment, 2015c. Conservation advice *Numenius madagascariensis*. Retrieved from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice.pdf>. Accessed on 11 March 2020.
- [DoEE] Department of Environment and Energy, 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Retrieved from: <https://www.environment.gov.au/biodiversity/threatened/publications/tap/marine-debris-2018>. Accessed on 11 March 2020.
- [DEWHA] Department of Environment, Water, Heritage and the Arts, 2008a. The North-West Marine Bioregional Plan. Bioregional Profile. A Description of the Ecosystems, Conservation Values and Uses of the North-West Marine Region. Department of the Environment, Water, Heritage and the Arts, Canberra, ACT.
- [DEWHA] Department of Environment, Water, Heritage and the Arts, 2008b. Species Profile and Threats Database. *Pristis zijsron* – Green Sawfish, Dindagubba, Narrowsnout Sawfish. Retrieved from: [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=68442](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=68442). Accessed on 11 March 2020.
- [DPIRD] Department of Primary Industries and Regional Development, 2019. Finfish Spawning Table for some Key Species. 5 June 2019.
- [DSEWPac] Department of Sustainability, Environment, Water, Population and Communities, 2012. Species group report card – seabirds. Department of Sustainability, Environment, Water, Population and Communities, Canberra, Australian Capital Territory.
- [DSEWPac] Department of Sustainability, Environment, Water, Population and Communities, 2013. Recovery plan for the white shark *Carcharodon carcharias* White Shark. Retrieved from: <https://www.environment.gov.au/biodiversity/threatened/recovery-plans/recovery-plan-white-shark-carcharodon-carcharias>. Accessed on 11 March 2020.
- [DEH] Department of the Environment and Heritage, 2006. A guide to the integrated marine and coastal regionalisation of Australia. IMCRA Version 4.0. Retrieved from: <https://parksaustralia.gov.au/marine/pub/scientific-publications/archive/imcra4.pdf>. Accessed on 11 March 2020.
- [DNP] Director of National Parks, 2018. Australian Marine Parks: North-west Marine Parks Network Management Plan 2018. Director of National Parks, Canberra.
- Double, M.C., Andrews-Goff, V., Jenner, K.C.S., Jenner, M.N., Laverick, S.M., Branch, T.A., & Gales, N.J. (2014). Migratory movements of pygmy blue whales (*Balaenoptera musculus brevicauda*) between Australia and Indonesia as revealed by satellite telemetry. *PloS one*. 9: e93578.
- [ERM] Environmental Resources Management Australia Pty Ltd, 2012. Marine environmental baseline study, Field Survey Report Rev 1. Reported prepared for PTTEP AA (0119757 CTR05) July 2012.
- [FAO] Food and Agriculture Organization, 2015. Overview of the trawl fisheries socio-economic conditions in Indonesia after the second trawl ban. In: *Socio-economics of trawl fisheries in Southeast Asia and Papua New Guinea*. Proceedings of the Regional Workshop on Trawl Fisheries Socio-economics 26-27 October 2015. Da Nang, Viet Nam
- Geiling, N., 2014. Arctic Shipping: Good For Invasive Species, Bad For the Rest of Nature. *Smithsonian*. Available at: <http://www.smithsonianmag.com/science-nature/global-warmings-unexpected-consequence-invasivespecies-180951573/?no-ist>. Accessed 10 Apr 2019.
- Giles, J., R.D. Pillans, M.J. Miller & J.P. and Salini, 2006. Sawfish Catch Data in Northern Australia: A Desktop Study. Internal CSIRO Report for FRDC. 2002/064:74.
- Global Fishing Watch, 2020. Indonesia VMS. Retrieved from: <https://globalfishingwatch.org/programs/indonesia-vms/>. Accessed on 11 March 2020.
- Gomez, C. Lawson, J.W., Wright, A.J., Buren, A.D., Tollit, D. and Lesage, V. 2016. A systematic review on the behavioural responses of wild marine mammals to noise: the disparity between science and policy. *Canadian Journal of Zoology*. 94: 801–819.

- Guinea, M.L., 2006. Survey 2005: Sea Snakes of Ashmore Reef, Hibernia Reef and Cartier Island. Charles Darwin University.
- Heap, A.D., and Harris, P.T., 2008. Geomorphology of the Australian margin and adjacent seafloor. *Australian Journal of Earth Sciences*, 55: 555-585.
- Heyward, A., Jones, R., Meeuwig, J., Burns, K., Radford, B., Colquhoun, J., Cappel, M., Case, M., O'Leary, R., Fisher, R., Meekan, M. and Stowar, M., 2011. Monitoring Study S5 Banks and Shoals, Montara 2011 Offshore Banks Assessment Survey. Report for PTTEP Australasia (Ashmore Cartier) Pty. Ltd. Australian Institute of Marine Science, Townsville. 253pp.
- Heyward, A., Pinceratto, E. and Smith, L., (eds.) 1997. Big Bank Shoals of the Timor Sea: An Environmental Resource Atlas. Prepared by Australian Institute of Marine Science and BHP Billiton Pty Ltd., Perth, Western Australia.
- Holmes, L.J., McWilliam, J., Ferrari, M.C.O., McCormick, M.I. 2017. Juvenile damselfish are affected but desensitize to small motor boat noise, *Journal of Experimental Marine Biology and Ecology*, 494, 63-68.
- [IUCN] International Union for the Conservation of Nature, 2017. Red List Website. Available at: <http://www.iucnredlist.org>. Accessed September 2017.
- Jensen, A. and Silber, G., 2004. Large whale ship strike database (NOAA Technical Memorandum No. NMFS-OPR). National Marine Fisheries Service, Silver Spring.
- Jiménez-Arranz, G., Glanfield, R., Banda, N. and Wyatt R, 2017. Review on Existing Data on Underwater Sounds Produced by the Oil and Gas Industry. Submitted to E&P Sound & Marine Life.
- Jones, J. (Ed.), 2013. A maritime school of strategic thought for Australia. Canberra: Sea Power Centre.
- Kahn, B., 2012. Blue whales of the Savu Sea, Indonesia. Report of the Indian Ocean Cetacean Symposium 2009, held at Paradise Island Resort and Spa, Maldives, 18-20 July 2009. Marine Research Centre, Maldives. 46pp. Revised edition 2012. [www.mrc.gov.mv](http://www.mrc.gov.mv).
- Kashiwagi, T., Marshall, A.D., Bennet, M.B. and Ovenden, J.R., 2011. Habitat segregation and mosaic sympatry of the two species of manta ray in the Indian and Pacific Oceans: *Manta alfredi* and *M. birostris*. *Marine Biodiversity Records*, 4: e53.
- Kimberley Bird Watching, 2018. Ashmore Reef. Retrieved from: <http://kimberleybirdwatching.com.au/tours/ashmore-reef/>. Accessed on 11 March 2020.
- Ladich, F. 2000. Acoustic communication and the evolution of hearing in fishes. *Philosophical Transactions of the Royal Society of London B* 355(1401): 1285-1288.
- Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M., 2001. Collision between ships and whales, *Marine Mammal Science* 17(1): 35-75.
- Last, P.R. and Stevens, J.D., 1994. *Sharks and Rays of Australia*. Melbourne, Victoria: CSIRO.
- Last P.R. and Stevens J.D., 2009. *Sharks and Rays of Australia*. Second edition. CSIRO Publishing, Australia.
- Limpus, C.J., 1995. *Conservation of marine turtles in the Indo-Pacific region*.
- Limpus, C.J., Miller, J.D., Parmenter, C.J., Reimer, D., McLachlan, N. and Webb, R., 1992. Migration of green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) turtles to and from eastern Australian rookeries. *Wildlife Research*, 19(3): 347-358.
- Marshall, A., Bennett, M.B., Kodja, G., Hinojosa-Alvarez, S., Galvan-Magana, F., Harding, M., Stevens, G. and Kashiwagi, T., 2018. *Mobula birostris* (amended version of 2011 assessment). The IUCN Red List of Threatened Species 2018: e.T198921A126669349. Downloaded on 14 February 2020.
- Marshall, A., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Herman, K., Jabado, R.W., Liu, K.M., Pacoureau, N., Rigby, C.L., Romanov, E. and Sherley, R.B., 2019. *Mobula alfredi*. The IUCN Red List of Threatened Species 2019: e.T195459A68632178. Downloaded on 14 February 2020.

- Martin, B., J.T. MacDonnell, N.E. Chorney, and D.G. Zeddies. 2012. Appendix A: Sound Source Verification of Fugro Geotechnical Sources. In ESS Group, Inc. Renewal Application for Incidental Harassment Authorization for the Non-Lethal Taking of Marine Mammals Resulting from Pre-Construction High Resolution Geophysical Survey. For Cape Wind Associates, LLC. [http://www.nmfs.noaa.gov/pr/pdfs/permits/capewind\\_iha\\_application\\_renewal.pdf](http://www.nmfs.noaa.gov/pr/pdfs/permits/capewind_iha_application_renewal.pdf)
- McCauley, R., 2005. Underwater sea noise in the Otway Basin – drilling, seismic and blue whales, Oct–Dec 2003, in: Howell, E. (Ed.), A Compilation of Recent Research into the Marine Environment. Australian Petroleum Exploration Association, Canberra, pp. 18–19.
- McCauley, R.D., Gavrilov, A.N., Jolliffe, C.D., Ward, R. and Gill, P.C., 2018. Pygmy blue and Antarctic blue whale presence, distribution and population parameters in southern Australia based on passive acoustics. Deep Sea Research Part II: Topical Studies in Oceanography, 157, pp.154-168.
- McLean, D.L., Taylor, M.D., Partridge, J.C., Gibbons, B., Langlois, T.J., Malseed, B.E., Smith, L.D. and Bond, T., 2018. Fish and habitats on wellhead infrastructure on the north west shelf of Western Australia. Continental Shelf Research, 164, pp.10-27.
- McPherson, C., Martin, B., and Erbe C., 2012, Ambient Noise Monitoring in the Timor Sea: December 2010 – December 2011, JASCO Document 00329, Version 1.0, technical report by JASCO Applied Sciences for Environmental Resources Management.
- Newman S.J., Smith K.A., Skepper C.L. and Stephenson P.C. 2008. Northern Demersal Scalefish Managed Fishery. ESD Report Series No. 6, June 2008. Department of Fisheries, Perth, Western Australia.
- Newman, S., Wakefield, C., Skepper, C., Boddington, D., Smith, E., 2019. Northern Demersal Resource Status Report 2017. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2017/18: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia.
- [NOAA] National Oceanic and Atmospheric Administration, 2010. Recovery Plan for the Sperm Whale. Office of Protected Resources National Marine Fisheries Service. National Oceanic and Atmospheric Administration. Silver Spring, Maryland
- [NOPSEMA] National Offshore Petroleum Safety and Environmental Management Authority, 2019. Environment Bulletin #1, Oil Spill Modelling.
- Nichols, T.A., T.W. Anderson, and Sirovic, A., 2015. 'Intermittent Noise Induces Physiological Stress in a Coastal Marine Fish', Plos One, 10: 13.
- NT News, 2016. Indonesian fisherman rescued by Australian fishing vessel in timor sea. Retrieved from: <https://www.ntnews.com.au/news/northern-territory/indonesian-fishermen-rescued-by-australian-fishing-vessel-in-timor-sea/news-story/f2a2f09c789bc3ed5449ab78f24fb9ef>. Accessed on 11 March 2020.
- Oil & Gas UK, 2014. Guidance on risk-related decision making. Issue 2. Oil & Gas UK. London. 25 p.
- O2 Marine, 2018. Cash Maple Field Development: Marine Environmental Baseline Survey. Report number R1702055, Prepared for ERM Australia.
- Paulay, G., Kirkendale, L., Lambert, G. and Meyer, C., 2002. Anthropogenic biotic interchange in a coral reef ecosystem: A case study from Guam. Pacific Science 56(4):403–422.
- Pillans, R.D., Stevens, J.D., Kyne, P.M. and Salini, J., 2009. Observations on the distribution, biology, short-term movements and habitat requirements of river sharks Glyptis spp. in northern Australia. Endangered Species Research, 10: 321 – 332.
- Plotkin, P., and Wicksten, M.K., and Amos, A., 1993. Feeding ecology of the loggerhead turtle *Caretta caretta* in the Northwestern Gulf of Mexico. Marine Biology. 115. 1-5. 10.1007/BF00349379.
- Prince, R.I., 1994. Status of the Western Australian marine turtle populations: the Western Australian Marine Turtle Project 1986-1990. In: Russell, J., ed. Proceedings of the Australian Marine Turtle Conservation Workshop, Gold Coast 14-17 November 1990. Page(s) 1-14. Queensland Department of Environment and Heritage. Canberra, ANCA.

- Popper, AN, Hawkins, AD, Fay, RR, Mann, DA, Bartol, S, Carlson, TJ, Coombs, S, Ellison, WT, Gentry, RL, Halvorsen, MB, Løkkeborg, S, Rogers, PH, Southall, BL, Zeddies, DG and Tavalga, WN. 2014. Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. ASA S3/SC1.4 TR-2014. 73 pp.
- Ramirez-Llodra, E., Brandt, A., Danovaro, R., De Mol, B., Escobar, E., German, C.R., Levin, L.A., Martinez, Arbizu, P., Menot, L., Buhl-Mortensen, P., Narayanaswamy, B.E., Smith, C.R., Tittensor, D.P., Tyler, P.A., Vanreusel, A., and Vecchione, M., 2010, Deep, Diverse and Definitely Different: Unique Attributes of the World's Largest Ecosystem, *Biogeosciences*, vol. 7, pp. 2851–2899.
- Reynolds S.D., Norman, B.M., Beger M., Franklin, C.E. and Dwyer, R.G. 2017. Movement, distribution and marine reserve use by an endangered migratory giant. *Diversity and Distributions*, 2017; 23:1268–1279. <https://doi.org/10.1111/ddi.12618>
- Richardson, W.J., Greene, C.R., Malme, C.I. and Thomson, D.H., 1995. *Marine Mammals and Noise*, Academic Press, San Diego, California.
- Salgado Kent, C., McCauley, R.D., Duncan, A., Erbe, C., Gavrilov, A., Lucke, K. and Parnum, I. 2016. Underwater sound and vibration from offshore petroleum activities and their potential effects on marine fauna: an Australian perspective. Centre for Marine Science and Technology, Curtin University, Perth, WA.
- SapuraOMV, 2019. Gem 3D Marine Seismic Survey. Retrieved from: [https://info.nopsema.gov.au/activities/392/show\\_public](https://info.nopsema.gov.au/activities/392/show_public). Accessed from 11 March 2020.
- Shipmap, 2020. Visualisation of Global Cargo Ships. Available from <https://www.shipmap.org>. Accessed 11 March 2020.
- Simmonds, M., Dolman, S. and Weilgart, L. (eds), 2004. *Oceans of noise – A Whale and Dolphin Conservation Society Science Report*, Wiltshire, United Kingdom.
- Sleeman, J. C., Meekan, M.G., Fitzpatrick, B.J., Steinberg, C.R., Ancel, R. and Bradshaw, C.J.A. 2010. Oceanographic and atmospheric phenomena influence the abundance of whale sharks at Ningaloo Reef, Western Australia. *Journal of Experimental Marine Biology and Ecology* 383:77–81.
- Smith, T.G., Geraci, J.R. and St Aubin, D.J. 1983. Reaction of Bottlenose Dolphin *Tursiops truncatus* to a Controlled Oil Spill. *Canadian Journal of Fisheries and Aquatic Science* 40: 1522-1525.
- Southall, BL, Bowles, AE, Ellison, WT, Finneran, JJ, Gentry, RL, Greene Jr., CR, Kastak, D, Ketten, DR, Miller, JH, Nachtigall, PE, Richardson, WJ, Thomas, JA and Tyack, PL. 2007. Marine mammal sound exposure criteria: Initial scientific recommendations. *Aquatic Mammals*, vol. 33, iss. 4, pp. 411-509.
- Spiga, I., J. Fox, and R. Benson. 2012. 'Effects of Short-and Long-Term Exposure to Boat Noise on Cortisol Levels in Juvenile Fish.' in A. N. Popper and A. Hawkins (eds.), *Effects of Noise on Aquatic Life* (Springer: New York). Stevens, J.D., R.D. Pillans & J. Salini, 2005. Conservation Assessment of Glyphis sp. A (Spear-tooth Shark), Glyphis sp. C (Northern River Shark), *Pristis microdon* (Freshwater Sawfish) and *Pristis zijsron* (Green Sawfish). Hobart, Tasmania: CSIRO Marine Research.
- [TSSC] Threatened Species Scientific Committee, 2014. Listing Advice *Isurus oxyrinchus* shortfin mako shark. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/79073-listing-advice.pdf>. In effect under the EPBC Act from 27-Nov-2014.
- [TSSC] Threatened Species Scientific Committee, 2015a. Conservation advice *Balaenoptera borealis* sei whale. Available from: [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=34](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=34). Accessed on 11 March 2020.
- [TSSC] Threatened Species Scientific Committee, 2015b. Conservation advice *Balaenoptera physalus* Fin Whale. Available from: [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=37](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=37). Accessed from 11 March 2020.
- [TSSC] Threatened Species Scientific Committee, 2015c. Conservation advice *Megaptera novaeangliae* Humpback Whale. Available from: [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=38](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=38). Accessed from 11 March 2020.

- [TSSC] Threatened Species Scientific Committee, 2015d. Conservation advice *Rhincodon typus*. Retrieved from: [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=66680](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66680). Accessed on 11 March 2020.
- [TSSC] Threatened Species Scientific Committee, 2015e. Conservation advice *Anous tenuirostris melanops* Australian lesser noddy. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/26000-conservation-advice-01102015.pdf>. In effect under the EPBC Act from 01-Oct-2015.
- [TSSC] Threatened Species Scientific Committee, 2015f. Conservation Advice *Papadula abbotti* Abbott's booby. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/59297-conservation-advice-01102015.pdf>. In effect under the EPBC Act from 01-Oct-2015.
- [TSSC] Threatened Species Scientific Committee, 2016a. Conservation advice *Calidris canutus* Red Knot. Retrieved from: [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=855](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=855). Accessed on 11 March 2020.
- Van Andel, T., H and Veevers, J.J., 1967. Morphology and sediments of the Timor Sea. Scripps Institution of Oceanography. Accessed on 11 March 2020.
- Vanderlaan, A.S. and Taggart, C.T., 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. Marine mammal science, 23(1), pp.144-156.
- Williamson, M. and Fitter, A., 1996. The Characteristics of Successful Invaders, Biological Conservation, vol. 78, pp. 163-170.
- Whitlock, P.A., Pendoley, K.L. and Hamann, M., 2014. Inter-nesting distribution of flatback turtles *Natator depressus* and industrial development in Western Australia. Endangered Species Research 26: 25-38.
- Wilson, S.G., Polovina, J.J., Stewart, B. S., and Meekan, M. G. 2006. Movements of whale sharks (*Rhincodon typus*) tagged at Ningaloo Reef, Western Australia. Marine Biology 148:1157–1166.
- World Ocean Atlas, 2013. National Oceanographic Data Center. Retrieved from: <https://rda.ucar.edu/datasets/ds285.0/docs/woa13/woa13documentation.pdf>. Accessed on 11 March 2020.
- Wysocki, L.E., Dittami, J.P. and Ladich, F., 2006. Ship noise and cortisol secretion in European freshwater fishes. Biological conservation, 128(4), pp.501-508.
- Zykov, M.M. 2013. Underwater Sound Modeling of Low Energy Geophysical Equipment Operations. Document Number 00600, Version 2.0. Technical report by JASCO Applied Sciences for CSA Ocean Sciences. <https://www.slc.ca.gov/wpcontent/uploads/2018/09/AppG.pdf>.

Abbreviation	Description
ABF	Australian Border Force
AC	Ashmore Cartier
AFMA	Australian Fisheries Management Authority
AHIS	Aboriginal Heritage Enquiry System
AHO	Australian Hydrographic Office
ALARP	As Low As Reasonably Practicable
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council

Abbreviation	Description
APPEA	Australian Petroleum Production and Exploration Association
ASAP	As soon as possible
BIA	Biologically Important Areas
CAMRIS	Coastal and Marine Resources Information System
CBTA	Competency Based Training and Assessing
CEO	Chief Executive Officer
CFA	Commonwealth Fisheries Association
CMS	Capability Management System
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DoAWE	Department of Agriculture, Water and the Environment
DAWR	Department of Agriculture and Water Resources
DBCA	Department of Biodiversity and Conservation Attraction
DEWHA	Department of the Environment, Water Heritage and the Arts
DFAT	Department of Foreign Affairs and Trade
DIIS	Department of Industry, Innovation and Science
DMIRS	Department of Mines, Industry Regulation and Safety.
DNP	Director of National Parks
DP	Dynamic positioning
DPIRD	Department of Primary Industries and Regional Development
EEZ	Exclusive Economic Zone
EIO	East Indian Ocean
EMBA	Environment that may be affected
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation (Act)
EPO	Environmental Performance Outcome
EPS	Environment Performance Standard
ERP	Emergency Response Plan
ESD	Ecologically Sustainable Development
FAO	Food and Agriculture Organisation
GT	Gross tonnes
ID	Identification
IFC	International Finance Corporation

Abbreviation	Description
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMO	International Maritime Organisation
IMS	Invasive Marine Species
IOGP	International Association of Oil & Gas Producers
IPIECA	International Petroleum Industry Environmental Conservation Association
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
JAMBA	Japan Australia Migratory Birds Agreement
JRCC	Joint Rescue Coordination Centre
KEF	Key Ecological Feature
KPI	Key performance indicator
LED	Light emitting diode
MARPOL	Marine pollution (International Convention for the Prevention of Pollution from Ships)
MC	Measurement Criteria
MNES	Matters of National Environmental Significance
MOC	Management of Change
MoU	Memorandum of Understanding
MS	Management System
MSS	Marine seismic survey
NERA	National Energy Resources Australia
NM	Nautical miles
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NT	Northern Territory
NTM	Notice to Mariners
NWMR	North-west Marine Region
OGUK	Oil & Gas UK
OIW	Oil in water
PFSEL	Provisional Fisheries Surveillance and Enforcement Line
PMST	Protected Matters Search Tool
PTTEP AA	PTTEP Australasia (Ashmore Cartier) Pty Ltd and or PTTEP Australia Timor Sea Pty Ltd
RACI	Responsible, Accountable, Consulted, and Informed

Abbreviation	Description
RAN	Royal Australian Navy
RL	Retention Lease
ROKAMBA	Republic of Korea Australian Migratory Birds Agreement
ROV	Remote operated vehicle
SITREP	Situation report
SDS	Safety Data Sheet
SMART	Specific, Measurable, Achievable, Realistic, Timely
SMPEP	Shipboard Marine Pollution Emergency Plan
SOLAS	Safety of Life at Sea
SOPEP	Ship oil pollution emergency plan
SPL	Sound pressure level
SSHE	Safety, security, health and environment
TSSC	Threatened Species Scientific Committee
VMS	Vessel Monitoring System
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WOMP	Well Operations Management Plan



## Appendix A: Stakeholder Consultation Records

Stakeholder	Date	Sent/Received	Summary of Correspondence	Assessment of Merit
<b>Commonwealth Government</b>				
Australian Fisheries Management Authority (AFMA) - Petroleum	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	20/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
Australian Hydrographic Office (AHO)	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	18/11/2019	Received	Confirmation of receipt. Advised that the data supplied will now be registered, assessed, prioritised and validated in preparation for updating Navigational Charting products. These adhere to International and Australian Charting Specifications and standards.	Relevant matter raised. Assessment of merit completed in Section 6 of the EP.
	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
	2/03/2020	Received	Confirmation of receipt. Advised that the data supplied will now be registered, assessed, prioritised and validated in preparation for updating Navigational Charting products. These adhere to International and Australian Charting Specifications and standards.	Relevant matter raised. Assessment of merit completed in Section 6 of the EP.

	13/03/2020	Phone call	Follow up phone call to stakeholder to inquire about the presence of wellheads on electronic navigation charts. AHO confirmed the Oliver-1 St1, Oliver-2 or Tenacious West-1 St1 wellheads are not currently marked on their electronic navigation charts (ENCs) and noted wellheads are generally not included on charts as they are not a (a) conspicuous object that can be used for navigation, or (b) present a hazard to navigation. AHO advised hazards to navigation generally include features less than 20 m deep, or present a risk to submarines or trawlers.	N/A - general correspondence only. PTTEP was confirming whether wellheads are presented on Electronic Navigation Charts (ENCs).
Australian Maritime Safety Authority (AMSA)	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	21/11/2019	Received	Advised that the Master should notify AMSA's Joint Rescue Coordination Centre (JRCC) for promulgation of radio-navigation warnings at least 24-48 hours before operations commence. Advised JRCC will also need to be advised when operations start and end. Requested that the Australian Hydrographic Office are contacted no less than four working weeks before operations for promulgation of the appropriate Notice to Mariners (NTM).	N/A - General correspondence only. No on-the-water activities were proposed at the time of this correspondence and therefore this general advice does not apply. (Refer to consultation received 03/03/2020 for AMSA relevant matters)
	22/11/2019	Sent	Advised / confirmed with AMSA that there are no physical (on-the-water) activities proposed as part of the EP. The activity will not use vessels or require communications with other marine users to deconflict activities. Advised that once the EP is accepted, the wells will continue to remain suspended <i>in situ</i> until a plan for the wells is determined. Once resolved, a new EP will be developed (e.g. for abandonment or production) and AMSA will be notified through the usual consultation processes.	N/A - Correspondence sent by PTTEP
	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
	3/03/2020	Received	Advised that the Master should notify AMSA's Joint Rescue Coordination Centre (JRCC) for promulgation of radio-navigation warnings at least 24-48 hours before operations commence. Advised JRCC will also need to be advised when operations start and end. Requested that the Australian Hydrographic Office are contacted no less than four working weeks before operations for promulgation of the appropriate Notice to Mariners (NTM).	Relevant matter raised. Assessment of merit completed in Section 6 of the EP?

15/04/2020	Sent	<p><b>Attachment: Stakeholder Notification PDF</b></p> <p>PTTEP AA submitted the following query to AMSA:</p> <p>During the well suspension activity, the only credible hydrocarbon spill scenario is the potential loss of marine diesel from a damaged fuel tank from the single project vessel as a result of a collision with another vessel. We understand that in the unlikely event that a spill did occur from the vessel, AMSA would be the Control Agency (as per any other vessel-sourced marine pollution incident in Commonwealth waters) and that the Vessel Master would notify AMSA JRCC of the incident. No spills from petroleum facilities are included in the scope of this EP.</p> <p>Does AMSA require PTTEP AA to have any Emergency Management Team (EMT) personnel or function during such a vessel spill incident? We understand that AMSA, as Control Agency, would stand up their Incident Management Team and provide this function, with communications directly with the vessel.</p> <p>PTTEP AA provided the following context to understand the nature and scale of the maximum credible spill scenario:</p> <ul style="list-style-type: none"> <li>• The project vessel is expected to be on site only once and for approximately 5 days. The work will be undertaken in an area located outside of any major shipping routes and with relatively low vessel traffic so a vessel collision and hydrocarbon spill is highly unlikely.</li> <li>• The maximum marine diesel release volume (based on the single largest fuel tank, in accordance with AMSA guidelines) is 250 m3.</li> </ul>	N/A - Correspondence sent by PTTEP
------------	------	--	------------------------------------

			<ul style="list-style-type: none"> <li>• As required under the OPGGS Act, an OPEP has been prepared and is included with the Environment Plan for this petroleum activity. This includes notification requirements and a first strike response plan for the vessel to implement (consistent with a vessel SOPEP) in the event of a release. We'd be happy to provide AMSA with a copy of the draft OPEP if required.</li> <li>• Due to the type of hydrocarbon and rapid weathering characteristics, the response strategy is expected to comprise source control, natural weathering, and to monitor and evaluate. Assisted dispersion using propeller wash may be an option if deemed safe to do so.</li> <li>• Marine diesel is not suitable for dispersant application.</li> <li>• Protect and deflect / containment and recovery strategies are unlikely to be a feasible option given the rapid weathering of marine diesel and the time it would take to mobilise boom and recovery equipment to the offshore location.</li> <li>• No hydrocarbons are expected to enter State or Territory coastal waters. No shoreline contact or impacts are predicted to occur. Therefore, no shoreline response is expected to be required.</li> <li>• Oiled wildlife response is not expected in this remote offshore location due to H&amp;S considerations for responders and the impracticality of mobilising and recovering fauna in open water.</li> <li>• PTTEP AA can provide a point of contact / liaison person who would also ensure other statutory and stakeholder notifications are sent (i.e. to NOPSEMA, WA DMIRS, commercial fisheries).</li> <li>• PTTEP AA note that they are responsible for the cost of spill response operations and have adequate financial assurance for this activity.</li> </ul>	
	17/04/2020	Received	<p>In response to PTTEP's query on 15/04/2020, AMSA advised the following:</p> <ol style="list-style-type: none"> <li>1. Under the National Plan for Maritime Emergencies AMSA is the Control Agency for ship sourced pollution incident from vessels within Commonwealth waters. Any response would be undertaken in consultation with the ship owners/representatives.</li> <li>2. All vessels are required to have a Shipboard Oil Pollution Emergency Plan or Shipboard Marine Pollution Emergency Plan.</li> <li>3. All pollution incidents are to be reported consistent with the MARPOL reporting requirements (provided link to AMSA's Mandatory MARPOL pollution reporting webpage).</li> </ol>	Relevant matter raised
Department of Agriculture - Fisheries	18/11/2019	Sent	<p><b>Attachment: Stakeholder Notification PDF</b></p> <p>Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so.</p> <p>The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.</p>	N/A - Correspondence sent by PTTEP

	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
Department of Defence (Defence)	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
Department of Foreign Affairs and Trade	4/03/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Advised the Department is being contacted as the activities proposed in the EP are located within the 1997 Perth Treaty area. It was noted that the Treaty is not in force but Australia still acts consistently with the requirements. Acknowledged that under the 1997 Perth Treaty there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights. Confirmed PTTEP AA has reviewed sources such as Global Fishing Watch which suggest that Indonesian commercial fishers may be present within the 1997 Perth Treaty Area. Advised the risks and impacts associated with potential interactions with Indonesian fishers will be fully assessed in the EP prior to submission to NOPSEMA.  Requested DFAT pass on this notification to the Indonesian Minister of Fisheries and Marine Affairs, if necessary.	N/A - Correspondence sent by PTTEP

Department of Industry, Innovation and Science (DIIS)	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
Director of National Parks (DNP)	6/03/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Advised that the Department is being contacted as the administrator of the Australian Marine Park network. Advised the EP uses a worst-case diesel spill to determine the spatial extent of the largest area of the environment that may be affected (EMBA) during the activity. Spill modelling has been conducted to provide an indication of diesel trajectory and concentration in the event of a spill using a highly conservative vessel tank volume. The model suggested that in the worst-case scenario spill, there is a low chance of hydrocarbons contacting Ashmore Reef AMP. Hydrocarbons at this distance from the spill are predicted to be weathered to a point below where ecological impacts will not occur, but where a surface sheen may still be visible. The risks, sensitivities, and operational controls associated with a marine diesel spill will be thoroughly assessed in the EP and submitted to NOPSEMA for assessment. AMP values and sensitivities will be considered consistent with the relevant Management Plan.	N/A - Correspondence sent by PTTEP

	30/03/2020	Received	<p>Confirmed receipt and understanding of the activity. Advised that NOPSEMA has worked closely with Parks Australia to develop and publish a guidance note that outlines what titleholders need to consider and evaluate. In the context of the management plan objectives and values, you should ensure that the EP:</p> <ul style="list-style-type: none"> <li>- identifies and manages all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable.</li> <li>- clearly demonstrates that the activity will not be inconsistent with the management plan.</li> </ul> <p>Advised that the North-west and North Marine Parks Network Management Plans came into effect on 1 July 2018, and provides further information on values for Ashmore Reef and the Oceanic Shoals Marine Park respectively. Australian marine park values are broadly defined into four categories: natural (including ecosystems), cultural, heritage and socio-economic. Information on the values for the marine parks is also located on the Australian Marine Parks Science Atlas.</p> <p>Confirmed that DNP do not require further notification of progress made in relation to the activity unless details regarding the activity change and result in an overlap with or new impact to a marine park, or for emergency responses (see details below). Emergency responses: The DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the 24 hour Marine Compliance Duty Officer on 0419 293 465. The notification should include:</p> <ul style="list-style-type: none"> <li>- titleholder details</li> <li>- time and location of the incident (including name of marine park likely to be effected)</li> <li>- proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc.)</li> <li>- confirmation of providing access to relevant monitoring and evaluation reports when available; and</li> <li>- contact details for the response coordinator.</li> </ul> <p>Note that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.</p>	Relevant matter raised. Assessment of merit completed in Section 6 of the EP.
--	------------	----------	---	---

WA State Government

Department of Mines, Industry Regulation and Safety (DMIRS)	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	13/12/2019	Received	Confirmation of receipt	N/A - General correspondence only
	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
	6/03/2020	Received	Confirmation of receipt	N/A - General correspondence only
Department of Primary Industries and Regional Development (DPIRD) - Fisheries	18/11/2019	Sent	<b>Attachment: Stakeholder Notification PDF</b> Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	28/02/2020	Sent	<b>Attachment: Location Map</b> Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.	N/A - Correspondence sent by PTTEP
<b>Northern Territory Government</b>				

Northern Territory Department of Mines and Energy	6/03/2020	Sent	<p><b>Attachment: Location Map</b></p> <p>Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Advised that the Department is being contacted as the administrator (on behalf of the DITRDC) of The Territory of Ashmore and Cartier Islands. Advised that the closest suspended wellhead to The Territory of Ashmore and Cartier Islands is located about 160 km north-east and 195 km east of Cartier Island and Ashmore Reef respectively. Acknowledged that The Territory is relatively distant from the wellheads and activity, however advised the EP uses a worst-case diesel spill to determine the spatial extent of the largest area of the environment that may be affected (EMBA) during the activity. Spill modelling has been conducted to provide an indication of diesel trajectory and concentration in the event of a spill using a highly conservative vessel tank volume. The model suggested that in the worst-case scenario spill, there is a low chance of hydrocarbons contacting Ashmore Reef. Advised that the risks, sensitivities, and operational controls associated with a marine diesel spill will be thoroughly assessed in the EP and submitted to NOPSEMA for assessment.</p>	N/A - Correspondence sent by PTTEP
<b>Fisheries</b>				
Commonwealth Fisheries Association (CFA)	18/11/2019	Sent	<p><b>Attachment: Stakeholder Notification PDF</b></p> <p>Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so.</p> <p>The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.</p>	N/A - Correspondence sent by PTTEP
	28/02/2020	Sent	<p><b>Attachment: Location Map</b></p> <p>Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.</p>	N/A - Correspondence sent by PTTEP
Western Australian Fishing Industry Council (WAFIC)	18/11/2019	Sent	<p><b>Attachment: Stakeholder Notification PDF</b></p> <p>Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 20 December 2019, and provided a contact address (email) to do so.</p> <p>The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.</p>	N/A - Correspondence sent by PTTEP

18/11/2019	Received	<p>Acknowledged receipt of notification.</p> <p>Noted commercial fishing catch history for this area has been assessed and noted that there has been no active commercial fishing over these locations. Confirmed understanding that the EP is a requirement for NOPSEMA, however, there will be NO physical operations proposed as part of this EP, therefore no displacement of any potential commercial fishing activities. Noted that currently there are no exclusion zones in place over these sites. Confirmed understanding that the exclusion zone situation will not change as a result of this EP, and that this will be reconsidered once PTTEP resolve their future plans for these wells. Noted ongoing stakeholder fatigue and suggested WAFIC's response be accepted as the overarching complete reply from the commercial fishing sector. Advised WAFIC does not recognise any need to engage with commercial fishers with a licence overlapping the site of the three wells because there is no active commercial fishing over this area.</p> <p>Noted that should there be an unplanned spill event WAFIC understands that the proponent will have full contingencies in place and recognition of all commercial fishing resources.</p> <p>Advised an officer from the Commonwealth Fisheries Association has been copied into the correspondence , noting the commonwealth fisheries overlapping the sites.</p>	<p>No relevant matters raised. WAFIC raised matters that are relevant in the broader context of offshore oil and gas development (i.e. exclusion zones and stakeholder fatigue), however these are not considered relevant matters for this EP.</p>
------------	----------	---	---

19/11/2019	Sent	<p>Acknowledgement of response. Thanked WAFIC for copying in the CFA address (noted that the email provided to the CFA address on AFMA's website was undelivered).</p> <p>Confirmed WAFIC's point that there will be no on-the-water activities as part of the EP and therefore no physical displacement of potential fishing activities. Confirmed no safety zones / exclusion zones are proposed in the EP; and EP contributors are not aware of any gazetted zones associated with the wells that would exclude fishers from accessing the area in which the wells are suspended. Confirmed this may need to be revisited once PTTEP resolve future plans for these wells.</p> <p>Clarified WAFIC's comment regarding unplanned spills, by advising the three wells are currently suspended in isolation from the hydrocarbon zone and there is no spill risk associated with the continued suspension of the wells. Therefore the EP does not contain an "environment that may be affected" (EMBA) associated with a hydrocarbon spill.</p> <p>Thanked WAFIC for the advice that, considering no fishing effort occurs over the wells, WAFIC does not recognise any need to engage with commercial fishers with a licence overlapping the site of the three wells. Confirmed that licence holders will not be contacted as potentially relevant persons as part of this EP. Conveyed appreciation for WAFIC's comment regarding stakeholder fatigue and accepted WAFIC's response to this consultation as the overarching complete reply from the commercial fishing sector.</p>	N/A - Correspondence sent by PTTEP
19/11/2019	Received	Acknowledgement of response. Advised email thread had been shared with DPIRD (Fisheries).	N/A - General correspondence only
28/02/2020	Sent	<p><b>Attachment: Location Map</b></p> <p>Email sent to stakeholder notifying them of the addition of the ROV inspection into the EP. Advised the inspection is anticipated to occur in Q4 of 2020, but may change slightly depending on the date of EP acceptance and vessel availability. Advised the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP before being submitted to NOPSEMA for assessment.</p>	N/A - Correspondence sent by PTTEP
29/02/2020	Received	<p>WAFIC provided the following response to consultation sent by PTTEP AA on 28/02/2020:</p> <p>Note the following:</p> <ul style="list-style-type: none"> <li>• Appreciate earlier consultation noted no on-the-water activities, however, NOPSEMA has requested ROV inspections <ul style="list-style-type: none"> <li>o ROV inspections to take approximately five days</li> <li>o No exclusion zones</li> </ul> </li> </ul>	Assessment of merit completed in Section 6 of the EP. No relevant matters raised, however PTTEP has made efforts to accommodate requests despite being outside of the scope of the EP (refer response below).

- Note these wells are located just outside of Australia's EEZ therefore zero overlap with any WA commercial fisheries.
  - o No consultation required with WA commercial fishing licence holders
  - o Any potential impact to the fishery / fishing activities / the resource in the event of a significant spill event will be included and mitigated within the EP
  - o Thank you for confirming the risks and impacts associated with a short-duration vessel-based activity will be thoroughly assessed in the EP
- The project vessel will most likely mobilise from Darwin Port
  - o Please confirm PTTEP's communication policy with all staff and vessel crew, contractors and sub-contractors regarding interacting and protecting the rights of active commercial fishers on the water
  - o All support / project vessels must divert around active fishing activity (even if not convenient to do so) enroute to and returning from site
  - o All support / project vessels are to avoid any close engagement with any commercial fishing activity enroute to and returning from site
  - o All support / project vessels in the vicinity of a commercial fishing vessel to do their utmost not to create an ocean disturbance risking the split of schooling fish enroute to and returning from site
  - o Please ensure the above points are formally contained within the EP as an agreed outcome.
- The activities are anticipated to occur in Q4 of 2020, however this may change slightly depending on the date of EP acceptance and vessel availability
  - o Once the date is confirmed please track project vessel transit route from Darwin port to site with active commercial fisheries in the area to ensure there are no on-the-water disruptions please.
  - o Please ensure this point is formally contained within the EP as an agreed outcome.
- No fishing from support/commercial vessels
  - o Commercial fishers are not permitted to recreationally fish whilst engaged in commercial fishing activity
  - o It is the commercial fishing industry's expectation there is zero recreational fishing from any support / project O&G commercial vessel
  - o Please ensure this point is formally contained within the EP as an agreed outcome.

		<p>As noted in our previous engagement regarding this activity, I reconfirm that this reply from WAFIC be the overarching complete reply from the WA commercial fishing sector. We do not recognise any need for ERM on behalf of PTTEP to engage with commercial fishers with licences in the vicinity but not necessarily overlapping the site of the three wells because there is no active commercial fishing over this area. We also note that based on today's information and previous information and noting that the activity is located outside of Australia's EEZ any further communication with WAFIC regarding this environment plan is not required (unless there is a quantum change in the scope of the EP).</p>	
6/04/2020	Sent	<p><u>PTTEP AA provided WAFIC with the following response:</u></p> <p>Please note that the components of the well suspension activities that comprise a "petroleum activity" under the OPGGS Act and that fall within the scope of activities managed under PTTEP AA's EP are the activities that occur within the Operational Area, which is outside of the Australian Fishing Zone / EEZ. Vessel movements to and from the Operational Area are not by definition a petroleum activity and will take place in accordance with standard maritime law and practices. PTTEP AA does not have legal authority to manage or ensure compliance of such vessel movements, therefore, this makes it difficult to incorporate some of your requests into the EP in the form of environmental performance outcomes or performance standards. However, there are reasonable steps that PTTEP AA can take with our vessel contractor to accommodate your requests to help ensure that there aren't any negative interactions between the project vessel and the fishing industry. Please see specifics below.</p>	N/A - Correspondence sent by PTTEP

**PTTEP AA's communication policy regarding interactions and protecting the rights of commercial fishers.**

**WAFIC request:**

- Please confirm PTTEP's communication policy with all staff and vessel crew, contractors and sub-contractors regarding interacting and protecting the rights of active commercial fishers on the water
- Project vessel to divert around and avoid any close engagement with active fishing activity while en route to and returning from site.
- Project vessel in the vicinity of a commercial fishing vessel to do their utmost not to create an ocean disturbance risking the split of schooling fish while en route to and from site.

**PTTEP AA response:**

- PTTEP AA can confirm that the project vessel will not be towing equipment or be limited in its ability to manoeuvre while underway to and from the Operational Area. The vessel is therefore reasonably able to avoid other vessels and fishing activities. This is standard maritime practice. An induction will be given to project personnel prior to mobilisation of the project vessel to the Operational Area, and WAFIC's request to keep a reasonable distance from commercial fishing activity will be clearly communicated to the Vessel Master and crew.
- The ROV inspection, which is now scheduled for Q1 of 2021 will involve a single vessel underway, no different from any other vessel (e.g. fishing, recreational, commercial freighter, tanker, etc.) underway in the region. No significant disturbance to fish populations or to fishing activities is expected.

**Tracking the project vessel transit route**

**WAFIC request:**

- Please track project vessel transit route from Darwin port to site with active commercial fisheries in the area to ensure there are no on-the-water disruptions.

**PTTEP AA response:**

- PTTEP AA will not actively oversee or remotely track the project vessel's route while it is underway to and from the Operational Area. This is not practicable and would not provide any additional assurance against on-the-water interactions with fishers or other users. Please note, however, that the project vessel's automatic identification system (AIS) will record the vessel's position and course, should a situation arise where this data is needed.

			<p><b>No fishing from the project vessel</b></p> <p><i>WAFIC request:</i></p> <ul style="list-style-type: none"> <li>• It is the commercial fishing industry's expectation there is zero recreational fishing from any project vessel.</li> </ul> <p><i>PTTEP AA response:</i></p> <ul style="list-style-type: none"> <li>• We can confirm that recreational fishing from the project vessel will not be permitted. This will be clearly communicated to the Vessel Master and crew during the induction given prior to mobilisation of the project vessel to the Operational Area.</li> </ul> <p>Lastly, I'd like to advise that current uncertainty associated with the global COVID-19 pandemic may change the PTTEP AA's activity schedule, potentially moving the proposed ROV inspection later than Q1 2021. We can provide clarification of the proposed inspection date once this is confirmed, should you require this.</p>	
	6/04/2020	Received	Confirming receipt and satisfaction of the above response.	N/A - General correspondence only
<b>Businesses</b>				
SapuraOMV	7/02/2020	Received	<p>SapuraOMV provided PTTEP AA with the following notification:</p> <p>"Please note that, according to our previously published and accepted Environment Plan commitments and as per regulatory requirements, SapuraOMV is hereby providing 14 days notice of its intention to commence activities associated with the Gem 3D Marine Seismic Survey. As such the vessel is currently estimated to enter your title(s) at 06:00hrs on 22nd February 2020 and is expected to take 27 days for completion of the survey."</p>	Relevant matter. Confirmation of activity completion included in Section 8 of the EP.
	17/03/2020	Received	<p>SapuraOMV provided PTTEP AA with the following notification:</p> <p>"Please be advised that the Gem 3D Marine Seismic Survey activity, conducted under petroleum Access Authority AC-64-AA, was completed at 23:02Hrs ACST on March 16th, 2020. The seismic survey vessel, Polarcus Asima, then recovered seismic equipment and departed the survey Operations Area, with survey demobilisation considered complete at 06:00Hrs on March 17th, 2020."</p>	



## Appendix B: Protected Matters Search Tool Searches



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 30/10/19 19:48:22

[Summary](#)

[Details](#)

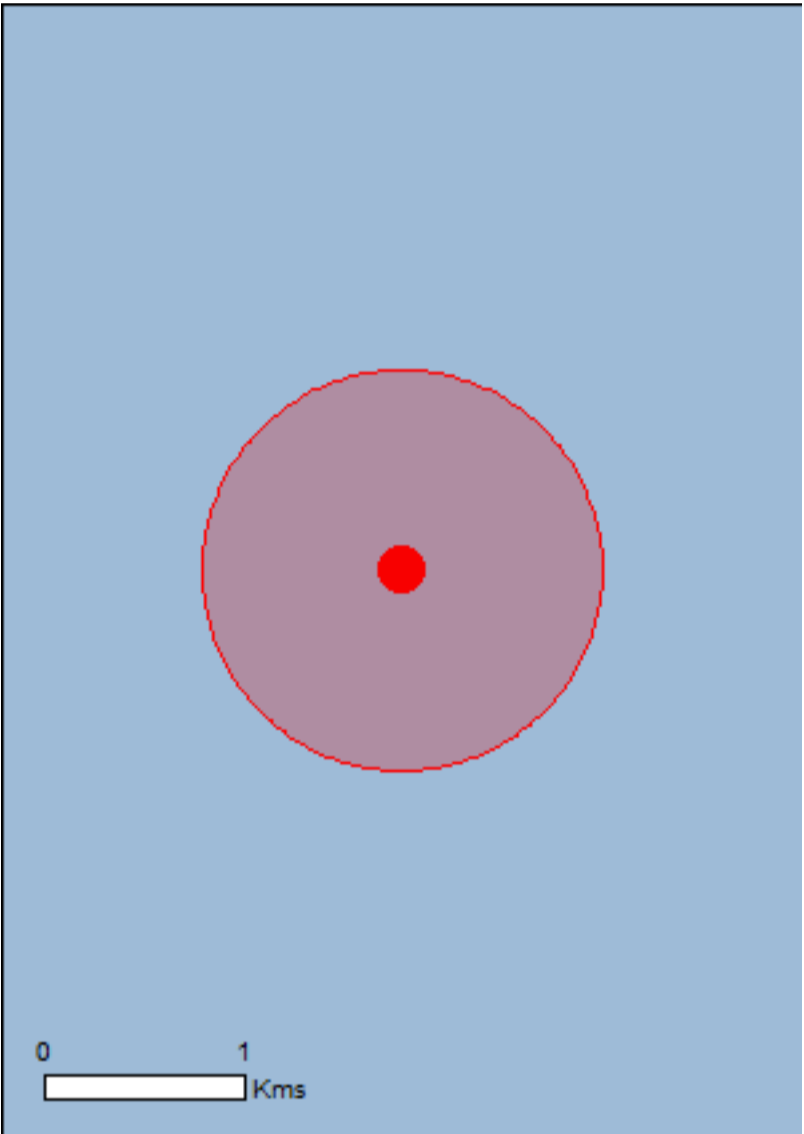
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are  
©Commonwealth of Australia  
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 1.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	14
<a href="#">Listed Migratory Species:</a>	26

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	28
<a href="#">Whales and Other Cetaceans:</a>	22
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Commonwealth Marine Area		[ Resource Information ]
Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.		
Name		
Extended Continental Shelf		
Listed Threatened Species		
Name		Type of Presence
Birds		
<a href="#">Calidris canutus</a>		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a>		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a>		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
<a href="#">Balaenoptera borealis</a>		
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera musculus</a>		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a>		
Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a>		
Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
<a href="#">Caretta caretta</a>		
Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
<a href="#">Chelonia mydas</a>		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a>		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species <a href="#">[ Resource Information ]</a>		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Migratory Marine Species		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Reptiles		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
<a href="#">Hydrophis coggeri</a> Slender-necked Seasnake [25925]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
<a href="#">Lapemis hardwickii</a> Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[ Resource Information ]
Name	Status	Type of Presence
Mammals		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Delphinus delphis</a> Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia simus</a> Dwarf Sperm Whale [58]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		Species or species habitat likely to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area
<a href="#">Ziphius cavirostris</a> Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-11.63 125.0253

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 30/10/19 19:47:07

[Summary](#)

[Details](#)

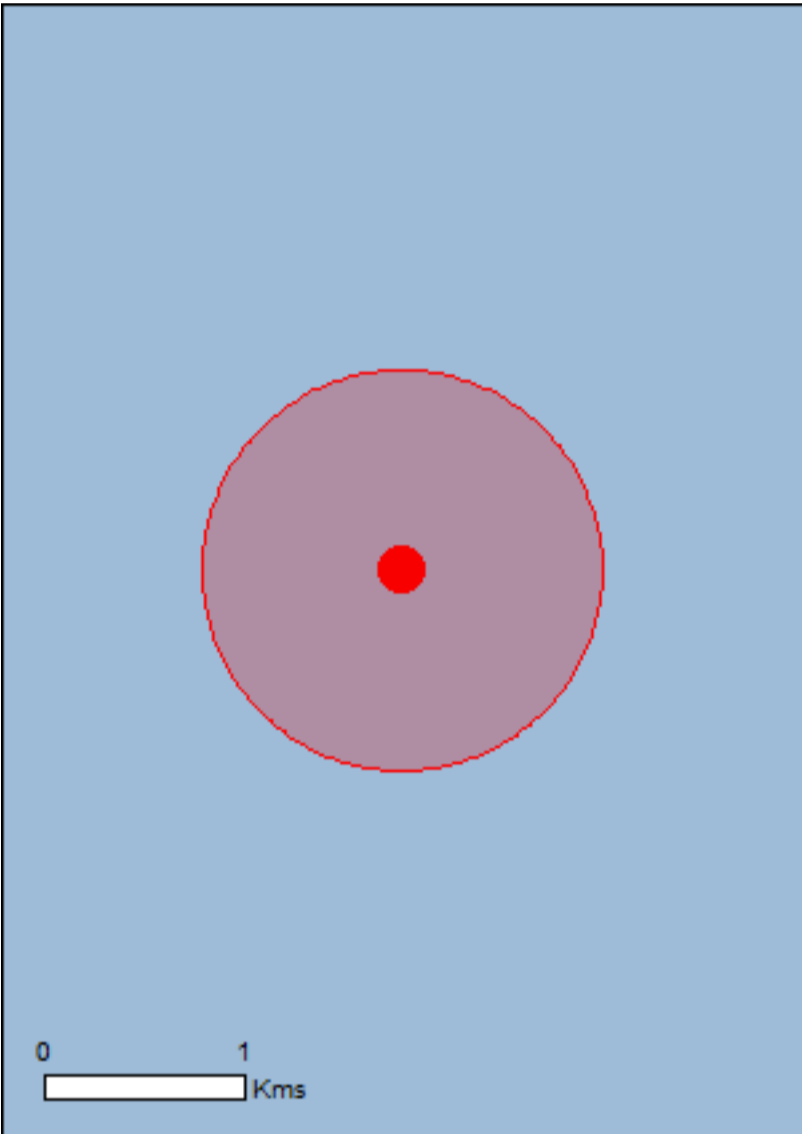
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are  
©Commonwealth of Australia  
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 1.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	19
<a href="#">Listed Migratory Species:</a>	33

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	58
<a href="#">Whales and Other Cetaceans:</a>	22
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Commonwealth Marine Area		[ Resource Information ]
Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.		
Name		
EEZ and Territorial Sea		
Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
Birds		
<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Sharks		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Glyphis garricki</a> Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Migratory Marine Species		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Isurus oxyrinchus</a> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<a href="#">Isurus paucus</a> Longfin Mako [82947]		Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
<a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[ <u>Resource Information</u> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Fish		
<a href="#">Bhanotia fasciolata</a> Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Corythoichthys amplexus</a> Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
<a href="#">Corythoichthys flavofasciatus</a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
<a href="#">Corythoichthys intestinalis</a> Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
<a href="#">Corythoichthys schultzi</a> Schultz's Pipefish [66205]		Species or species habitat may occur within area
<a href="#">Cosmocampus banneri</a> Roughridge Pipefish [66206]		Species or species habitat may occur within area
<a href="#">Doryrhamphus dactyliophorus</a> Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
<a href="#">Doryrhamphus excisus</a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
<a href="#">Doryrhamphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Halicampus dunckeri</a> Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus spinirostris</a> Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
<a href="#">Haliichthys taeniophorus</a> Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area
<a href="#">Hippocampus spinosissimus</a> Hedgehog Seahorse [66239]		Species or species habitat may occur within area
<a href="#">Micrognathus micronotopterus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<a href="#">Enhydrina schistosa</a> Beaked Seasnake [1126]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Hydrophis coggeri</a> Slender-necked Seasnake [25925]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
Whales and other Cetaceans		[ <a href="#">Resource Information</a> ]
Name	Status	Type of Presence
Mammals		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia simus</a> Dwarf Sperm Whale [58]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		Species or species habitat likely to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area
<a href="#">Ziphius cavirostris</a> Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-11.861 124.8968

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 30/10/19 19:47:52

[Summary](#)

[Details](#)

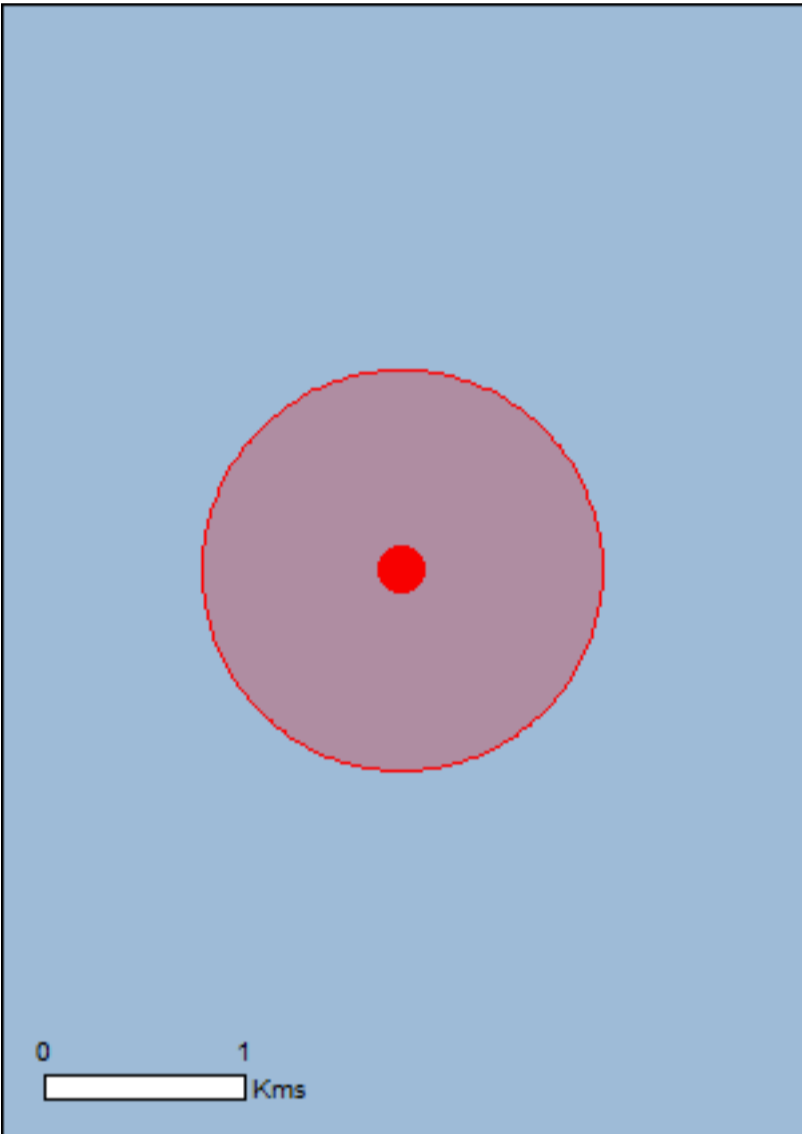
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are  
©Commonwealth of Australia  
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 1.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	14
<a href="#">Listed Migratory Species:</a>	26

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	28
<a href="#">Whales and Other Cetaceans:</a>	22
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Commonwealth Marine Area		[ Resource Information ]
Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.		
Name		
Extended Continental Shelf		
Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
Birds		
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species <a href="#">[ Resource Information ]</a>		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Migratory Marine Species		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Reptiles		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
<a href="#">Hydrophis coggeri</a> Slender-necked Seasnake [25925]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
<a href="#">Lapemis hardwickii</a> Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[ Resource Information ]
Name	Status	Type of Presence
Mammals		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Delphinus delphis</a> Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia simus</a> Dwarf Sperm Whale [58]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		Species or species habitat likely to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area
<a href="#">Ziphius cavirostris</a> Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Coordinates

-11.6434 125.01

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/03/20 18:38:58

[Summary](#)

[Details](#)

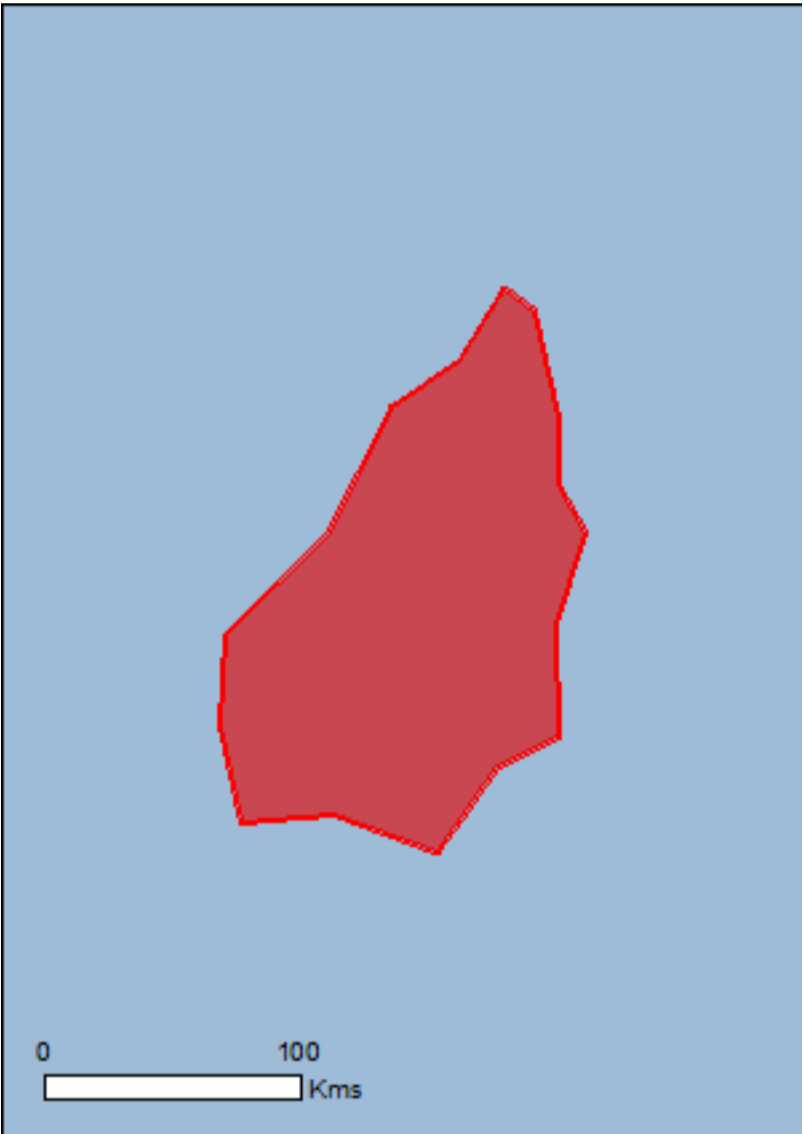
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

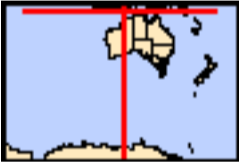
[Acknowledgements](#)



This map may contain data which are  
©Commonwealth of Australia  
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 1.0Km](#)



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	2
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	22
<a href="#">Listed Migratory Species:</a>	33

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	63
<a href="#">Whales and Other Cetaceans:</a>	25
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	1

# Details

## Matters of National Environmental Significance

Commonwealth Marine Area

[ Resource Information ]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

Extended Continental Shelf

Marine Regions

[ Resource Information ]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[North-west](#)

Listed Threatened Species

[ Resource Information ]

Name	Status	Type of Presence
------	--------	------------------

Birds

<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
--	------------	--

<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
--	------------	--

<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
---	-----------------------	--

<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
---	-----------------------	--

<a href="#">Papasula abbotti</a> Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
--	------------	--

Mammals

<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
--	------------	--

<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species
---	------------	--------------------

Name	Status	Type of Presence
habitat likely to occur within area		
Reptiles		
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Glyphis garricki</a> Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Listed Migratory Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Migratory Marine Species		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Isurus oxyrinchus</a> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<a href="#">Isurus paucus</a> Longfin Mako [82947]		Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat likely to occur within area
<a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area

Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Papasula abbotti</a> Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Fish		
<a href="#">Bhanotia fasciolata</a> Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Corythoichthys amplexus</a> Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
<a href="#">Corythoichthys flavofasciatus</a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
<a href="#">Corythoichthys intestinalis</a> Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
<a href="#">Corythoichthys schultzi</a> Schultz's Pipefish [66205]		Species or species habitat may occur within area
<a href="#">Cosmocampus banneri</a> Roughridge Pipefish [66206]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Doryrhamphus dactyliophorus</a> Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
<a href="#">Doryrhamphus excisus</a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
<a href="#">Doryrhamphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area
<a href="#">Halicampus dunckeri</a> Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus spinirostris</a> Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
<a href="#">Haliichthys taeniophorus</a> Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area
<a href="#">Hippocampus spinosissimus</a> Hedgehog Seahorse [66239]		Species or species habitat may occur within area
<a href="#">Micrognathus micronotopterus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Enhydrina schistosa</a> Beaked Seasnake [1126]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Hydrophis coggeri</a> Slender-necked Seasnake [25925]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
<a href="#">Lapemis hardwickii</a> Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[ Resource Information ]
Name	Status	Type of Presence
Mammals		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia simus</a> Dwarf Sperm Whale [58]		Species or species habitat may occur within area
<a href="#">Lagenodelphis hosei</a> Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species

Name	Status	Type of Presence
<a href="#">Mesoplodon densirostris</a> Blainville's Beaked Whale, Dense-beaked Whale [74]		habitat likely to occur within area  Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		  Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		  Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		  Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		  Species or species habitat likely to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		  Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		  Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		  Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		  Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		  Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		  Species or species habitat may occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		  Species or species habitat may occur within area
<a href="#">Ziphius cavirostris</a> Cuvier's Beaked Whale, Goose-beaked Whale [56]		  Species or species habitat may occur within area

Extra Information

Key Ecological Features (Marine)	[ Resource Information ]
Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.	

Name	Region
<a href="#">Carbonate bank and terrace system of the Sahul</a>	North-west

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Coordinates

-10.5983 125.1025,-10.8422 124.9475,-11.0034 124.71,-11.015 124.706,-11.4431 124.482,-11.785 124.1263,-12.0951 124.1111,-12.4259 124.1829,-12.3964 124.5016,-12.5227 124.8659,-12.2286 125.074,-12.1289 125.2922,-11.7418 125.2821,-11.4329 125.3822,-11.2701 125.2922,-11.0378 125.2855,-10.6689 125.2086,-10.5983 125.1025

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.