



Montara-1,2,3 and Skua-1 Wellhead Abandonment Environment Plan
TM-70-PLN-I-00003
Rev 0.01

FACILITY	TM - Montara Field
REVIEW INTERVAL	Not applicable

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REVISION HISTORY

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Acronyms and Abbreviations

Abbreviation	Description
AFMA	Australian Fishers Management Authority
AFZ	Australian Fishing Zone
AHO	Australian Hydrographic Office
AIMS	Australian Institute of Marine Science
ALARP	As low as reasonably practicable
AMP	Australian Marine Parks
AMSA	Australian Maritime Safety Authority
ANZECC/ ARMCANZ	Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand
APPEA	Australian Petroleum Production and Exploration Association
ASBTIA	Australian Southern Bluefin Tuna Industry Alliance
ATSB	Australian Transport Safety Bureau
Bbls	Barrels
BIA	Biologically important areas
BMS	Business management system
BOP	Blowout Preventer
BRUVS	Baited Remote Underwater Video Stations
CAMBA	China-Australia Migratory Bird Agreement
CFA	Commonwealth Fisheries Association
CMMS	Computerised Maintenance Management System
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DEWHA	Department of the Environment, Water, Heritage and the Arts (now DAWE)
DISER	Department of Industry, Science, Energy and Resources
DNP	Director of National Parks
DoD	Department of Defence
DoEE	Department of the Environment and Energy (now DAWE)
DoT	Department of Transport
DPaW	Department of Parks and Wildlife (now DBCA)
DSEWPac (now DoEE)	Department of Sustainability, Environment, Water, Population and Communities
DWS	Diamond wire saw
EDMS	Electronic Document Management System
EEZ	Exclusive Economic Zone
EP	Environment plan

Abbreviation	Description
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPO	Environmental performance outcome
EPS	Environmental performance standard
ESD	Ecologically sustainable development
GHG	Greenhouse gases
HSE	Health safety and environment
IAP2	International Association for Public Participation
ITF	Indonesian Throughflow (current)
IUCN	International Union for Conservation of Nature
JAMBA	Japan-Australia Migratory Bird Agreement
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
KEFs	Key ecological features
Km	Kilometre
LMS	Listed migratory species
LTS	Listed threatened species
M	Metres
MM	Million
MMA	Marine Management Area
MNES	Matters of national environmental significance
MoC	Management of Change
MODU	Mobile offshore drilling unit
MoU	Memorandum of understanding
MP	Marine Park
m/s	Metres per second
NDSF	Northern Demersal Scalefish Fishery
NM	Nautical mile
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
NT	Northern Territory
NWMR	North-West Marine Region
NWS	North-West Shelf
OIM	Offshore Installation Manager
OPEP	Oil pollution emergency plan

Abbreviation	Description
OPGGS (E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PGB	Permanent Guide Base
PLONOR	Pose Little or No Risk (to the Environment)
PMST	Protected matters search tool
PSD	Particle size distribution
PSZ	Petroleum safety zone
RAMSAR	Wetlands of International Importance
RMS	Remote Monitoring Systems
ROKAMBA	Republic of Korea (Republic of Korea – Australia Migratory Birds Agreement)
ROV	Remotely operated vehicle
SAT	Saturation diving
TGB	Temporary Guide Base
WA	Western Australia
WAFIC	Western Australia Fishing Industry Council
WBM	Water Based Muds
WHP	Wellhead platform
WH	Wellhead
WOMP	Well Operations Management Plan

ENVIRONMENT PLAN SUMMARY

This Jadestone Energy Montara-1,2,3 and Skua-1 wellhead abandonment Environment Plan Summary has been prepared from material provided in this Environment Plan (EP). The summary consists of the content from the EP as detailed in Table as required by Regulation 11(4):

Table: EP Summary

EP Summary material requirement	Relevant section of EP containing EP Summary material
The location of the activity	Section 2.1
A description of the receiving environment	Section 3
A description of the activity	Section 2
Details of the environmental impacts and risks	Section 6 and 7
The control measures for the activity	Section 7
The arrangements for ongoing monitoring of the titleholders' environmental performance	Section 8.3
Response arrangements in the oil pollution emergency plan	Not applicable – no hydrocarbon spills
Consultation already undertaken and plans for ongoing consultation	Section 4 and Appendix C
Details of the titleholders nominated liaison person for the activity	Section 1.2

1. INTRODUCTION

1.1 Background

Jadestone Energy (Eagle) Pty Ltd (Jadestone Energy) plans to permanently abandon four wellheads in situ, Montara-1,2, 3 and Skua-1, in the Montara field. The Montara Field was discovered in 1988 with the drilling of the exploration well Montara-1, and later appraised with the drilling of appraisal wells Montara-2 and Montara-3, in 1991 and 2002, respectively. The wells were suspended with annual monitoring undertaken by remotely operated vehicle (ROV).

In 2021, both the primary and secondary barrier envelopes were verified, and the wells confirmed to be plugged and abandoned as per the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) accepted Well Operations Management Plan (WOMP) (Doc Number MV-00-PLN-W-00007 Revision 0 accepted on 22/06/21). A final abandonment report was submitted to NOPSEMA for these wells in September 2021.

Skua-1 was accepted as plugged and abandoned under the Petroleum Submerged Lands Act (PLSA) by the Department of Mines (this department ceased in 1992) in 1974. No WOMP is required for this well.

This EP has been prepared to meet the requirements of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGG Act) for decommissioning. The defined petroleum activity for this EP is to leave the wellheads in situ in perpetuity. No further operations or works are required.

The wellheads are within the Commonwealth waters of the Timor Sea, off northern Western Australia (Figure 1-1).

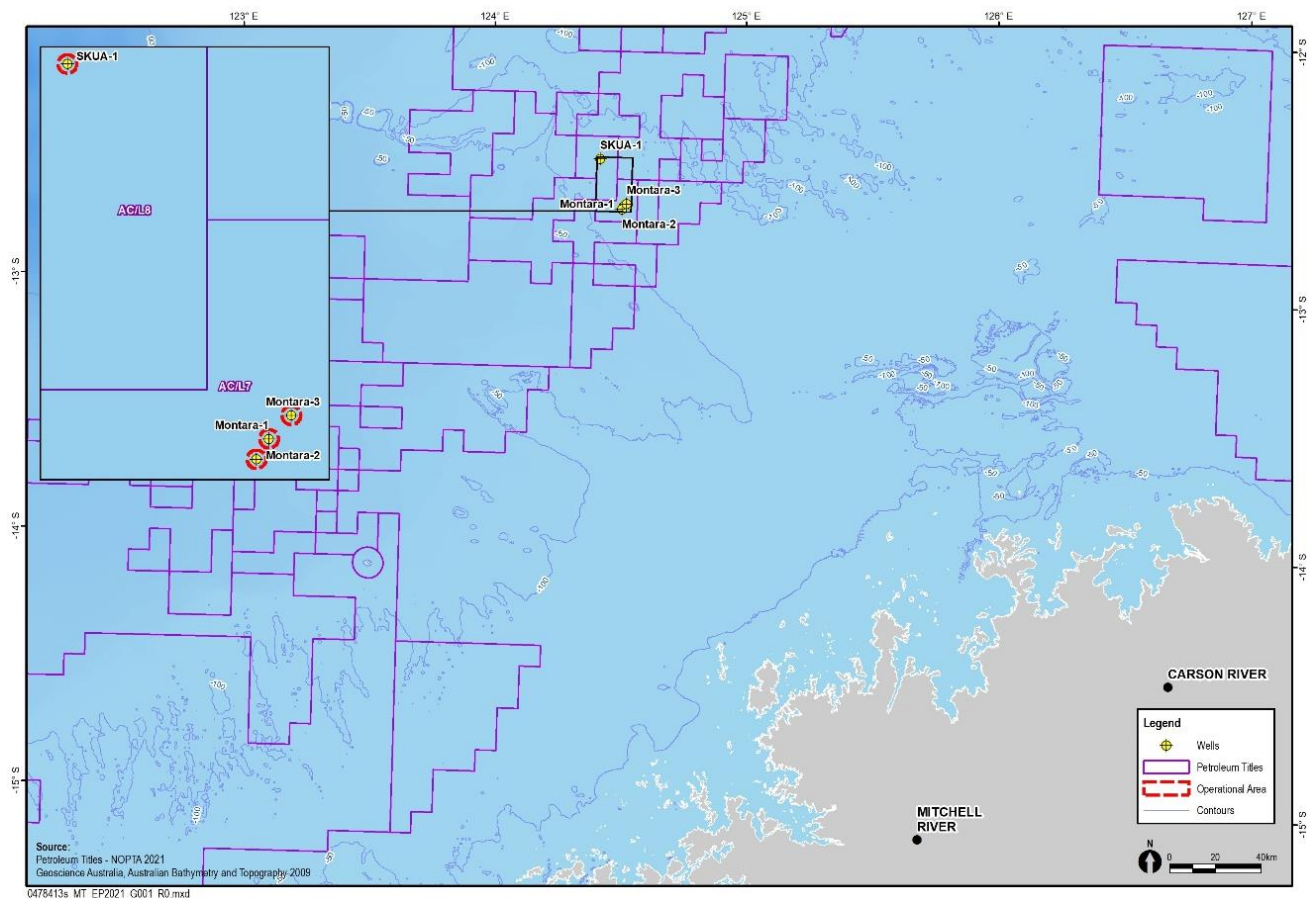


Figure 1-1: Location of the subsea wellheads, production licenses AC/L7 and AC/L8

1.2 Operator and Titleholder Details

Jadestone Energy is engaged in exploration, appraisal and pre-development activities in Southeast Asia, with a portfolio of ten exploration and pre-development assets. Jadestone Energy is an active operator within the region and the Company's principal focus is on assets in Australia, Indonesia, Vietnam and the Philippines. Jadestone Energy is the sole titleholder of production licences AC/L7 and AC/L8 with operational control of the four wellheads.

Jadestone Energy's Australian office is located at:

The Atrium Building Level 2, 168 St Georges Terrace

Perth, Western Australia, 6000

ACN 627 006 679 (Jadestone Energy (Eagle) Australia)

Jadestone Energy's contact for the abandonment activity is:

Guy Hattersley, Drilling and Wells Manager

Phone: +61 8 9486 6600

Email: GHattersley@jadestone-energy.com

In the event contact details for Jadestone Energy or the liaison contact change within the timeframe of this EP, the Regulator, NOPSEMA will be advised of the updated details.

1.3 HSE Policy

Protecting the environment, valuing cultural heritage and maintaining open stakeholder communication are an integral part of Jadestone Energy's business approach. This is reflected in Jadestone Energy's Health, Safety and Environment (HSE) Policy (1-2) and this EP.

HEALTH, SAFETY & ENVIRONMENT POLICY



Respect



Integrity



Safety



Results-oriented



Sustainability



Passion

PHILOSOPHY

Jadestone's philosophy is to ensure that health, safety and environmental protection is intrinsic to, and embedded within, our operating activities. The business focusses on those things that deliver top performance and value optimisation while eliminating waste. A focus on HSE performance provides a safe and rewarding work environment for Jadestone employees, and the achievement of sustainable business activities in the local and global communities where they work.

EXECUTION

Within the HSE Policy, Jadestone has committed to:

- Promote a strong HSE culture through visible leadership and an engaged, competent workforce aligned with Jadestone's Shared Values
- Assess all risks and manage them to as low as reasonably practicable
- Maintain an ever-improving HSE management system through setting and monitoring performance targets to achieve our aims within a framework of continuous improvement
- Take all necessary actions to prevent incidents, with an aspiration of targeting zero. Investigate and apply learnings
- Encourage and promote the ownership of HSE performance by all employees and contractors
- Ensure all contractor companies working with us have a management system that either equals or exceeds Jadestone's own management system
- Manage and maintain plant, equipment and machinery to achieve required performance, safety and integrity
- Openly monitor, evaluate and report HSE performance, and communicate to all relevant stakeholders, and
- Comply with all regulatory requirements as an absolute minimum.

RESPONSIBILITY

Everyone who is engaged to work for Jadestone shall be familiar with this policy and its contents.

Everyone must take responsibility for ensuring their own safety, the safety of those around them, and the protection of the environment, by following Jadestone's policies and procedures. That includes taking all necessary precautions and immediately acting upon and reporting any HSE concerns they may have.

Everyone has the right to stop the job and a responsibility to intervene in work fronts or activities if they feel there is a risk to themselves, their workmates or to the environment.

A. Paul Blakeley OBE
President & Chief Executive Officer

April 2020

Figure 1-2: Jadestone Energy's HSE Policy (April 2020)

1.4 Legislative Framework

The wellheads are located within the Commonwealth Petroleum Jurisdiction Boundary and therefore regulated under Commonwealth legislation; primarily under the OPGGS Act and the OPGGS(E) Regulations. In accordance with Regulation 13(4) of the OPGGS(E) Regulations, this section describes the Commonwealth legislation, international agreements and other relevant guidelines and codes of practice to the abandonment of wellheads. Key applicable Commonwealth and State legislation are summarised below:

Offshore Petroleum and Greenhouse Gas Storage Act 2006

The OPGGS Act and OPGGS(E) Regulations specify the requirements to manage the environmental impacts of petroleum activities. The Regulations require that an EP must be accepted by the regulatory authority (NOPSEMA) prior to commencing the proposed activity. NOPSEMA guidelines outline the requirements for the content of EPs.

Environment Protection and Biodiversity Conservation Act 1999

Under Commonwealth government streamlining arrangements, NOPSEMA's assessment of this EP provides consideration of the impacts to matters of national environmental significance (MNES) protected under Part 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This obviates the requirement to refer the project to the Department of Agriculture, Water and the Environment (DAWE).

Environment Protection (Sea Dumping) Act 1981

This Act regulates the loading and dumping of waste at sea and fulfils Australia's international obligations under the London protocol to prevent marine pollution by controlling dumping of wastes and other matter. The Sea Dumping Act applies to all vessels, aircraft and platforms in Australian waters and to all Australian vessels and aircrafts in any part of the sea.

Since the abandonment of Skua-1 took place before the Sea Dumping Act came into force, a permit is not required. However, discussions are ongoing with DAWE with regard to the requirement for a Sea Dumping Permit for the abandonment of Montara-1, -2 and -3 wellheads in situ and Jadestone will meet its obligations under the Act.

Ecologically Sustainable Development

Australia has developed a National Strategy for Ecologically Sustainable Development (ESD) (available at <https://www.environment.gov.au/about-us/esd/publications/national-esd-strategy-part1>), which identifies four principles and ways to apply them to a range of industry sectors and issues such as climate change, biodiversity conservation, urban development, employment, and economic activity, diversity and resilience. OPGGS(E) Regulation 3 states that any petroleum activity carried out in an offshore area is carried out in a manner consistent with the principles of Ecologically Sustainable Development (ESD) as set out in section 3A of the EPBC Act. These are listed below:

- a. Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- b. If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- c. Principle of inter-generational equity: that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- d. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making, and
- e. Improved valuation, pricing and incentive mechanisms should be promoted.

Jadestone Energy has incorporated the principles of ESD into the decision-making framework described in Section 5 and in the development of control measures and environmental performance outcomes proposed in Sections **Error! Reference source not found.** and 7. Jadestone Energy believes that the commitments made

within this EP demonstrate that the environmental management of the activity will be conducted in accordance with the principles of ESD.

Australia is signatory to several international environmental protection agreements and conventions which are relevant to the region, including for the protection of wetlands and environmental values. Australia is also a signatory to several international conventions of potential relevance to the activity, including:

- Australia-Indonesia Memorandum of Understanding (MoU) regarding the Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone (AFZ) and Continental Shelf – 1974 (Memorandum of Understanding Box); and
- Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention);

A summary of conventions, standards, guidelines and policies relevant to the activity is provided below in **Error! Reference source not found..**

Table 1-1: Summary of Applicable International Conventions, Industry Standards, Guidelines and Policy Documents

Guideline/Legislation	Description
Australian Marine Parks	<p>Australian Marine Parks are established by proclamation under the <i>EPBC Act</i> for the purpose of protecting and maintaining biological diversity in the parks.</p> <p>An environment plan (EP) must be consistent with the Australian Marine Park Management plans. In all cases where an activity has potential to impact or present risk to AMPs, regardless of whether the activity is inside or outside a park, the EP should evaluate how these impacts and risks will be of an acceptable level and reduced to as low as reasonably practicable (ALARP).</p>
Bilateral Agreements on the Protection of Migratory Birds	<p>Australia has negotiated bilateral agreements with Japan (Japan-Australia Migratory Birds Agreement [JAMBA], 1974), China (China-Australia Migratory Birds Agreement [CAMBA], 1986) and the Republic of Korea (Republic of Korea – Australia Migratory Birds Agreement [ROKAMBA], 2007) to protect species of migratory birds with international ranges.</p> <p>In November 2006, the East Asian-Australasian Flyway Partnership (Flyway Partnership) was launched in order to recognise and conserve migratory waterbirds in the East Asian – Australasian Flyway for the benefit of people and biodiversity.</p>
Convention on Biological Diversity (1992)	<p>The objectives of the convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.</p>
EPBC Act	<p>Environment Protection and Biodiversity Conservation Act 1999</p> <p>This Act came into force in July 2000 replacing five existing Commonwealth Acts (Environmental Protection (Impact of Proposals) Act 1974, World Heritage Properties Conservation Act 1983, National Parks and Wildlife Conservation Act 1975, Whale Protection Act 1980; and Endangered Species Protection Act 1992).</p> <p>The Environment Protection and Biodiversity Conservation Act (EPBC) provides for the protection of the environment, especially those aspects of the environment that are matters of National Environmental Significance (NES); and promotes ecologically sustainable development through the conservation and ecologically sustainable use of natural resources. Under this legislation all activities that will, or have the potential to, affect matters of NES are prohibited except; when undertaken in accordance with approval by the Minister for Environment, or when approved through a Bilateral Agreement with a State or Territory, or when approved through a process accredited by the Minister.</p> <p>Matters of “National Environmental Significance” are: World Heritage Properties; National Heritage Places; Wetlands of International Importance; Listed Threatened Species and Communities; Listed Migratory Species; Nuclear Actions; Commonwealth Marine Areas; and Great Barrier Reef Marine Park</p>

Guideline/Legislation	Description
EPBC Act-related guidelines	Relevant guidelines/policies and marine bioregional plans are considered in the management of impacts and risks NOPSEMA is the sole assessor for offshore petroleum activities in Commonwealth water (as of 28 February 2014). Under the new arrangements, environmental protection will be met through NOPSEMA's decision-making processes. This Act is the Australian Government's key piece of environmental legislation. The Act focuses on the protection of matters of national environmental significance (MNES). Australian Marine Park Management Plans were also developed under this Act.
London (Dumping) Convention (1972)	Dumping at sea is regulated by the convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (the 'London Convention'). Article 4 provides a general prohibition on dumping of wastes except as specified in the Convention. The convention has annexed to it two lists of substances, the 'blacklist' of substances which may not be dumped at all, and the 'grey list' of substances which may only be dumped under a specific permit.
Marine Bioregional Plans	Marine bioregional plans are identified and considered in Section 3. Key Ecological Features (KEF) are elements of the Commonwealth marine environment that are considered to be of regional importance for either a region's biodiversity or its ecosystem function and integrity.
NOPSEMA OPGGS Act-related guidelines	NOPSEMA guidelines applicable to the activity include: <ul style="list-style-type: none"> NOPSEMA Guidance note: Environment plan content requirements (N04750-GN1344, September 2020); NOPSEMA Guidance note: Notification and Reporting of Environmental Incidents (N-03000-GN0926 Rev 4, 28 February 2014); NOPSEMA Guidance note: Petroleum activities and Australian Marine Parks (N-04750-GN 1785, June 2020); NOPSEMA Guideline: Environment Plan decision making (N-04750-GL1721, June 2021) Relevant guidelines/ policies are considered in the management of impacts and risks.

Guideline/Legislation	Description
OPGGS Act	<p>The OPGGSA 2006 (OPGGSA) entered into force in 2008, superseding and repealing the previous offshore petroleum legislation – the Offshore Petroleum Act 2006 (OPA) and the Petroleum (Submerged Lands) Act 1967 (PSLA).</p> <p>Facilities located entirely in Commonwealth offshore waters are controlled by the Commonwealth OPGGSA and its regulations, including but not limited to the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations).</p> <p>The Act, and its regulations, is currently administered by the Joint Authority, which consists of the commonwealth minister for Resources and Water and the WA State Minister for Mines and Petroleum. The commonwealth minister for Energy and Resources is advised by the Commonwealth Department of Industry, Science, Energy and Resources (DISER).</p>
OPGGSE Regulations	<p>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations)</p> <p>Under the OPGGS (E) Regulations an EP is required for proposals under Commonwealth jurisdiction, comprising a description of the environmental effects and risks of the project, and proposed mitigation measures to reduce these risks.</p> <p>The EP must be submitted to and accepted by the Designated Authority (DA). The DA for Commonwealth waters adjacent to WA state waters and out to the Australian Exclusive Economic Zone (EEZ) at 200 nm is NOPSEMA, who administers the regulations.</p>
Plans of management for: - World Heritage properties, - Commonwealth/National Heritage places	<p>Sites accepted to the World Heritage listing are only inscribed if considered to represent the best examples of the world's cultural and natural heritage. There are no World Heritage properties that intersect with the operational areas</p> <p>The Commonwealth Heritage List is a list of natural, Indigenous and historic heritage places owned or controlled by the Australian Government. There are no Commonwealth Heritage places that intersect with the operational areas;</p> <p>The National Heritage list is Australia's list of natural, historic and Indigenous places of outstanding significance to the nation. There are no National Heritage properties that intersect with the operational areas</p>
Sea Installations Act 1987	<p>The Sea Installations Act regulates the placement, use and maintenance of seabed installations in Australian waters. A sea installation refers to any man-made structure that is in contact with the seabed and used for an environment-related activity. The London Protocol is implemented through Section 5 of the Sea Dumping Act; Article 1.4.1.4 of the London Protocol covers the abandonment of man-made structures</p>

Guideline/Legislation	Description
Species Profile and Threats Database https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl	This database has been used in Section 3 as a source of information on the receptors. Information accessed has included species details such as habitat, movements, feeding, reproduction and taxonomic comments. Noting that profiles are not available for all species and ecological communities. Results of searching this database are found within Appendix A.
The Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (APPEA 2008)	In Australia, the petroleum exploration and production industry operate within an industry code of practice developed by the Australian Petroleum Production and Exploration Association (APPEA); the APPEA Code of Environmental Practice (2008). This code provides guidelines for activities that are not formally regulated and have evolved from the collective knowledge and experience of the oil and gas industry, both nationally and internationally. The APPEA Code of Practice covers general environmental objectives for the industry, including planning and design, assessment of environmental risks, emergency response planning, training and inductions, auditing and consultation and communication. As an APPEA member, Jadestone Energy adheres to this Code of Environmental Practice when undertaking offshore activities.
The Conservation Values Atlas (DoEE 2019) https://www.environment.gov.au/topics/marine/marine-bioregional-plans/conservation-values-atlas	The Conservation Values Atlas has been developed by the Commonwealth Government. This is used for the identification of Biologically Important Areas (BIA), KEFs etc. which have been presented in the Section 3 and considered in the assessment of impacts and risks in Sections Error! Reference source not found. and 7. BIAs are identified by the Commonwealth government, are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour, such as breeding, foraging, resting or migration.

1.5 This Environment Plan

This wellhead abandonment Environment Plan (this EP hereafter) has been prepared in accordance with the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS(E) Regulations) under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) and as administered by NOPSEMA.

The objectives of this EP are to ensure that:

- All activities associated with the Activity are planned and conducted in accordance with Jadestone Energy's Health, Safety and Environmental (HSE) Policy (Section 1.3);
- Potential adverse environmental impacts and risks associated with the proposed activities, during both routine and non-routine operations, are continually reduced to as low as reasonably practicable (ALARP) and of acceptable levels; and
- That the environmental performance outcomes (EPO) and environmental performance standards (EPS) outlined in this EP are met.

This EP contains the environmental impact assessment for the abandonment of the wellheads. The assessment aims to systematically identify and assess the potential environmental impacts and risks associated with the activity and to stipulate mitigation measures to avoid and/or reduce any adverse impacts to the marine environment to ALARP and acceptable levels. The implementation of the EPOs specified within this document will provide Jadestone Energy with the required level of assurance that the activities are being managed in an environmentally responsible manner.

NOPSEMA's Guidance Note for Environment Plan Content Requirements (GN-1344; Rev 4, April 2019) and the Australian Government's Offshore decommissioning guideline (DISER, 2020) was referred to in the preparation of this EP.

The petroleum activity ends upon acceptance of the EP by NOPSEMA, and on submission and acceptance of the notifications as required under Regulation 29 (end of activity) and Regulation 25A (end of EP) of the OPGGS(E)R 2009.

At process end, Jadestone Energy will have made arrangements satisfactory to NOPSEMA for leaving the wellhead (property) in situ in perpetuity compliant to Section 270(3)(ii) of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act).

2. ACTIVITY DESCRIPTION

2.1 Location

The Montara field lies approximately 690 km (373 nautical miles) east of Darwin in a water depth of approximately 80 m (Figure 1-1) in Commonwealth waters of the Timor Sea.

This EP provides for the permanent abandonment of four wellheads: Skua-1 within Production Licence AC/L8 and Montara-1, -2 and -3 within production Licence AC/L7. An overview of the wellheads is provided in

Table 2-1.

Table 2-1: Wellhead overview

Site	Skua-1	Montara-1	Montara-2	Montara-3
Licence/Permit	AC/L8	AC/L7	AC/L7	AC/L7
Year well abandoned	1974	1988	1991	2002
Distance from Montara WHP	21.8 km	2.1 km	3.3 km	0.7 km
Actual Water Depth	80.5 m	85.1 m	87 m	72 m
Wellhead height above sea floor (2020 ROV inspection)	0.95 m above seabed (2012 inspection)	Top of Debris Cap 4.4 m above seabed	Top of Debris Cap 4.1m above seabed	Top of Debris Cap 2.8 m above seabed
Drilling mud used	Water based mud (WBM) with some sections containing 3-5% oil	WBM	WBM	WBM
Wellhead Details	Blowout Preventer (BOP) was pulled, and a corrosion cap installed	Temporary Guide Base (TGB) and Permanent Guide Base (PGB) in place. 1 guidepost lodged in TGB	TGB and PGB in place	TGB and PGB in place
Debris at location	Rope, bollard, 2 tyres	3" hose 4m long on seabed ~10m from WH. Looks like Drill pipe	J-Hook grapple with steel wire rope ~30m from WH	3" diameter wire debris ~30m from WH
Location	12° 30' 19" S 124° 25' 58" E	12° 41' 21.66" S 124° 31' 53.98" E	12° 41' 57.86" S 124° 31' 31.85" E	12° 40' 40.154" S 124° 32' 33.461" E

The locations of key environmental sensitive receptors in closest proximity to the Operational Areas are provided in Table 2-2.

Table 2-2: Locations of key sensitive receptors in relation to the Montara Field

Sensitive receptor	Approx. distance from the Operational Areas (km)
Goeree Shoal	28
Vulcan Shoal	28
Eugene McDermott Shoal	40
Barracouta Shoal	39
Cartier Island	106
Hibernia Reef	126
Ashmore Reef	149
Cassini Island	181
Browse Island	187
Long Reef	188
Mainland Australia	211
Rote Island (Indonesia)	239
West Timor	244
Seringapatam Reef	288
Sandy Islet (Scott Reef)	322
Scott Reef	322
East Timor	339
Savu Island (Indonesia)	351
Flores Island (Indonesia)	486
Sumba Island (Indonesia)	474

2.2 Wellheads

The wellheads are comprised of steel with metal-to-metal ring gaskets. If debris was noted near each well location during an ROV inspection it has been noted and included in

Table 2-1.

The Skua pipeline is approximately 1.5 km to the W-SW of the Skua-1 wellhead.

Images of the four wellheads are provided in Figure 2-1 to Figure 2-4.



Figure 2-1: Images of Montara-1 wellhead – debris cap (top left), TGB (top right, middle left), wellhead upper structure (middle right), hose debris and broken guidepost in TGB structure (bottom L-R) (Jadestone Energy, 2020)

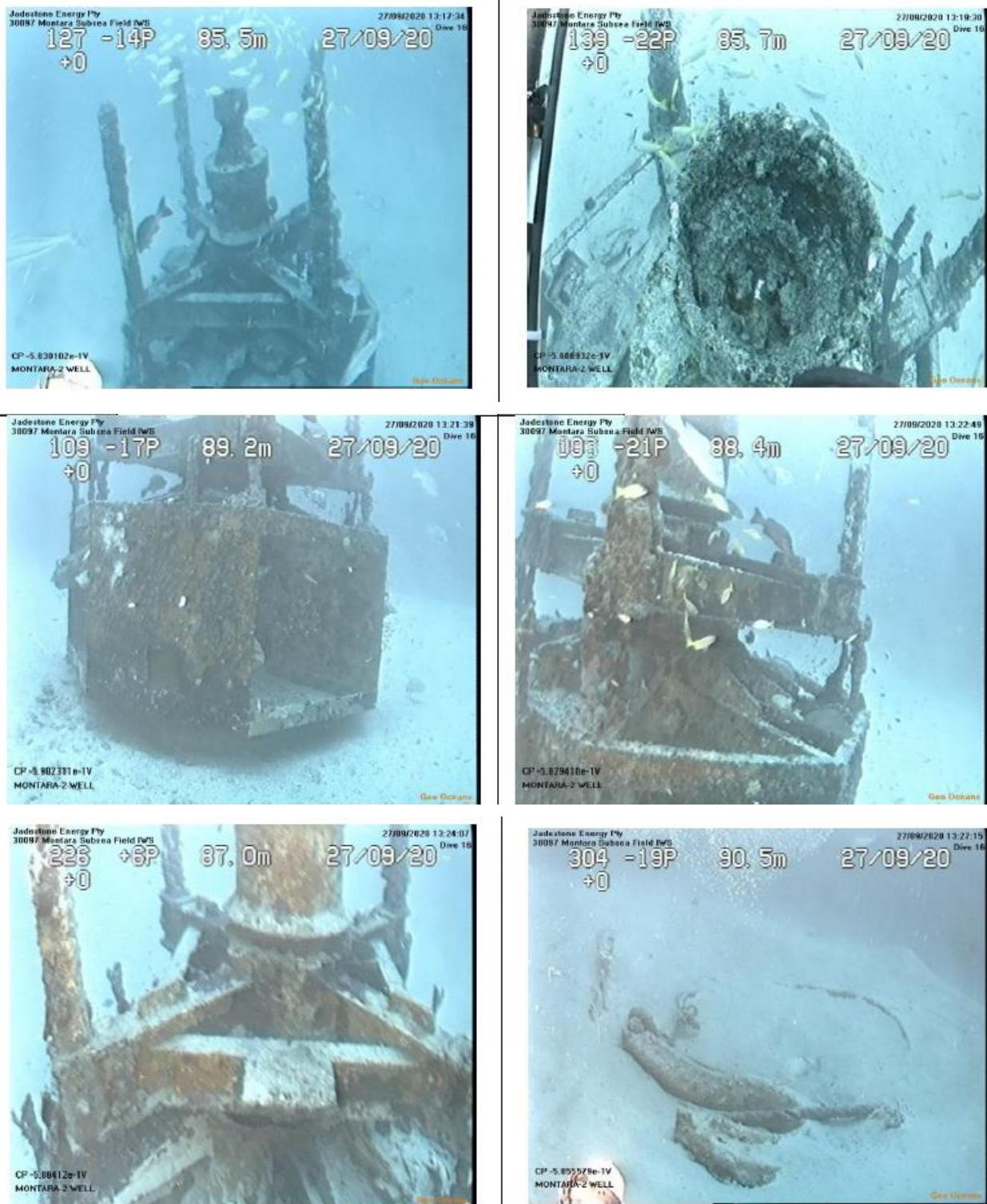


Figure 2-2: Images of Montara-2 wellhead – Upper wellhead with PGB (Top Left), Debris cap (Top Right), west face of TGB and wellhead (Middle L-R), east face wellhead and debris (Bottom L-R) (Jadestone Energy, 2020)

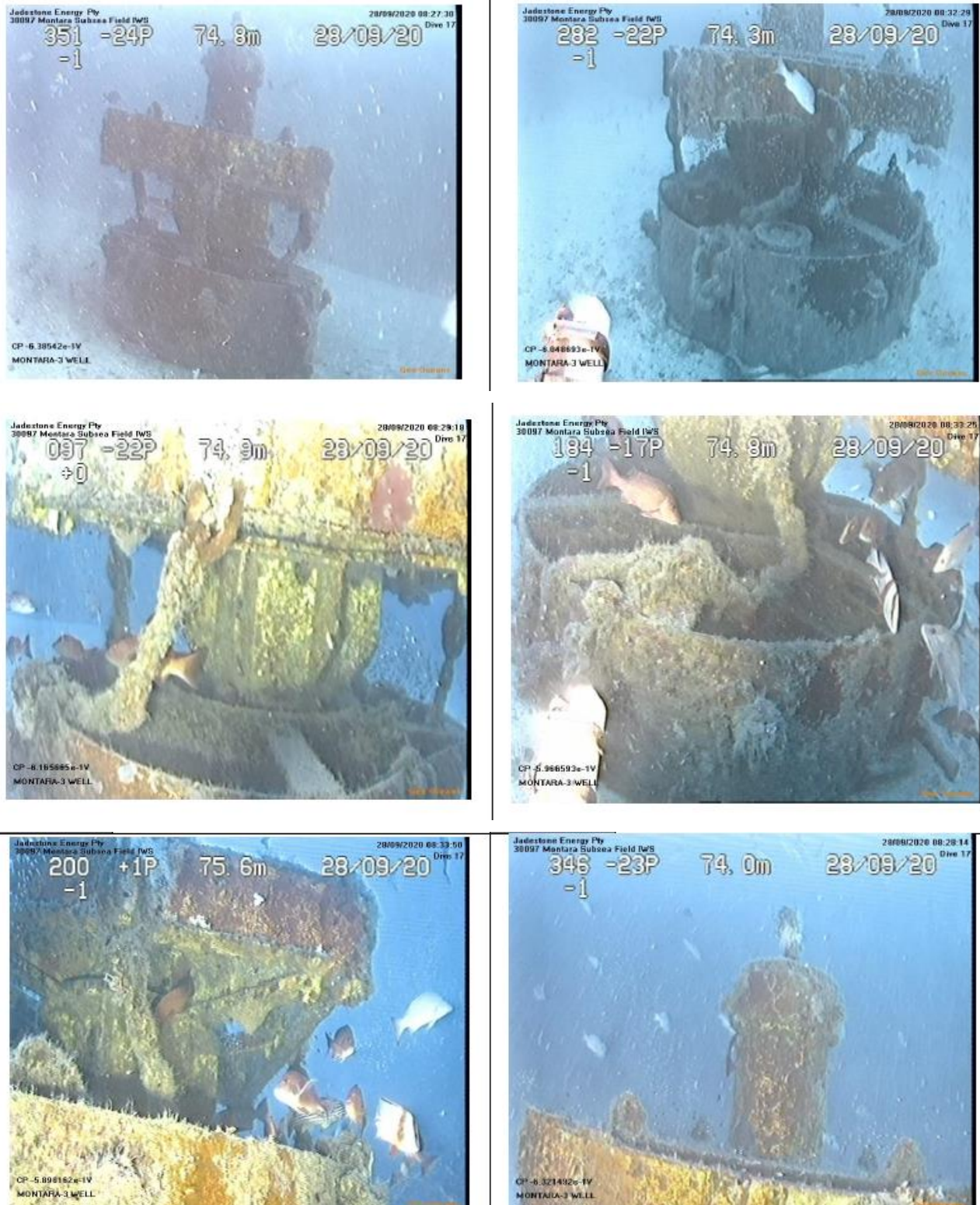


Figure 2-3: Images of Montara-3 wellhead – South and East face of wellhead (Top L-R), West and North face of TGB (Middle L-R), North face of PGB/TGB and debris cap (Bottom L-R) (Jadestone Energy, 2020)

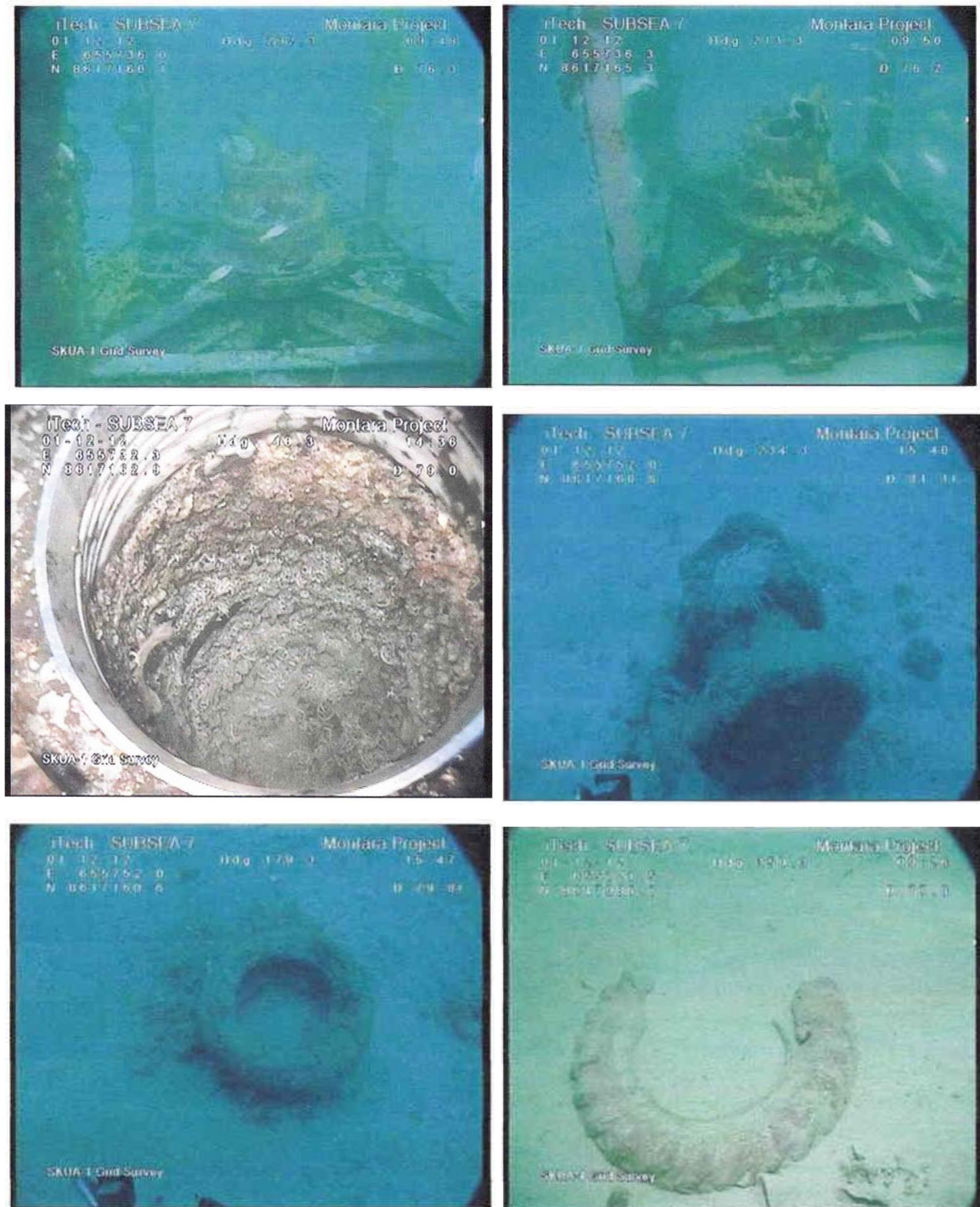


Figure 2-4: Images of Skua-1 wellhead –Wellhead (Top L-R), Debris cap and bollard debris (Middle L-R), debris (two tyres) (Bottom L-R) (PTTEP, 2012)

2.3 Petroleum Safety Zone (PSZ)

There is currently no PSZ around any of the wellheads subject to this EP, however the wellheads are marked on nautical charts and will continue to be going forward.

A cautionary zone of 2.5 nautical miles (NM) radius is maintained around subsea structures including the wellheads. This information has been notated on Admiralty Charts covering the region (#314), and although vessels are requested to avoid navigating, anchoring and fishing, it is not an exclusion zone.

2.4 Operational Area

No activities are proposed at the Montara-1, -2 and -3 and Skua-1 wellheads, however for the purposes of risk assessment, the Operational Areas includes a 500 m radius around each of the wellheads.

2.5 Operational Details of the Activity

The petroleum activity is the permanent abandonment of the Montara-1, -2, -3 and Skua-1 wellheads in situ. Wellhead details are provided in Section 2.2. The petroleum activity involves no further property inspections or maintenance, offshore operations, or environmental monitoring.

2.6 Options Assessment

2.6.1 Overview

Section 572(3) of the OPGGS Act states that *"a titleholder must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations in which the titleholder is or will be engaged and that are authorised by the permit, lease, licence or authority."*

The Offshore Petroleum Decommissioning Guideline (DISER, 2020) clarifies that the 'Base Case' is complete removal. It states that options other than complete removal may be considered if the titleholder can demonstrate that the alternative decommissioning approach delivers equal or better environmental and safety outcomes compared to complete removal, and that the approach complies with all other requirements.

To define the petroleum activity for this EP, Jadestone Energy conducted an options assessment to evaluate wellhead decommissioning options relative to the Base Case. Consistent with the Decommissioning Guidelines, and the Offshore Oil and Gas Decommissioning Decision-making Guidelines (APPEA, 2016) the options assessment considered environmental, social and safety criteria to evaluate each decommissioning option. In accordance with the Section 572 Maintenance and Removal of Property Policy (NOPSEMA, 2020), the EP must evaluate the feasibility of all options.

Stakeholders were consulted on the selected option as described in Section 4.

Section 2.6.2 describes the options assessment process and related results. These results provide Jadestone Energy with an understanding of the preferred decommissioning option based on how it ranks against the assessment criteria.

The preferred option is determined against the acceptability criteria detailed in Section 5.4. This is undertaken in accordance with Section 5.

2.6.2 Decommissioning Options and Screening

To develop the decommissioning options, three possible options were considered. These were:

- Base Case – removal of the wellhead;
- Option 1 – leave the wellhead in situ; and
- Option 2 – install a wellhead cover or cap to reduce snagging risks to commercial trawl fishers.

An options screening assessment was undertaken to determine which options would be taken forward to the decommissioning options assessment.

Option 2 was not taken further in the assessment as installation of a wellhead cap would not result in an additional benefit as it would only reduce, but not remove the navigational hazard posed by the wellheads. As the wellheads remain marked on nautical charts, installing a wellhead cap is considered to provide little benefit over the base case.

The Base Case and Option 1 were carried forward for the options assessment. The technical feasibility of each of these options are described Table 2-3.

Table 2-3: Base Case (Complete removal) Options Summary

Base Case	Method	Description	Technical feasibility
Complete removal of wellheads with external cutting tool	<p>External cutting above the mudline using a cutting tool such as a diamond wire saw (DWS)</p> <p><u>Deployed via:</u></p> <p>Vessel in field with a heave compensated crane with the capability to lift the wellheads to deck</p> <p><u>Duration of Activity</u></p> <p>Approximately 1 week in field per wellhead plus 3 days for transit to/from the Montara Field</p> <p><u>Cost of option</u></p> <p>~\$2MMmob/demob</p> <p>3 days transit time @ ~\$250K/day = \$750K</p> <p>7 days per wellhead @~250K/day = \$1.75MM</p> <p>= ~9.75MM for all wellheads to be removed as 1 campaign</p>	<p>Dredging below the TGB/PGB or removal required prior to cutting of the wellhead as the most readily available DWS types are mounted to the conductor.</p> <p>Some removal of marine growth would be required prior to cutting.</p> <p>Cutting tools are deployed from the outside of the wellhead (above the mudline where there is access following removal of TGB/PGB) to sever the wellhead, conductor and internal casing strings from the casing stump by cutting from the outside. This method will usually leave a stump (~0.1 m) protruding from the seafloor.</p> <p>Both DWS and wellhead structure require crane support during the cut.</p> <p>Alternative DWS that may be suitable for cutting around TGB/PGB may be feasible but would likely require modifications which have not been proven in-field for wellhead removal.</p>	<p>The wellheads are in >72 m of water; the preferred method in the interests of safety for removal at this depth is using a ROV rather than saturation diving.</p> <p>Direct access to the wellhead for external DWS mounting is not feasible without removal of the TGB/PGB.</p> <p>There is minimal clearance above the seabed preventing access below the TGB/PGB for any external cutting to the wellhead conductor without dredging seabed material from around the outside.</p> <p>The extent of conductor cement at seabed level below the TGB/PGB is unknown. The cement patio may also present a physical impediment and prevent dredging.</p> <p>There is some marine growth on all the wellheads, but it is limited due to the water depths and lack of diverse habitats around the wellheads in the remote offshore location. Some cleaning would likely be required prior to commencing cutting.</p> <p>As the wellheads have been in situ for many years, the strength of the wellhead is unknown and therefore the ease in which the wellhead will be removed is unknown. It is considered likely the wellhead would break apart upon retrieval, resulting in additional debris scattering around the site. This would then require additional time, additional lifts and potentially different tools to retrieve the debris depending on the size of the debris pieces. A worst-case scenario would be multiple trips to remove the debris if the vessel does not have the right tools, and there would be additional seabed disturbance from the debris. This is considered extremely likely for Skua-1 given the age of the wellhead.</p>

Base Case	Method	Description	Technical feasibility
Complete removal of wellheads with internal cutting tool	<p>Internal Cutting inside the wellhead using high pressure water jetting or mechanical tool</p> <p><u>Deployed via:</u></p> <p>Vessel in field with a heave compensated crane with the capability to lift the wellhead to deck</p> <p><u>Duration of Activity</u></p> <p>Approximately 1 week in field per wellhead plus 3 days for transit to/from the Montara Field</p> <p><u>Cost of option</u></p> <p>~\$2MM mob/demob</p> <p>3 days transit time @ ~\$250K/day = \$750K</p> <p>7 days per wellhead @~250K/day = \$1.75MM</p> <p>= ~9.75MM for all wellheads to be removed as 1 campaign</p>	<p>High pressure water blasting tool is deployed inside the wellhead to enable the tool to be below the mudline. The wellhead and internal casing string are severed from the wellhead</p> <p>The severed wellhead and casing/ conductor stumps (and any surrounding cement attached) are then pulled and recovered using the same tooling used to make the cut. This method should leave nothing protruding from the seafloor.</p>	<p>Recovery of each wellhead in one piece is considered unlikely given the age of the wellheads, as per the option above, this would result in multiple lifts and potentially multiple trips to field and additional seabed disturbance.</p> <p>This option carries additional risk to the previous option as the wall thickness of the wellheads is unknown (as it is not detailed in any end of well reports for these wellheads); therefore it is unknown if the wellheads will be able to bear the weight of the cement when being pulled and retrieved to surface.</p> <p>Wall thickness can be measured via calipers during the wellhead removal activity, and this can then be extrapolated to calculate the strength of the wellhead. To conduct the caliper measurements, a wireline unit would be required which would be deployed via a light well intervention vessel.</p> <p>The latching mechanism on the wellheads is also unknown; this presents a risk gaining access to the wellbore for any internal cutting or pressure management options.</p> <p>This option also requires use of a heave compensated crane for lifts and a pole to hold the wireline unit with a miniature derrick. This requirement limits the range of vessels that could be available to complete the activity.</p> <p>The measurement and wellhead removal could be completed in two separate campaigns or in one single campaign, though it is possible that the measurements would produce a result that means the wellhead retrieval is not technically feasible and therefore the option results in a significant economic loss due to a change in contracting arrangements of the vessels and inability to complete the job.</p>

2.6.3 Assessment Criteria

The criteria used for the options assessment are detailed in Table 2-4.

Table 2-4: Options Assessment Criteria

Criteria	Sub-criteria	Description
Technical Feasibility	Engineering and execution complexity	The extent to which the option requires the use of proven technology. The ability to recover from unplanned excursions and complete the planned option.
	Corrosion and stability	The state of corrosion and stability of the equipment
People	Risk to personnel offshore and onshore	Health and safety risks to company-related personnel both onshore (e.g., logistics) and offshore.
	Residual risk to other marine users	Health and safety risks to marine users such as commercial vessels, fishers and members of the public.
Environment	Water quality and sediment quality	Assessment of water and sediment quality.
	Ecological services	Assessment of biodiversity and habitat changes due to the physical presence of property, and seabed disturbance because of the petroleum activity.
	Emissions	Emissions such as light, noise, air and marine discharges.
	Waste	Volume and type of waste associated with offshore operations (e.g., landfill, recyclables).
	Potential incidents	Accidental events resulting in impacts to the environment offshore (e.g., vessel collision)
Socio-economic	Effect on commercial fisheries	Displacing commercial fisheries or affecting their catch.
		Increase in biodiversity around wellheads
	Other socio-economic effects	Effects on local communities, recreational users, commercial activities, etc.
Reputation	Reputational risk	Media coverage of the activity at local, national or international level
Economic	Financial cost	Operational / capital costs to Jadestone

2.6.4 Options Evaluation

The rating table used for each criterion and sub-criterion and completed options assessment is detailed in Table 2-5 and Table 2-6, respectively.

The Jadestone risk management framework is described in Section 5 and due to the nature of the activity, the impact levels 1, 2 and 3 were used to define the guiding principles of acceptability assessment (refer Table 5-4) for this activity.

Table 2-5: Options Assessment Rating Template

Criteria	Sub-criteria	Most Preferred	Considered	Least Preferred
Technical Feasibility	Engineering and execution complexity	Scope is defined and understood. Low levels of technical risk. Methods widely used across industry.	Some uncertainty in parts of the scope and equipment used. Moderate levels of technical risk. Some examples of the method being used in industry.	Uncertainty in many areas of the scope and in equipment used. High levels of technical risk. Method not widely used across industry.
	Corrosion and stability	Wellheads stable with limited corrosion and likely to be retrieved in one piece	Wellheads have some corrosion and possible it will break into several large fragments if disturbed	Wellheads have significant or unknown corrosion and are unstable resulting in multiple pieces of debris
People	Risk to personnel offshore and onshore	Slight risk to personnel due to exposure hours and/or health and safety risk.	Minor risk to personnel due to exposure hours and/or health and safety risk.	Major risk to personnel due to exposure hours and/or health and safety risk.
	Residual risk to other marine users	No material health and safety risks to identified marine users.	Minor health and safety risks to identified marine users. Risk reduction measures potentially required.	Major health and safety risks to identified marine users. Significant risk reduction measures required.
Environment (including principles of ESD)	Water quality and sediment impacts	Discharges/emissions have slight effect – recovery in days to weeks in the immediate vicinity of the property.	Discharges/emissions have minor effect – recovery in weeks to months.	Local effects to water quality and sediment quality. Potential effects long term
	Ecological services	Retention of hard substrate. Slight seabed disturbance.	Some loss of hard substrate. Minor seabed disturbance.	Complete or significant loss of hard substrate. Moderate seabed disturbance.

Criteria	Sub-criteria	Most Preferred	Considered	Least Preferred
	Emissions	No or low number of offshore vessel days (i.e., days).	Minor number of offshore vessel days (i.e. weeks).	High levels of emissions. Large number of offshore vessel days (i.e., months).
	Waste	No or low levels of operational waste.	Moderate levels of operational waste.	High levels of operational waste.
	Potential incidents	No or low risk of accidental events such as vessel collision.	Moderate risk of accidental events such as vessel collision.	High risk of accidental events such as vessel collision.
Social	Effect on commercial fisheries	Site/property will have no effect on current or future commercial fisheries. Potential benefits to commercial fishers. No issues raised by stakeholders	Site will be available to current and future commercial fisheries, but some property will remain. Potential for low fishing gear and/or navigational risks. Concern/ query received by stakeholders due to activity	Site will no longer be accessible to current and future commercial fisheries, and/or has significant fishing gear and/or navigational risks. Modification of planned activity due to stakeholder consultation
	Other socio-economic effects	Site/ property not expected to be of a material socio-economic concern. Potential benefits.	Site/property not expected to exclude other marine users. Potential for some socio- economic concerns.	Site/property may exclude other marine users. Potential for significant socio-economic concerns.
Reputation	Reputational risk	Slight impact – no media coverage	Limited impact – State media coverage	Considerable impact – national coverage
Economic	Financial cost	<\$1 million	<\$1–10 million	>\$10–25 million

Table 2-6: Options Assessment of Base Case and Option 1 for Management of the Wellheads

Criteria	Sub-criteria	Comparative Impact		Options Assessment
		Base Case – Complete removal	Option 1 – Leave in situ	
TechnicalFeasibility	Engineering and execution complexity			<p>Leave in situ poses no technical risk. As the wellheads are aging assets and the likelihood of the wellhead being removed in one piece is unknown, multiple campaigns may be required to remove the wellhead and associated debris if it were to break apart during initial lifts.</p> <p>The external wellhead removal methods and potential risks are described in Table 2-2. Risks associated with removal of the wellheads by external cutting include:</p> <ul style="list-style-type: none"> The presence of a TGB/PGB around the wellheads which prevents direct access to the wellhead for external DWS mounting. Removal of TGB/PGB would be required or dredging to access the conductor below the TGB/PGB The extent of cement at seabed level below GB is unknown (from conductor cementing) – a cement patio is likely to present a physical barrier to dredging Conventional DWS options are not possible due to technical issues such as crane deployment (not being possible to access below the TGB/PGB). <p>Due to the obstruction of the TGB/PGB being present at the bottom of the well head, the only viable method for external removal of the wellhead utilises a prototype tool that has never been tested in the field and would require modification for wellhead removal. This presents a risk in terms of technical feasibility. Based on the presence of the TGB/PGB and the prototype tool recommended to undertake the external cut, external cutting is considered to have a high level of complexity with a low likelihood of success.</p> <p>The internal wellhead removal methods and potential risks are described in Table 2-3. Risks associated with removal of the wellheads by internal cutting include:</p> <ul style="list-style-type: none"> The condition of the wellhead debris cap, internal housing, and latching mechanism are unknown which presents a risk to internal cutting operations. It is unclear if full bore access internal to the WH is achievable from the ROV survey. Based on the age of the wellheads and the uncertainty of the wellhead wall thickness, removal by internal cutting is considered to have a high level of complexity and a low likelihood of success. <p>Considering both potential wellhead removal options have a low likelihood of success with some uncertainty in many areas of the scope, the preference from a technical feasibility perspective is to leave the wellhead in place.</p>
TechnicalFeasibility	Corrosion and Stability			<p>Although ROV footage indicates the wellheads are stable, the likelihood that the wellheads could be retrieved in one piece is unknown. Over time the wellhead will break down, potentially large pieces will break off onto the surrounding seabed, though will likely remain within the immediate vicinity of the wellhead and bury/ re-bury over time. Leave in situ poses risk to the corrosion and stability of the wellheads as they break down, but that is the intent of leaving the wellhead in situ. Complete removal poses no risk to the future corrosion and stability of the wellhead.</p>
People	Risk to personnel offshore and onshore			<p>Leave in-situ is the preferred option as this eliminates the health and safety risks to personnel during removal. This includes vessel mobilisation and execution, land logistics, supply base, waste disposal health and safety risks. The wellhead removal option would result in weeks of exposure hours, with 4 weeks as a minimum but additional time potentially required for multiple trips (if needed). In the event that the wellheads are not recovered in one piece, there would be a requirement for multiple lifts, increasing the health and safety risks of the job. Additionally, the unknown stability of the wellhead could result in it breaking apart at any stage and risking the safety of personnel offshore.</p> <p>For these reasons, the leave in situ option is most preferred.</p>
	Residual risk to other marine users			<p>Given the remote offshore location of the wellhead and the water depth of >72 m, no credible health and safety risks to marine users have been identified from leaving the wellheads in situ. The wellheads have been in place since 1974, 1988, 1991 and 2002 and no harm or events are known to have occurred as a result of their placement during this time.</p> <p>No known trawl fisheries overlap with the wellhead locations, and no trawl-based fishery was identified as using the fishing grids in the well locations in the last five years. Trawl-based fisheries have a higher snag risk compared to line-based fisheries.</p> <p>A number of line-based fisheries are permitted to operate in the area, however only the Northern Demersal Scalefish Fishery (NDSF) was identified as having catch history in the last five years in this locality. Limited feedback was received as a result of consultation on the EP activity from the NDSF fishery, with one response received having no objections with the infrastructure remaining in place.</p> <p>The locations of the wellheads have been communicated to relevant stakeholders through consultation for this activity and they are marked on admiralty charts. Therefore, this sub-criterion is not considered a differentiator between the two options.</p>

Criteria	Sub-criteria	Comparative Impact		Options Assessment
		Base Case – Complete removal	Option 1 – Leave in situ	
Environment	Water quality and sediment impacts			<p>As the wellheads are supported by a TGB/PGB, dredging of up to 15 m³ of sediment would be required to remove the wellhead by external cutting. Up to 50 bbls of water-based mud (with some residual oil from Skua-1) would be released to the marine environment during wellhead removal from exposure to the casing annuli. Wellhead removal would result in moderate localised impacts to water and sediment quality.</p> <p>If the wellhead is left in situ it would slowly degrade overtime releasing corrosion material. The wellhead is comprised predominantly of mild steel. Iron, the primary component of steel (98%), is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). All iron oxides are included on the OSPAR PLONOR list (Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment). Based on the low toxicity of iron, the slow-release rate and rapid dilution of the open ocean environment, any impacts to sediments and water quality will be low and in the immediate vicinity of the wellhead.</p> <p>Complete removal would result in vessel discharges to sea for the period of the removal (approximately four weeks), however vessel discharges would be in accordance with legislative requirements (e.g. MARPOL) and therefore no long term impacts the water or sediment quality would be expected unless there was an unplanned event (such as vessel collision).</p>
	Ecological services			The leave in situ option provides habitat for marine life around the well head structure with a potential environmental benefit. That said, any local benefit would be immaterial as the wellhead is small. Removal of the wellheads would remove the established community at the wellheads.
	Emissions			Leave in situ is the preferred option as there would be no emissions generated. If removed, emissions (e.g. Greenhouse Gases) would be generated by onshore vehicles and offshore vessel operations. As the activity would take a minimum of four weeks, a moderate level of emissions is expected.
	Waste			Leave in situ is preferred as there would be no waste generated off location. If removed a large amount of waste would be associated with wellhead disposal.
	Potential Incidents			No or low risk of accidental events such as vessel collision from leaving the wellhead in situ given the low fishing effort in the operational area and water depth of the wellheads. There is no risk of a hydrocarbon incident from the wellheads as they are verified as plugged and abandoned. There is a moderate risk of incident in the case of complete removal as this involves a vessel in field for approximately four weeks to remove the wellheads.
Social	Effect on commercial fisheries			<p>A number of fisheries were identified as being licensed to operate in the vicinity of the wellheads. These were further assessed (Appendix B) against recent catch history within the Operational Areas (within last 5 years); and fishing methods that are feasible to operate in the water depth.</p> <p>Trawl-based fisheries have the greatest snag risk from seabed infrastructure. No trawl-based fishery was identified as using the fishing grids overlapping with the well locations in the last five years.</p> <p>The Northern Demersal Scalefish Fishery (a line-based fishery) was identified as having catch history in the last five years in this area. Although limited feedback was received as a result of notification of the activities from this fishery, the one response received had no objections with the infrastructure remaining in place. The ecological habitat provided by the wellhead may locally enhance fish populations, as seen in ROV footage there are some fish aggregating around the wellheads which could be of some limited benefit to the Demersal Scale fish Fishery in the area, but given the size of the wellhead these aggregations are not expected to be significant.</p>
	Other socio-economic effects			Given the remote offshore location of the wellhead and the water depth, no socio-economic concerns have been identified for either option. Therefore, this sub-criterion is not considered a differentiator between the two options and is acceptable with either option.
Reputation	Reputational risk			Given the remote offshore location of the wellhead and the feedback from stakeholder consultation, no reputational concerns have been identified for either option. Therefore, this sub-criterion is not considered a differentiator between the two options.

Criteria	Sub-criteria	Comparative Impact		Options Assessment
		Base Case – Complete removal	Option 1 – Leave in situ	
Economic	Financial cost			<p>Wellhead removal costs for all four wellheads would be in the region of \$10MM to remove all four wellheads in the same campaign. There is the risk that multiple trips to the wellheads may be required if the wellheads cannot be removed in one piece, or if all four wellheads cannot be pulled at the same time. This would result in additional mobilization/demobilization costs for each trip to the field (~\$2MM for each mobilization/demobilization plus 3 days transit time ~\$750K).</p> <p>There is the potential for the wellhead removal activities to be completed in the same campaign as the installation of remote monitoring systems (RMS) on two other Jadestone Energy wellheads (Sea Eagle and Tahbilk, subject to a different EP) in the permit areas. However, the requirement for a large vessel for the wellhead removal activity, would significantly increase the cost of the Sea Eagle and Tahbilk RMS activity as a larger crane and larger vessel are required than that needed for the RMS activity.</p> <p>The wellheads are located in >72 m of water, this exceeds the maximum operating depth for air diving, consequently ROV operations are required for wellhead removal (saturation (SAT) diving spreads are considered disproportionately high cost).</p> <p>Leave in-situ is preferred as it would involve no additional costs. The economic cost outweighs the benefit of removal.</p>

2.6.5 Results and Option Selection

Option 1 (leave in situ) is the preferred option in terms of technical, environmental and safety criteria. The base case (complete removal) was conservatively selected as the preferred option in terms of social criteria (effect on commercial fisheries), as there is a low snag risk associated with leaving the wellhead in situ. Jadestone has introduced additional control measures and conducted stakeholder engagement to address concerns raised by stakeholders (Section 4).

On this basis Option 1 (leave in situ), was selected as it was the preferred option overall. The options assessment demonstrated that Option 1 (leave in situ) provides a better environmental, and safety outcome compared to the Base Case (complete removal) (DISER, 2020). Jadestone is therefore proposing a deviation from the removal requirements of subsection 572(3) of the OPGGS Act and Option 1 (leave in-situ) has been defined as the petroleum activity for the purposes of this EP.

Section 6 and 7 of this EP assess complete removal (Base Case) against Option 1 (leave in situ) across individual risks to demonstrate and confirm that leave in-situ is the ALARP option for decommissioning the wellheads.

3. EXISTING ENVIRONMENT

3.1 Definition of Areas

Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009, Regulation 13(2) requires the proponent to:

- ‘(a) describe the existing environment that may be affected by the activity; and*
- (b) include details of the particular relevant values and sensitivities (if any) of that environment.’*

To address this requirement, Jadestone has evaluated the values and sensitivities within the Operational Areas which have been defined as a 500m zone around each of the wellheads.

Details of the environmental values and sensitivities in the Operational Areas are described here in Section 3 and listed in Appendix A.

Distances quoted throughout this report have been measured from the Montara Field. The Operational Areas of this report include the wellheads of Montara-1,2,3 which lie 2.1 km, 3.3 km and 0.7 km respectively from the Montara wellhead platform and Skua-1 which is 21.8 km from the Montara WHP in the Montara field.

3.2 Marine Regional Setting

Australia’s offshore waters have been divided into six marine regions in order to facilitate their management by the Australian Government under the EPBC Act. The activity is located within the Northwest Marine Region (NWMR) (Figure 3-1). The NWMR encompasses Commonwealth waters from the Western Australia/Northern Territory border in the north, to Kalbarri in the south. The main physical features and values of the NWMR are:

- Ashmore Reef, Cartier Island, Seringapatam Reef and Scott Reef which have been identified as regionally important areas supporting a high biodiversity of marine life and supporting foraging and breeding aggregations. Ashmore Reef and Cartier Island are located approximately 149 km and 106 km north-west, respectively, from the Montara field;
- A number of key ecological features (KEFs) have been identified in the region (Section 3.4.6). The Continental Slope Demersal Fish Community has been identified as an important marine community, due to its high species diversity and endemism. The Carbonate Bank and Terrace System of the Sahul Shelf has also been identified as regionally important as it is a unique sea floor

feature; contributing to the biodiversity and productivity of the local area. Neither of these features overlap the Operational Areas; and

- Other priority areas in the NWMR include Rowley Shoals and Ningaloo Reef. However, these areas are at least 700 km from the Operational Area.

Within the NWMR the Operational Areas lies within the Northwest Shelf Transition provincial bioregion, summarised in Table 3-1.

Table 3-1: Provincial bioregions in Operational Area

Area	Description
Northwest Shelf Transition	The Northwest Shelf Transition covers the mostly shallow waters (<100 m) between Cape Leveque (WA) and the Tiwi Islands (NT). This transition has a diverse seafloor topography including submerged terraces, carbonate banks, pinnacles, reefs and sand banks.

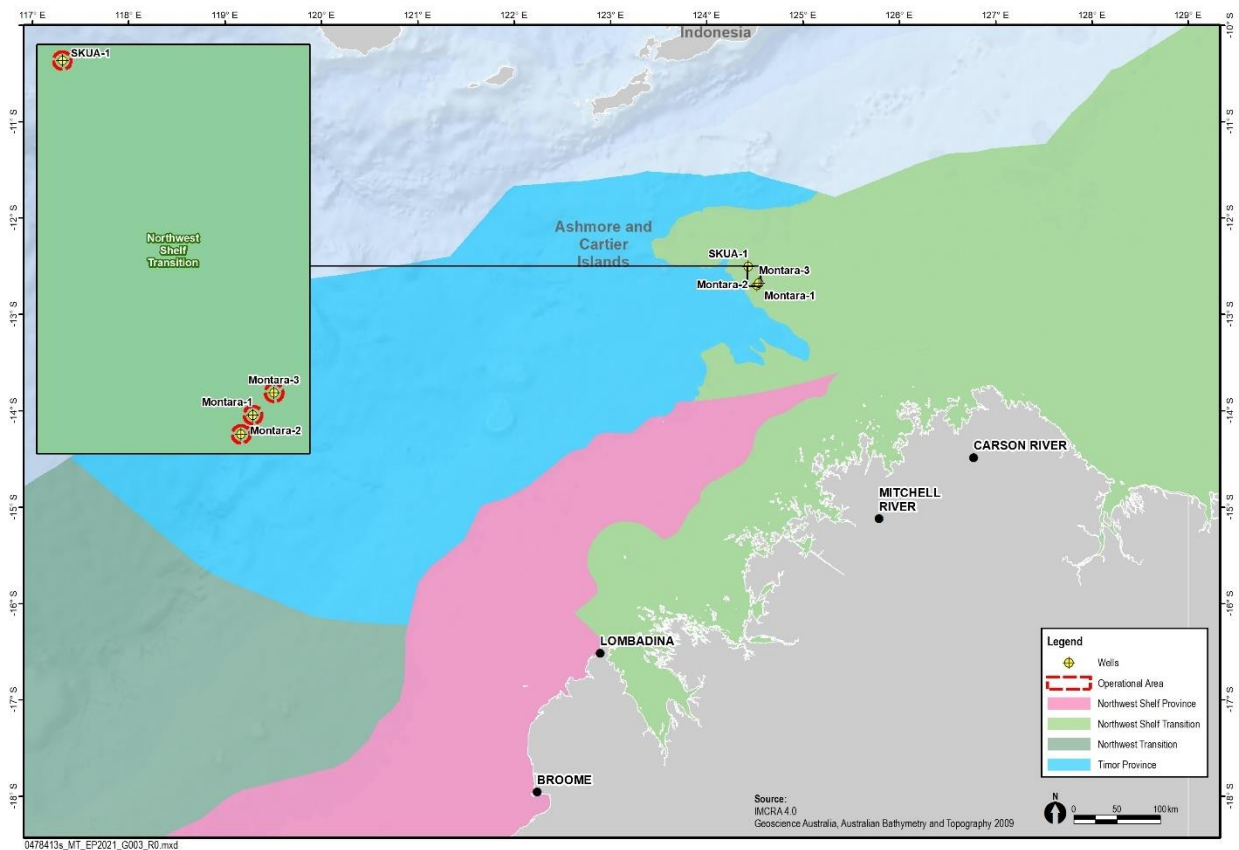


Figure 3-1: Provincial Bioregions relevant to the Operational Areas

3.3 Physical Environment

3.3.1 Climate

The Operational Areas experiences a monsoonal climate with two predominant seasons including a hot wet summer season, October to March and a cool dry winter season April to September, which are referred to as the northwest and southeast monsoons, respectively. The climate is influenced by two major atmospheric pressure systems: the subtropical ridge of high-pressure cells referred to as highs or anticyclones, and a broad

tropical low-pressure region called the monsoon trough (RPS Metocean 2008). These two major systems create three discrete weather phenomena that influence conditions within the Operational Area:

- The north-west monsoon season occurs from October to March, or wet season, and is characterised by north-west to south-west winds. The monsoon season is generally associated with broad areas of cloud and rain including periods of widespread heavy rainfall;
- 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; and
- Cyclonic activity occurs between November to April and the area will experience on average three cyclones a year. Cyclones can bring very large amounts of rain, with strong swell and rough seas common during these events.

In general, January to February and May to July are the windiest months however, peak wind velocities are associated with tropical cyclones that occur during the wet season. Cyclone probability is estimated to be one per annum within 180 km of the site and four per annum within 1,100 km of the site.

Mean annual rainfall in the region is 1,770 mm. Mean air temperature ranges from 24.9°C in July and 29.6°C in December. The closest meteorological station to the Montara field is located at Troughton Island approximately 630 km south-west of the Operational Areas (Bureau of Meteorology (BoM) 2012) (Table 3-2).

Table 3-2: Meteorological conditions representative of the Montara Field (Troughton Island)

Month	Mean Monthly Maximum Temperature (C°)	Mean Monthly Minimum Temperature (C°)	Mean Rainfall (mm)	Mean Relative Humidity (%)
January	31.8	26.3	273.0	77
February	31.4	26.1	137.9	78
March	31.9	26.4	145.3	74
April	32.7	26.8	31.2	64
May	31.1	25.3	40.5	58
June	28.9	23.2	7.6	56
July	28.1	22.1	2.8	58
August	28.8	22.5	0.6	62
September	30.2	24.5	0.3	69
October	31.7	26.3	2.9	69
November	32.9	27.4	9.4	69
December	32.9	27.3	120.1	69
Annual	31.0	25.3	828.9	67

3.3.2 Oceanography (Tides and Currents)

Broad scale oceanography in the north-west Australian offshore area is complex, with major surface currents influencing the Region, including the Indonesian Throughflow (ITF), the Leeuwin Current, the South Equatorial Current and the Eastern Gyral Current (Figure 3-2).

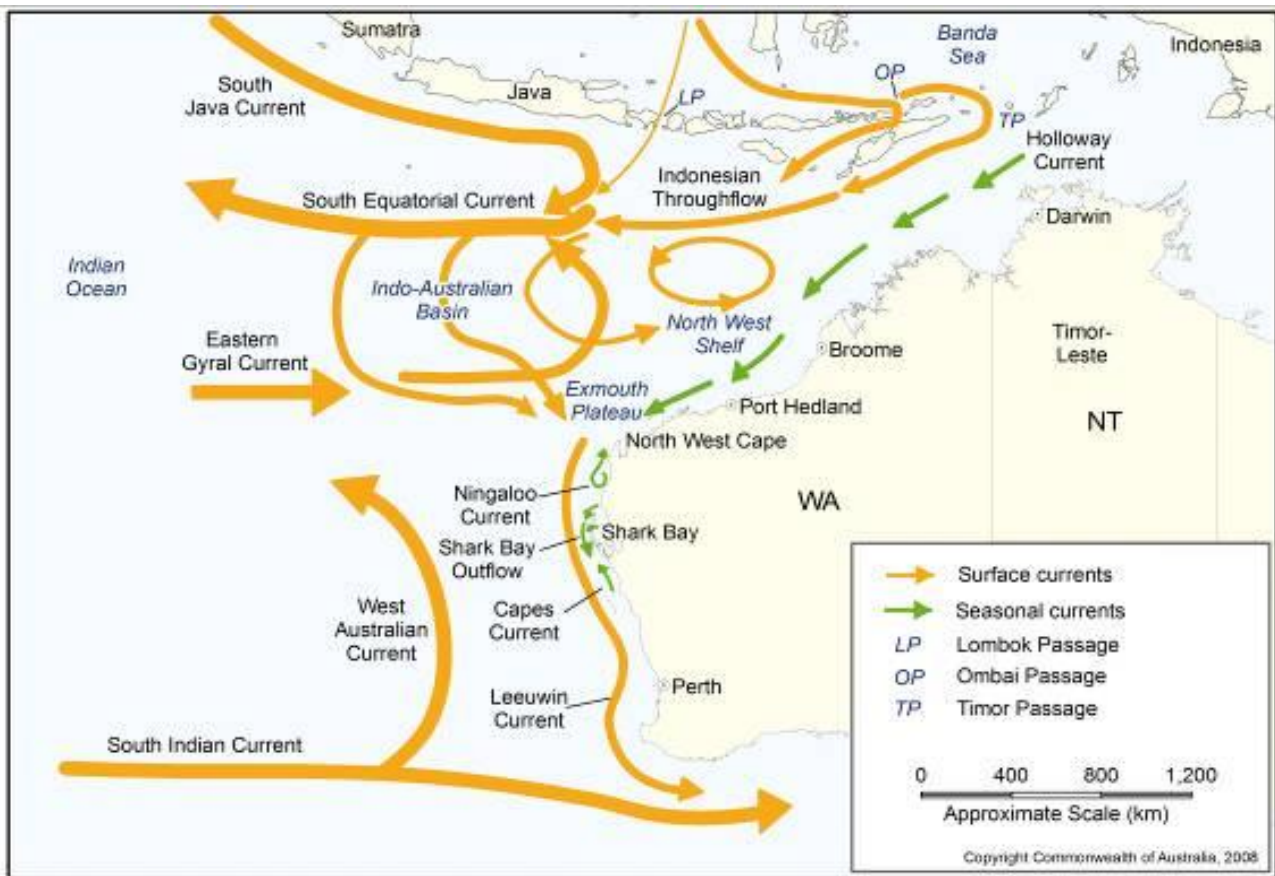
The oceanographic regime of the northwest Australian offshore area is strongly influenced by the ITF which transports warm, low salinity, oligotrophic waters through a complex system of currents, linking the Pacific and Indian Ocean via the Indonesian Archipelago (Department of State Development 2010). The strength of the ITF fluctuates seasonally and reaches maximum strength during the south-east monsoon (May to September) and weakens during the north-west monsoon.

Currents in the Kimberley region are also generated by several more localised factors, including tidal forcing, local wind forcing, inertial oscillations, shelf waves, seiche and trapped waves. Studies undertaken in the vicinity of Scott Reef and Seringapatam Reef suggest that the ITF does not directly influence these systems, but it is the eddies that peel off the main ITF current and travel along the shelf-break that have a greater influence on the reefs. In general, the tidal regime and wind forcing are the major contributors to local currents in the area. The currents in the Operational Areas are influenced by the semi-diurnal tides that have four direction reversals per day. Both the semidiurnal and diurnal tides appear to travel north-eastwards in the deep water leading to the Timor Trough prior to propagation eastwards and southwards across the wide continental shelf. The NWMR experiences some of the largest tides along a coastline adjoining an open ocean in the world.

Wind driven currents from monsoons and cyclones and drift currents (ITF) are likely to prevail during neap tides or during periods of strong influence when one of the current reversals may be suppressed. Maximum tidal range is 5.7 m and tidal currents flood to the southeast and ebb to the northwest and under normal conditions (i.e., no storms), maximum recorded current speed at the surface is 0.95 m/s, mainly due to the tide. Current speeds decrease with depth below the surface. The strength and direction of tidal current flow is also strongly influenced by local bathymetry.

Wind induced currents result from local wind forcing at the surface and are most pronounced during cyclones with development of transient oscillations known as inertial currents following the passage of cyclones. Wind driven surface currents and their direction are generated by prevailing seasonal winds from the west in summer and from the east and southeast during winter. The following current data has been estimated for one in 50-year storm conditions:

- Surface currents = 2 m/s;
- Mid depth currents = 1 m/s; and
- Seafloor currents = 0.67 m/s.



Source: DEWHA (2008)

Figure 3-2: Key ocean currents influencing Western Australia

3.3.3 Waves

Surface waves and sea swell in the region can vary widely in direction depending on wind direction, locations of major storms and local bathymetric effects such as the shelf break or proximity to islands such as Ashmore Reef. Waves are subject to the following key influences:

- Locally generated wind waves, seas: generally, from west during wet season and from the east during the dry season; and
- Remotely generated swells: South to south westerly swells persist from storms in the southern Indian Ocean and occasional, low amplitude waves up to 1 m originate from earthquakes in the Sunda Trench, between Australia and Indonesia.

In general, the maximum and mean sea swells are larger in winter than summer as a result of the strong easterly wind-generated seas and larger winter swell from the Southern and Indian Oceans. Occasional monsoonal storms and cyclones can result in much larger waves and swell. Extreme winds associated with cyclones can generate waves up to 21 m in height from any direction (RPS Metocean 2008).

Significant wave heights are experienced in the Montara field are as follows:

- Greater than 2 m, 7.7% of the time; and
- Greater than 4 m, 0.4% of the time.

The following wave data has been estimated for one in 50-year storm conditions as:

- Maximum wave height = 16.1 m;

- Significant wave height = 8.6 m; and
- Peak wave period = 11.4 seconds.

3.3.4 Temperature, Salinity and Turbidity

Seawater temperature in the region generally ranges from 25°C to 31°C at the surface and 22°C to 25°C at the seafloor. The sub-tropical water temperatures are largely influenced by the ITF and a highly pronounced thermocline, which is controlled by the ITF (Brewer et al. 2007).

Water quality monitoring at the Montara Field found surface water temperatures ranged from 28.0°C to 28.7°C, with a slight reduction of <1°C at 20 m depth. Salinity of surface waters was consistently around 33.9 PSU, with low variability (Jacobs 2017).

Turbidity in the surface waters (0.5 m to 23 m depth) near the Montara Field are typically low (<0.2 NTU; Jacobs 2017).

3.3.5 Bathymetry and Seafloor Geology

Bathymetry of the region is broadly categorised into three distinct zones based on water depth and geometric features. The three zones are (Baker et al. 2008, Heap and Harris 2008):

- Continental shelf;
- Continental slope; and
- Abyssal plain.

The inner continental shelf in the northwest region extends from the coast to approximately 30 m water depth and the middle continental shelf lies between 30 m and 200 m. The outer continental shelf and slope region descends from approximately 200 m water depth. The slope continues to descend over hundreds of kilometres until reaching the almost flat i.e., a less than 1:1,000 gradient, abyssal plain at water depths of approximately 4,000 m. The continental slope is steepest along the western flank of Scott Reef where a steep drop occurs. These steep slopes are incised by erosional gullies and canyons.

The shallow geology of the Operational Areas is interpreted as a thin, discontinuous layer of unconsolidated surficial sediment overlying a variably consolidated calcarenite sequence. The thickness of unconsolidated sediment varies across the site and ranges from being very thin or absent.

Geophysical interpretation and results from seabed sampling indicate that the unconsolidated sediments are fine to coarse carbonate sands. The sediments appear to be coarser closer to areas of significant relief and at the base of shallow depressions. Sub-bottom profilers did not achieve significant penetration into the calcarenite material, indicating that the upper surface of the calcarenite is relatively hard.

3.3.6 Sediment Quality

Sediment quality sampling undertaken near the Montara Field found that concentrations of metals, metalloids, hydrocarbons and phenolic compounds in sediment samples were either below the laboratory limit of reporting (LOR) and/or the ANZECC/ARMCANZ Sediment Quality Guidelines detailed in Simpson et al. (2013) (Jacobs 2017).

3.3.7 Sediment Particle Size Distribution

The particle size distributions (PSD) of sediments sampled near the Montara Field were dominated by fine and coarse sands, with very little clay (Jacobs 2017).

3.4 Conservation Values and Sensitivities

Conservation values and sensitivities listed and protected under the EPBC Act include Matters of Environmental Significance (MNES) and Other Protected Matters. MNES occurring, or potentially occurring,

in the Operational Areas are summarised in Table 3-3. The full EPBC Act Protected Matters report is provided in Appendix A.

Table 3-3: Summary of conservation values and sensitivities in the Operational Area

MNES and Other Matter Protected under EPBC Act	Operational Area
Commonwealth Marine Area	✓ (1)
Listed Threatened Species	✓ (19)
Listed Migratory Species	✓ (33)
Listed Marine Species	✓ (59)
Whales and other cetaceans (many of which are also Listed Threatened or Migratory Species)	✓ (13)
Australian Marine Parks	✗
State and Territory Marine Parks (MP) and Marine Management Areas (MMA)	✗
World Heritage	✗
Wetlands of International Importance (Ramsar)	✗
National Heritage Places	✗
Commonwealth Heritage Places	✗
Threatened Ecological Communities	✗
Key Ecological Features (KEFs)	✗
Nuclear actions and water resources, in relation to coal seam gas or coal mining	✗
Great Barrier Reef Marine Park	✗

3.4.1 Matters of National Environmental Significance (MNES)

Commonwealth Marine Areas

The Operational Areas are within the Exclusive Economic Zone (EEZ) and Territorial Sea which is a Commonwealth Marine Area. The Commonwealth Marine Area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters.

3.4.2 Listed Threatened and Migratory Species

The protected matters search tool (PMST) search (Appendix A) identified 19 Listed Threatened Species (LTS) and 33 Listed Migratory Species (LMS) as having the potential to occur within the Operational Areas. The LTS included:

- Four species of marine mammals;
- Six species of marine reptiles;
- Five shark species; and
- Four marine bird species.

The relevant sections of this EP discuss the likelihood of these species and their biologically important areas occurring within the Operational Areas. Those species that have been identified as likely to be present in the Operational Areas are summarised in Table 3-4 to Table 3-7 and further detailed below.

Sensitive habitat areas such as an aggregation, resting or feeding or known migratory routes for these species are shown as Biologically Important Areas (BIAs) (Figure 3-3 to **Error! Reference source not found.**). The relevant sections also outline the management such as:

- Recovery plans;
- Conservation advice; or
- Threat abatement plan for the impacts of marine debris on vertebrate marine life (DoEE 2018).

The requirements of the species recovery plans and conservation advice are considered to identify any requirements that may be applicable to the risk assessment.

3.4.3 Others matters protected by the EPBC Act

Listed marine species

A total of 59 Listed Marine Species are either likely to, or may, occur within the Operational Areas, including 11 bird species and 18 reptile species.

3.4.4 Marine Parks

No State Marine Parks (MP) or Australian Marine Parks (AMP) intersect with the Operational Area.

3.4.5 Terrestrial Values

The Operational Areas are over 200 km from the closest landfall and therefore does not contain any terrestrial sensitivities or values. Specifically, the following terrestrial values are not represented within the Operational Area:

- Ramsar wetland sites;
- State protected wetlands;
- marine and coastal zone;
- nationally important wetlands; and
- State protected terrestrial areas.

3.4.6 Key Environmental Features (KEFs)

Key ecological features (KEFs) are elements of the Commonwealth marine environment that are considered to be of regional importance for either a region's biodiversity or its ecosystem function and integrity. The Operational Areas do not include any KEFs. The nearest of the spatially defined KEFs is the Carbonate bank and terrace system of the Sahul Shelf at approximately 46 km from the Operational Areas at its closest point.

3.5 Biological Environment – Species and Communities' Descriptions

Numerous marine species occur in the region and have wide distributions that are associated with feeding and migration patterns linked to reproductive cycles. While the distance offshore, depth and lack of suitable foraging benthic habitat may preclude a number of these species, many are likely to occur within the Operational Areas in transit to and from key mating and foraging grounds. Pelagic foragers are also likely to be feeding within the area.

3.5.1 Benthic Habitat and Communities

The benthic habitats in the Operational Areas are generally dominated by soft sediments, sand and mud, with occasional patches of coarser sediments. Spatial and temporal distribution of benthic fauna depends on factors such as sediment characteristics, depth and season.

A benthic habitat assessment was undertaken in the area of Petroleum Production Licence AC/L7 during the 2010 wet season, which included the Montara field and surrounding areas (ERM 2011). Surveys were carried out using a towed video system and seabed sediment samples were also collected for sediment and

macrobenthic fauna analysis. Benthic habitats surveyed were characterised by homogenous, flat, featureless soft sediment; predominately comprised of sand with small rubble/shell fragments and marked by low relief ripples with evidence of bioturbation. Sparse patches of epifauna were recorded and included hydroids, octocorals (soft corals, gorgonians and seapens), black corals and ascidians.

Macrobenthic faunal assemblages surveyed had a generally low and highly patchy abundance of individuals. Polychaete bristleworms from the Phylum Annelida contributed the highest relative abundance of macrobenthic assemblages across the surveyed area, ranging from approximately 40 to 60% followed by Malacostracan crustaceans (shrimps, crabs etc.; approximately 13 to 19%). Gastropoda was represented by 33 taxa across the surveyed area with abundance ranging from approximately 0.5 to 5% (ERM 2011).

Hydrozoa and Bryozoa were the other common groups encountered in samples. All other taxa identified across the surveyed areas were minor contributors to macrobenthic assemblages (relative abundance <5%) (ERM 2011).

3.5.2 Plankton and invertebrates

Plankton is divided into two categories: phytoplankton and zooplankton. Phytoplanktonic algae are important primary producers and range in size from 0.2 to 200 µm. Zooplankton are small, mostly microscopic animals that drift with the ocean currents, and it has been estimated that 80% of the zooplankton in waters of the Australian continental shelf and shelf margin are the larval stages of fauna that normally live on the seabed (Raymont, 1983). A common feature of plankton populations is the high degree of temporal and spatial variability. Phytoplankton in tropical regions have marked seasonal cycles with higher concentrations occurring during the winter months (June–August) and low in summer months (December–March) (Hayes et al. 2005; Schroeder et al. 2009). Zooplankton rely on phytoplankton as food and are subject to similar seasonality.

3.5.3 Fish, Sharks and Rays

A list of fish, sharks and rays is provided in Table 3-4. The Operational Areas PMST report (Appendix A) identified:

- Five threatened/ migratory; and
- Six migratory.

The Operational Areas intersects with the Whale Shark foraging BIA (Figure 3-3).

0.01

Table 3-4: Fish, Sharks and Rays EPBC listed species

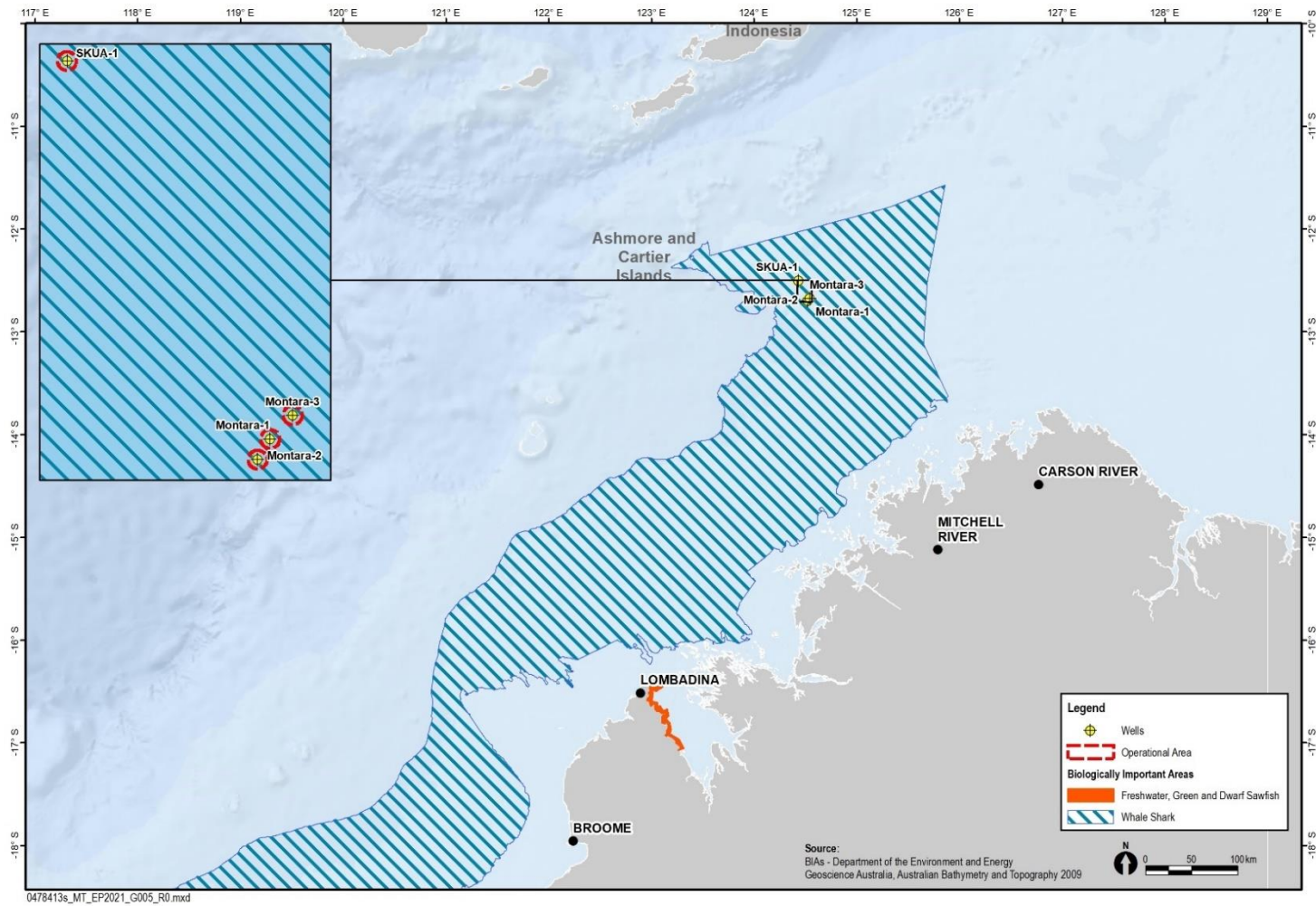
Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
Whale Shark (<i>Rhincodon typus</i>)	V, M	Foraging, feeding or related behaviour known to occur within area	✓	✓ Conservation advice <i>Rhincodon typus</i> whale shark (Threatened Species Scientific Committee, 2015d)	Ceased 2010	No
Great White Shark (<i>Carcharodon carcharias</i>)	V, M	Species or species habitat may occur within area	No	No	✓ Recovery plan for the white shark (<i>Carcharodon carcharias</i>) (DSEWPac 2013a)	No
Northern River Shark (<i>Glyphis garricki</i>)	E	Species or species habitat may occur within area	No	✓ Approved Conservation Advice for <i>Glyphis garricki</i> (northern river shark) (DoE, 2014)	✓ Sawfish and river shark multispecies recovery plan (Commonwealth of Australia, 2015b)	No
Green Sawfish (<i>Pristis zijsron</i>)	V, M	Species or species habitat known to occur within area	No	✓ Approved conservation advice for <i>Pristis zijsron</i> green sawfish (Threatened Species Committee, 2008b)	✓ Sawfish and river shark multispecies recovery plan (Commonwealth of Australia, 2015b)	No
Freshwater/ Largetooth sawfish	V, M	Species or species habitat known to occur within area	No	✓	✓	No

0.01

Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
<i>(Pristis pristis)</i>				Approved Conservation Advice for <i>Pristis</i> (largetooth sawfish) (DoE 2014b)	Sawfish and river shark multispecies recovery plan (Commonwealth of Australia, 2015b)	
Narrow/Knifetooth Sawfish <i>(Anoxypristis caspidata)</i>	M	Species or species habitat may occur within area	No	No	No	No
Oceanic Whitetip Shark <i>(Carcharhinus longimanus)</i>	M	Species or species habitat may occur within area	No	No	No	No
Shortfin Mako <i>(Isurus oxyrinchus)</i>	M	Species or species habitat likely to occur within area	No	No	No	No
Longfin Mako <i>(Isurus paucus)</i>	M	Species or species habitat likely to occur within area	No	No	No	No
Giant Manta Ray <i>(Manta birostris)</i>	M	Species or species habitat may occur within area	No	No	No	No
Reef Manta Ray <i>(Manta alfredi)</i>	M	Species or species habitat may occur within area	No	No	No	No

CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory

0.01



0.01

Figure 3-3: Biologically important areas for fish, sharks and rays

Whale Shark (Vulnerable/Migratory)

Whale sharks (*Rhincodon typus*) have a broad distribution in tropical and warm temperate seas. The whale shark is a highly migratory fish and only visits Australian waters seasonally (DoEE 2017b). They are known to aggregate at Ningaloo Reef (approximately 1,500 km south-west of the Operational Area) between May and June, and in the Queensland Coral Sea (approximately 2,400 km east of the Operational Area) between November and December (DoEE 2017b).

Whale sharks are not known to feed or breed in the Operational Areas; however, whale sharks may occur in the Operational Areas due to their widespread distribution and highly migratory nature, albeit in very low numbers. The Operational Areas are in the migratory BIA for the whale shark (Figure 3-3). The species migrates south to Ningaloo reef to feed during coral spawning, occurring in March/ April. It is unlikely that whale sharks will be encountered in significant numbers at the Operational Area.

Great White Shark (Vulnerable/Migratory)

The Great White Shark (*Carcharodon carcharias*) is widely, but sparsely, distributed in all seas, including cold temperate waters, having been recorded from central Queensland around the south coast to north-west WA, with movements occurring between the mainland coast and the 100 m isobath (DoEE 2017b). The species is known to undertake migrations along the WA coast, with individuals occasionally travelling as far north as Northwest Cape during spring, before returning south for summer (DoEE 2017b). Given a preference for cooler, southern waters inhabited by seals and sea lions, great white sharks are considered unlikely to be encountered in the Operational Areas.

Northern River Shark (Endangered)

The Northern River Shark (*Glyphis garricki*) is known to inhabit rivers, tidal sections of large tropical estuarine systems, macrotidal embayments, as well as inshore and offshore marine habitats, although adults have only been recorded in marine environments (DoEE 2017b). Limited data suggests that the species displays a preference for highly turbid, tidally influenced waters with fine muddy substrate. However, the presence of individuals in offshore areas suggests that northern river sharks undertake movements away from rivers and estuaries and are therefore likely to move between river systems (DoEE 2017b). Given the offshore location of the Operational Areas and the species' preference for turbid, inshore waters, it is unlikely that the species will be encountered in the Operational Areas.

Green Sawfish (Vulnerable/Migratory)

In Australian waters, green sawfishes (*Pristis zijsron*) have been recorded in the coastal waters off Broome in WA, around northern Australia to Jervis Bay, NSW (DoEE 2017b). It is unknown whether green sawfish migrate into Australian waters as adults or juveniles from populations outside Australia (DoEE 2017b). This species inhabits muddy bottom habitats and enters estuaries, although it has also been recorded in inshore marine waters, estuaries, river mouths, embankments and along sandy and muddy beaches, usually in shallow waters (DoEE 2017b).

No BIAs for the green sawfish are intersected by the Operational Areas and based on the offshore, deeper-water activity location, and the species' preference for turbid, inshore water, it is unlikely green sawfishes will be encountered in the Operational Area.

Freshwater/Largetooth Sawfish (Vulnerable/Migratory)

The freshwater, or largetooth, sawfish (*Pristis pristis*) may occur in all large rivers of northern Australia from the Fitzroy River in WA, to the western side of Cape York Peninsula, Queensland, although is mainly confined to the primary channels of large rivers (DoEE 2017b). In northern Australia, this species is thought to be confined to freshwater drainages and the upper reaches of estuaries, occasionally being found as far as 400 km inland. Few records exist of adults at sea, occurring in fresh or weakly saline water (DoEE 2017b).

No BIAs for the freshwater sawfish are intersected by the Operational Areas and based on the distribution, and preferred habitat of the species, it is considered unlikely that freshwater sawfishes will be found at the Operational Areas.

Narrow Sawfish (Migratory)

Narrow sawfishes (*Anoxypristis cuspidate*) are benthic-pelagic inhabiting estuarine, inshore and offshore waters to at least 40 m depth (IUCN 2017). Inshore and estuarine waters are critical habitats for juveniles and pupping females, while adults occur predominantly offshore (D'Anastasi et al. 2013). No BIAs for the narrow sawfish are intersected by the Operational Areas and based on the species' habitat preference it is highly unlikely to be found within the Operational Areas.

Oceanic Whitetip Shark (Migratory)

The oceanic whitetip shark (*Carcharhinus longimanus*) is widespread throughout tropical and subtropical waters of the world (30° N to 35° S) (IUCN 2020). They are an oceanic and pelagic species that regularly occurs in waters of 18 to 28°C, usually >20°C (IUCN 2020). Within Australian waters, they are found from Cape Leeuwin (Western Australia) through parts of the Northern Territory, down the east coast of Queensland and New South Wales to Sydney (Last and Stevens 2009). They are usually found in surface waters, though can reach depths of >180 m (Castro et al. 1999). They have occasionally been recorded inshore but are more typically found offshore or around oceanic islands and areas with narrow continental shelves (Fourmanoir 1961, Last and Stevens 1994). Based on this offshore habitat preference, it is possible that the species may be encountered within the Operational Areas.

No oceanic whitetip shark BIAs are intersected by the Operational Areas.

Shortfin and Longfin Mako Sharks (Migratory)

The shortfin mako (*Isurus paucus*) and the longfin mako (*Isurus longirostris*) are both offshore epipelagic species found in tropical and warm-temperate waters (DoEE 2017b). Both species occur in Australia in coastal waters off Western Australia, Northern Territory, Queensland and New South Wales at depths ranging from shallow coastal waters to at least 500 m (DoEE 2017b).

No BIAs for either of these species are intersected by the Operational Areas.

Giant Manta Ray (Migratory)

The giant manta ray (*Manta birostris*) inhabits tropical, marine waters worldwide. In Australia, the species is recorded from south-western WA, around the north coast to the southern coast of New South Wales (Australian Museum 2014). The species is commonly sighted along productive coastlines with regular upwelling, oceanic island groups, particularly offshore pinnacles and seamounts. Nearer to shore the giant manta ray is commonly encountered on shallow reefs, while being cleaned, or is sighted feeding at the surface inshore and offshore. It is also occasionally observed in sandy bottom areas and seagrass beds (Marshall et al. 2011b).

No BIAs for the giant manta ray are intersected by the Operational Areas and based on the species' habitat preferences it is unlikely that the giant manta ray will be encountered in the Operational Areas.

Reef Manta Ray (Migratory)

The reef manta ray (*Manta alfredi*) is commonly sighted inshore, but also found around offshore coral reefs, rocky reefs and seamounts, tending to inhabit warm tropical or sub-tropical waters (Marshall et al. 2011a). Long-term sighting records of the reef manta ray at established aggregation sites suggest that this species is more resident to tropical waters and may exhibit smaller home ranges, philopatric movement patterns and shorter seasonal migrations than the giant manta ray (Marshall et al. 2011a).

No BIAs for the reef manta ray are intersected by the Operational Areas and based on the species' habitat preferences it is unlikely that the reef manta ray will be encountered in the Operational Areas.

3.5.4 Marine Reptiles

A list of marine reptiles is provided in Table 3-5. The Operational Areas PMST report (Appendix A) identified:

- Six threatened/ migratory

Table 3-5: Marine Reptiles EPBC listed species

Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
Loggerhead Turtle (<i>Caretta caretta</i>)	E, M	Species or species habitat likely to occur within area	No	No	✓ Recovery plan for marine turtles in Australia (DoEE 2017)	✓ Marine debris
Green Turtle (<i>Chelonia mydas</i>)	V, M	Species or species habitat known to occur within area	No	No	✓ Recovery plan for marine turtles in Australia (DoEE 2017)	✓ Marine debris
Flatback Turtle (<i>Natator depressus</i>)	V, M	Species or species habitat likely to occur within area	No	No	✓ Recovery plan for marine turtles in Australia (DoEE 2017)	✓ Marine debris
Hawksbill Turtle (<i>Eretmochelys imbricata</i>)	V, M	Species or species habitat likely to occur within area	No	No	✓ Recovery plan for marine turtles in Australia (DoEE 2017)	✓ Marine debris
Olive Ridley Turtle (<i>Lepidochelys olivacea</i>)	E, M	Species or species habitat likely to occur within area	No	No	✓ Recovery plan for marine turtles in Australia (DoEE 2017)	✓ Marine debris
Leatherback Turtle (<i>Dermochelys coriacea</i>)	E, M	Species or species habitat likely to occur within area.	No	✓ Approved conservation advice for <i>Dermochelys coriacea</i> (Leatherback Turtle) (Threatened Species Scientific Committee, 2008a)	✓ Recovery plan for marine turtles in Australia (DoEE 2017)	✓ Marine debris

CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory

Marine Turtles

Six threatened/migratory marine turtles may be present in the Operational Areas. Marine turtles are oceanic species, except during nesting seasons where they come ashore to lay eggs. Marine turtles utilise reefs, soft-sediment habitats, seagrass and algal meadows as feeding areas, depending on species, and nest above the high-water mark on sandy beaches and islets within their geographical ranges. The nesting periods are species-dependent, although generally occur between September and March, peaking in December (Pendoley, 2005). Hatchlings appear between January and May and immediately leave the shore, moving into open ocean environments for a number of years before returning to inshore areas.

Marine turtles have been observed in the vicinity of the Operational Areas. Surveys conducted in response to the Montara oil spill in 2009 recorded a total of 25 individual turtles in open water. Two species were confidently identified; loggerhead and green turtles (Watson et al. 2009). Land based surveys recorded green and hawksbill turtle tracks on the islands associated with Ashmore Reef (Watson et al. 2009).

The Operational Areas do not intersect with any marine turtle BIAs (Figure 3-4 to Figure 3-6). The Operational Areas are approximately 106 km to the nearest nesting site at Cartier Island.

Loggerhead Turtle (Endangered/Migratory)

The loggerhead turtle (*Caretta caretta*) has a global distribution throughout tropical, sub-tropical and temperate waters (Marquez 1990). The closest known breeding/nesting grounds to the Operational Areas are found at the Dampier Archipelago (Baldwin et al. 2003), approximately 1,500 km south-west of the Operational Areas. Loggerhead turtles have been recorded in the reserves of Ashmore Reef MP (149 km) and Cartier Island MP (106 km), west-northwest of the Operational Areas (Guinea 1995) and have a large BIA for foraging within the Western Joseph Bonaparte Depression. Loggerhead turtles are unlikely to be encountered within the Operational Areas in significant numbers.

Green Turtle (Vulnerable/Migratory)

Green turtles (*Chelonia mydas*) are found in tropical and subtropical waters throughout the world (Marquez 1990; Bowen et al. 1992). The closest known significant breeding/nesting grounds to the Operational Areas are the Ashmore Reef Marine Park (MP) and Cartier Island MP, approximately 149 and 106 km to the northwest of the Operational Areas, respectively (Figure 3-4).

Green turtles may occasionally pass through the Operational Areas, as satellite tracking studies have shown that green turtles migrate between breeding grounds and feeding grounds off the northwest coast (Pendoley 2005). However, due to the water depths the area does not provide foraging habitat.

Flatback Turtle (Vulnerable/Migratory)

The flatback turtle (*Natator depressus*) is found in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya. It is the most widely distributed nesting marine turtle species in the Northern Territory (Chatto and Baker 2008), nesting on a wide variety of beach types around the entire coastline. The flatback turtle also nests in the Kimberley Region of Western Australia, with Cape Domett (Bowlay and Whiting 2007) and Lacrosse Island being important nesting areas for the species. The closest nesting sites to the Operational Areas are approximately 500 km to the south-east (Lacepede Islands).

While flatback turtles make lengthy reproductive migrations, up to 1,300 km from nesting beaches (Limpus et al. 1983), movements are generally restricted to the continental shelf (DoEE 2017b). Flatback turtles nesting within the Pilbara region migrate to their foraging grounds in the Kimberley region along the continental shelf at the end of the nesting season (RPS 2010). Due to their migrations between the Pilbara and the Kimberley regions of WA, individual flatback turtles may transit the Operational Areas during migration. However, given the distance from known aggregation areas, it is unlikely that significant numbers

of flatback turtles will be encountered within the Operational Areas. Due to the water depths the area does not provide foraging habitat.

Hawksbill Turtle (Vulnerable/Migratory)

Hawksbill turtles (*Eretmochelys imbricata*) are found in tropical, subtropical and temperate waters in all oceans of the world. The closest interesting site to the Operational Areas is Ashmore Reef approximately 149 km to the north-west, and the closest nesting site is Scott Reef, approximately 321 km to the south-west.

Olive Ridley Turtle (Endangered/Migratory)

The Olive Ridley turtle (*Lepidochelys olivacea*) has a circum-tropical distribution, with nesting occurring throughout tropical waters. No concentrated nesting has been found in Australia, although low density nesting occurs along the Arnhem Land coast of the Northern Territory, including the Crocodile, McCluer and Wessel Islands, Grant Island and Cobourg Peninsula (Chatto and Baker 2008). Therefore, Olive Ridley turtles are unlikely to be encountered within the Operational Areas in significant numbers.

Leatherback Turtle (Endangered/Migratory)

The Leatherback turtle (*Dermochelys coriacea*) has the widest distribution of any marine turtle, and can be found in tropical, subtropical and temperate waters throughout the world (Marquez 1990). No major centres of nesting activity have been recorded in Australia, although scattered isolated nesting (1-3 nests per annum) occurs in southern Queensland and Northern Territory (Limpus and McLachlin 1994). As such, it is expected that very few leatherback turtles will be encountered in the Operational Areas.

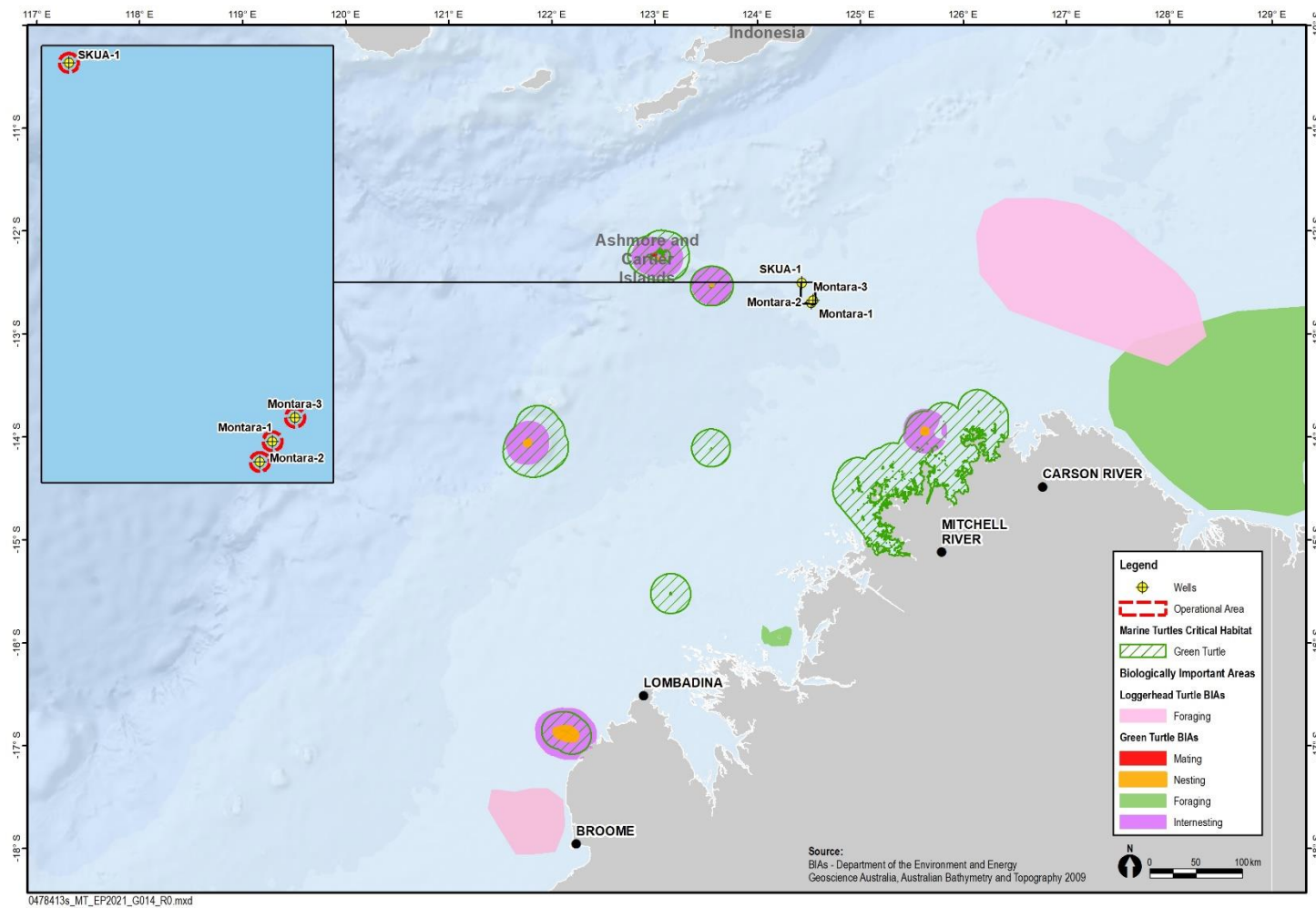


Figure 3-4: Biologically important areas for loggerhead and green turtles

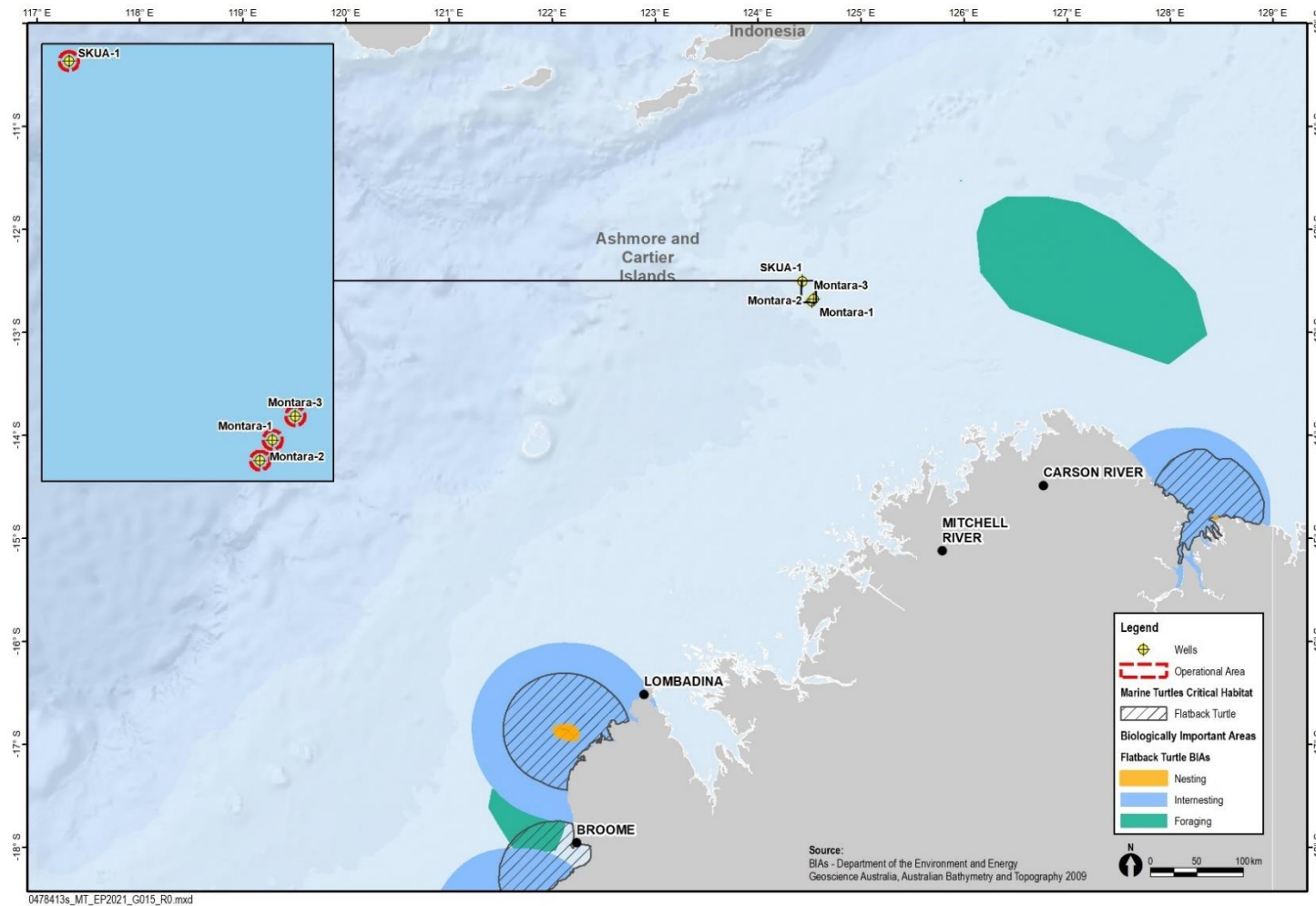


Figure 3-5: Biologically important areas for flatback turtles

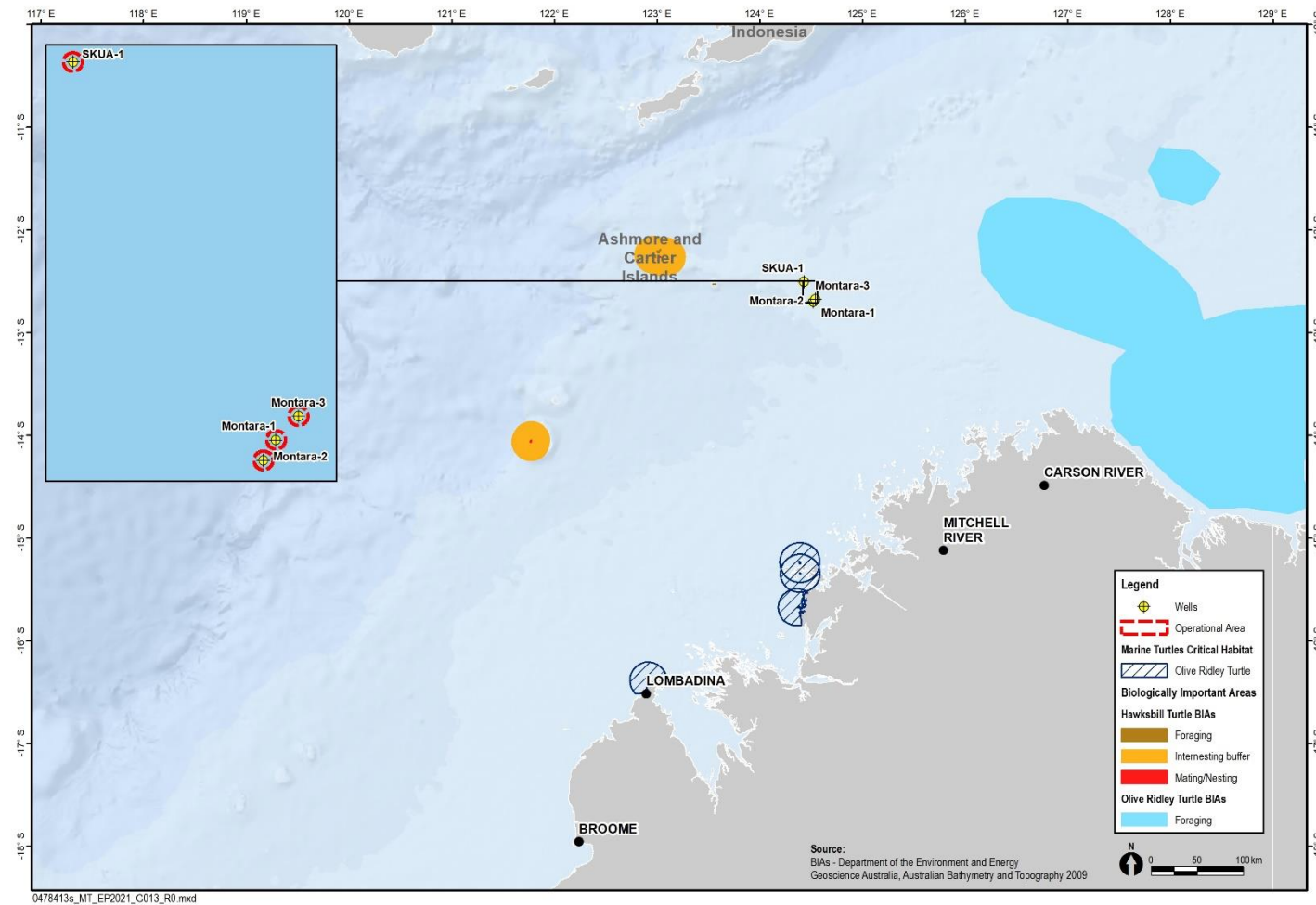


Figure 3-6: Biologically important areas for hawksbill and Olive Ridley turtles

3.5.5 Marine Mammals

A list of marine mammals is provided in Table 3-6. The Operational Areas PMST report (Appendix A) identified:

- Four threatened/ migratory; and
- Three migratory

Cetaceans

The region is thought to be an important migratory pathway between feeding grounds in the Southern Ocean and breeding grounds in tropical waters for several cetacean species. Pygmy blue whales (*Balaenoptera musculus*), fin whales (*Balaenoptera physalus*), dwarf minke whales (*Balaenoptera acutorostrata*) and Antarctic minke whales (*Balaenoptera bonaerensis*) may travel through the region on their way to breeding grounds, which are thought to be in deep oceanic waters around the Indonesian Archipelago.

During ambient noise monitoring at the southern (AC/L7) permit area in June–December 2011, numerous cetacean vocalisations were recorded (McPherson et al. 2012). Two species of odontocetes (toothed whales and dolphins) were identified during the first six-months of deployment, false killer whales and common bottlenose dolphins.

Pygmy blue whales (*B. m. breviceuda*) were detected at the nearby Cash-Maple (AC/RL7 block) permit area, which coincided with the timing of the northern and southern migrations (McCauley 2011). Humpback whales were only recorded during two periods in July and August 2011 at the Southern station. The vocalisations of bryde's whales were also detected at the southern permit area at the time of survey. Based on more recent scientific literature (Cerchio et al. 2015) and re-analysis of data, some of the Bryde's whales (*Balaenoptera edeni*) reported are now believed to be the calls of Omura's whale (*Balaenoptera omurai*) (McPherson et al. 2017). Omura's whales therefore appear to be present year-round along the region's continental shelf but showed seasonal differences in occurrence at specific sites (McPherson et al. 2017). Overall, they are most commonly detected in the Timor Sea in winter. Omura's whales are not listed as MNES species.

The Operational areas do not intersect with any BIAs for listed marine mammal species (Figure 3-7).

0.01

Table 3-6: Marine Mammal EPBC listed species

Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
Humpback Whale (<i>Megaptera novaeangliae</i>)	V, M	Species or species habitat likely to occur within area	No	✓ Approved Conservation Advice for <i>Megaptera novaeangliae</i> (humpback whale) (Threatened Species Scientific Committee, 2015a)	Ceased 2015	✓ Marine debris
Blue whale (<i>Balaenoptera musculus</i>) Including Pygmy Blue Whale	E, M	Species or species habitat likely to occur within area	No	No	✓ Conservation management plan for the blue whale: A recovery plan under the EPBC Act 1999 2015-2025 (Commonwealth of Australia, 2015a)	✓ Marine debris
Sei Whale (<i>Balaenoptera borealis</i>)	V, M	Species or species habitat may occur within area	No	✓ Conservation advice <i>Balaenoptera borealis</i> sei whale (Threatened Species Scientific Committee, 2015b)	Ceased in 2015	✓ Marine debris
Fin Whale (<i>Balaenoptera physalus</i>)	V, M	Species or species habitat may occur within area	No	✓ Conservation advice <i>Balaenoptera physalus</i> fin whale	Ceased 2015	✓ Marine debris

0.01

Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
				(Threatened Species Scientific Committee, 2015c)		
Bryde's Whale (<i>Balaenoptera edeni</i>)	M	Species or species habitat may occur within area	No	No	No	✓ Marine debris
Orca, Killer Whale (<i>Orcinus orca</i>)	M	Species or species habitat may occur within area	No	No	No	✓ Marine debris
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) (<i>Tursiops aduncus</i>)	M	Species or species habitat may occur within area	No	No	No	No

CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory

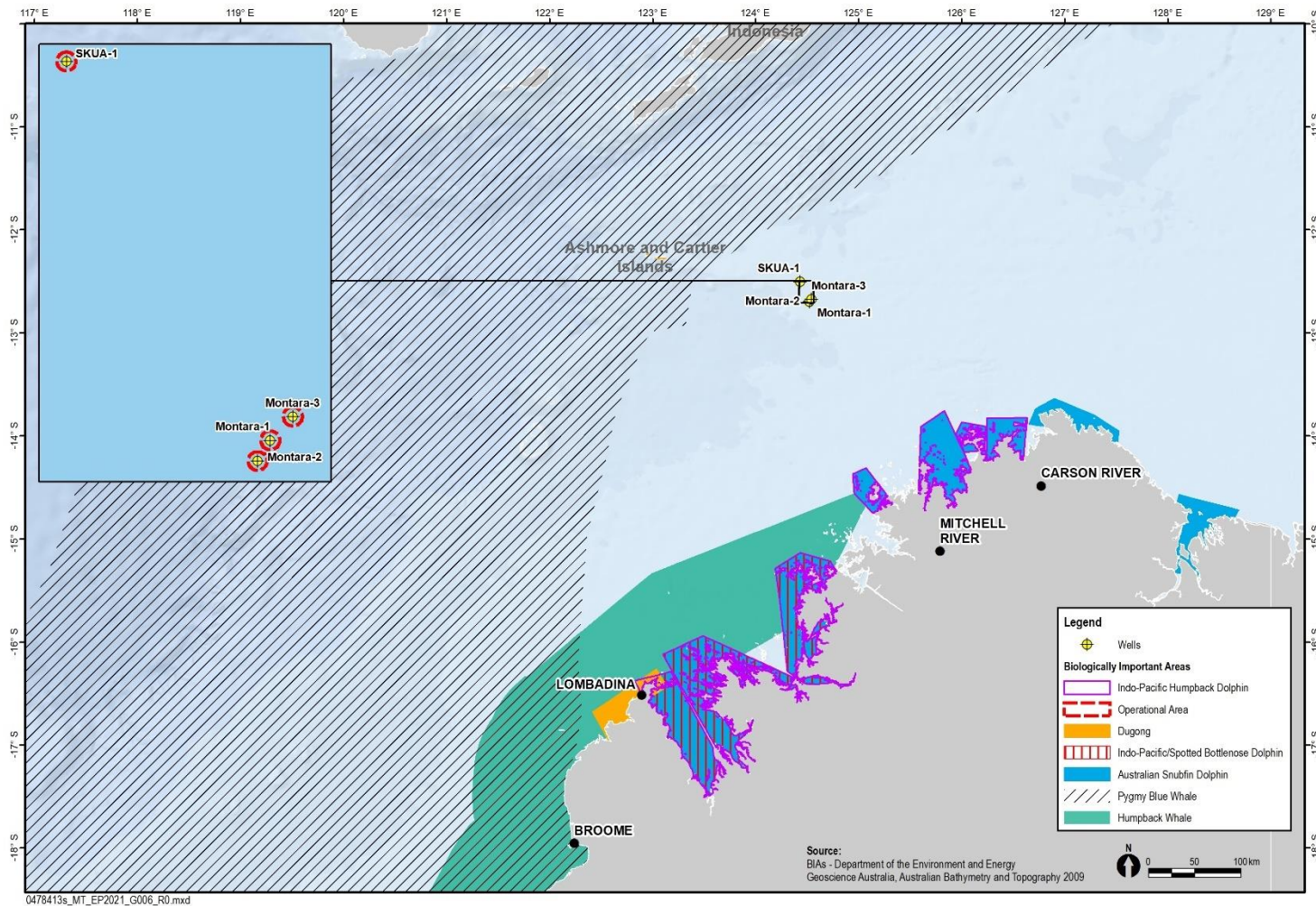


Figure 3-7: Biologically important areas for marine mammals

Humpback Whale (Vulnerable/Migratory)

Humpback whales (*Megaptera novaeangliae*) have a wide distribution, having been recorded from the coastal areas off all Australian states other than the Northern Territory (Bannister et al. 1996). Humpback whales migrate north and south along the eastern and western coasts of Australia from calving grounds in the tropical north to feeding grounds in the Southern Ocean (DoEE 2017b). Peak migration off the north-western coast of Australia occurs from late July to early September. From June to mid-September the inshore waters (landward of the 100 m isobath) between the Lacepede Islands and Camden Sound (approximately 400 km south-west of the Operational Area) are used as a calving area for this species (Jenner et al. 2001).

The Operational Areas are located outside of the recognised humpback whale migratory routes, which are usually within 30 km of the coastline (Figure 3-7).

Given the Operational Areas are situated north of the northernmost point of the humpback whale migration it is considered unlikely that the species will be encountered.

Blue Whale (Endangered/Migratory)

Blue whales (*Balaenoptera musculus*) are widely distributed throughout the world's oceans. There are two subspecies in the Southern Hemisphere: the southern blue whale (*Balaenoptera musculus intermedia*) and the pygmy blue whale (*Balaenoptera musculus brevicauda*) (DEWHA 2008). In general, the southern blue whale is found south of 60° S and pygmy blue whales are found north of 55° S (DEWHA 2008), making it likely that any blue whales frequenting the waters of the Operational Areas would be pygmy blue whales.

Blue whale migration is thought to follow deep oceanic routes, although little is known about their precise migration routes (DoEE 2017b). Sea noise loggers set at various locations along the coast of Western Australia have detected a seasonal presence indicating a pattern of annual northbound and southbound migration of pygmy blue whales past Exmouth and the Montebello Islands and locations to the north (McCauley and Jenner 2010). Pygmy Blue whales appear to migrate south from Indonesian waters passing Exmouth through November to late December each year. Observations suggest most Pygmy Blue whales pass along the shelf edge out to water depths of 1,000 m depth contour. The northern migration passes Exmouth over an extended period ranging from April to August (McCauley and Jenner 2010). They are believed to calve in tropical waters in winter and births peak in May to June, however the exact breeding grounds of this species are unknown (Bannister et al. 1996).

The Operational Areas do not include any recognised blue whale migratory routes or known feeding, breeding or resting areas. However, low numbers of blue whales migrating to and from Indonesian waters may occasionally pass through the Operational Areas, most likely during the southern migration (October to November) (DoEE 2017b). Ambient noise monitoring conducted for PTTEP AA in and around the Montara field documented the presence of cetacean species over a full 12-month period between December 2010 and December 2011. The data support the well documented seasonal timings of pygmy blue whales in the region, and the low numbers recorded are consistent with the field area being outside the recognised BIAs for this species.

Sei Whale (Vulnerable/Migratory)

Sei whales (*Balaenoptera borealis*) are a cosmopolitan species, found in the waters off all Australian states (DoEE 2017b). The Australian Antarctic waters are important feeding grounds for sei whales, as are temperate, cool waters (DoEE 2017b). The species has also been observed feeding in the Bonney Upwelling area in South Australia, indicating the area as potentially being an important feeding ground.

Breeding in this species is known to occur in tropical and subtropical waters (DoEE 2017b). Currently, the movements and distributions of sei whales are unpredictable and not well documented. However, information suggests that sei whales have the same general pattern of migration as most other baleen whales, although timing is later in the season and such high latitudes are not reached (DoEE 2017b).

Based on the cosmopolitan distribution of the species, sei whales may be encountered in low numbers within the Operational Areas.

Fin Whale (Vulnerable/Migratory)

Fin Whales (*Balaenoptera physalus*) are found in the waters all around Australia and the Australia Antarctic Territory (DoEE 2017b). The Australian Antarctic waters are also thought to be important feeding grounds for fin whales, while feeding has been observed in the Bonney Upwelling area indicating the area to be of importance as a feeding ground for the species (Morrice et al. 2004). No known mating or calving areas are known from Australian waters. Currently, the migration routes and locations of winter breeding grounds for this species are uncertain (DoEE 2017b).

Based on the cosmopolitan distribution of the species, fin whales may be encountered in low numbers within the Operational Areas.

Bryde's Whale (Migratory)

Bryde's Whales (*Balaenoptera edeni*) are a cosmopolitan species, found in the waters of all Australian states, including both Christmas and the Cocos Islands (DoEE 2017b). Two forms of Bryde's whale are known: the coastal and offshore form. The coastal form appears to be limited to habitat within the 200 m depth isobar, moving along the coast in response to availability of suitable prey (Best et al. 1984); the offshore form is known in deeper water (500 m to 1,000 m).

Ambient noise monitoring conducted in the Southern, Cash-Maple and Oliver permits by JASCO (2012) over a 12-month period between December 2010 and December 2011 recorded whale calls that were attributed to Bryde's whales year-round at all three permits, with no seasonal cycle observed. These data demonstrate that individuals may be encountered within the Operational Areas, however, no BIAs for Bryde's whales are intersected by the Operational Area.

Orca/Killer Whale (Migratory)

Orcas, or Killer Whales (*Orcinus orca*), are a cosmopolitan species, found in the waters off all Australian states in oceanic, pelagic and neritic regions, in both warm and cold waters. Killer whales are known to make seasonal movements, and are likely to follow regular migratory routes, however little is known about either local or seasonal movement patterns of the species (DoEE 2017b).

Given the lack of known migration routes or areas of significance in the region, the species is not expected to be encountered in the Operational Areas in significant numbers.

Spotted Bottlenose Dolphin (Migratory)

The spotted bottlenose dolphin (*Tursiops aduncus*) is generally considered to be a warm water subspecies of the common bottlenose dolphin (*Tursiops truncatus*) and known to exist in waters off all Australian states. The spotted bottlenose dolphin appears to be restricted to inshore areas such as bays and estuaries, nearshore waters, open coast environments, and shallow offshore waters including coastal areas around oceanic islands (DoEE 2017b). BIAs for this species are illustrated in Figure 3-7.

Due to the distance from the coast and deeper waters of the Operational Areas, spotted bottlenose dolphins are not expected to occur, particularly given the preference for shallower, coastal waters. Given their cosmopolitan distribution, the species may be encountered within the Operational Area.

3.5.6 Avifauna

A list of avifauna species is provided in Table 3-7. The Operational Areas PMST report (Appendix A) identified:

- Four threatened/migratory; and
- Seven migratory.

0.01

Table 3-7: Avifauna Listed EPBC species

Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
Red Knot (<i>Calidris canutus</i>)	E, M	Species or species habitat may occur within area	No	✓ Conservation advice <i>Calidris canutus</i> red knot (Threatened Species Scientific Committee, 2016a)	No	No
Australian Lesser Noddy (<i>Anous tenuirostris melanops</i>)	V	Species or species habitat may occur within area	No	✓ Conservation advice <i>Anous tenuirostris melanops</i> Australian lesser noddy (Threatened Species Scientific Committee, 2015e)	No	No
Curlew Sandpiper (<i>Calidris ferruginea</i>)	CE, M	Species or species habitat may occur within area	No	✓ Conservation advice <i>Calidris ferruginea</i> curlew sandpiper (Threatened Species Scientific Committee, 2015f)	No	No
Eastern Curlew (<i>Numenius madagascariensis</i>)	CE, M	Species or species habitat may occur within area	No	✓ Conservation advice <i>Numenius madagascariensis</i> eastern curlew (Threatened Species Scientific Committee, 2015g)	No	No
Common Noddy (<i>Anous stolidus</i>)	M	Species or species habitat may occur within area	No	No	No	Threat abatement plan for predation by feral cats. (DoE, 2015)

0.01

Common Name (Scientific Name)	EPBC Act Status	Type of presence	BIA within Operational Area	Management		
				Conservation advice	Recovery Plan	Threat Abatement Plan
Streaked Shearwater (<i>Calonectris leucomelas</i>)	M	Species or species habitat may occur within area	No	No	No	Threat abatement plan for predation by feral cats. (DoE, 2015)
Lesser Frigatebird (<i>Fregata ariel</i>)	M	Species or species habitat may occur within area	No	No	No	No
Great Frigatebird (<i>Fregata minor</i>)	M	Species or species habitat may occur within area	No	No	No	No
Common Sandpiper (<i>Actitis hypoleucos</i>)	M	Species or species habitat may occur within area	No	Wildlife conservation plan for migratory shorebirds (Commonwealth of Australia, 2015c)	No	No
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	M	Species or species habitat may occur within area	No	Wildlife conservation plan for migratory shorebirds (Commonwealth of Australia, 2015c)	No	No
Pectoral Sandpiper (<i>Calidris melanotos</i>)	M	Species or species habitat may occur within area	No	No	No	No

- CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory

Numerous species of birds frequent the Timor Sea area or fly through the area on annual migrations. Seabird feeding grounds, roosting and nesting areas are found at the offshore atolls in the wider region, particularly Ashmore Reef. Many species are listed under the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) or Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). Most seabirds breed at offshore sites, such as Ashmore Reef, Cartier Island and Browse Island, from mid-April to mid-May (Clarke 2010). Peak migration time of migratory shorebirds is between October and December (Clarke 2010). It is expected that some individuals of these species may pass through the Operational Areas during their annual migrations.

No avifauna migration, resting, foraging or breeding BIAs are present within the Operational Areas (Figure 3-8 and **Error! Reference source not found.**). The nearest breeding/roosting site to the Operational Areas are Cartier Island approximately 106 km away.

Red Knot (Endangered/Migratory)

The red knot is a migratory shorebird, and the species includes five subspecies, including two found in Australia; *Calidris canutus piersmai* and *Calidris canutus rogersi*. It undertakes long distance migrations from breeding grounds in Siberia, where it breeds during the boreal summer, to the southern hemisphere during the austral summer. Both Australia and New Zealand host significant numbers of red knots during their non-breeding period (Bamford et al. 2008). As with other migratory shorebirds, the species occurs in coastal wetland and intertidal sand or mudflats, where they feed on intertidal invertebrates, especially shellfish (Garnet et al. 2011).

They are unlikely to occur frequently in the Operational Areas, aside from individuals occasionally transiting through during migrations, due to the lack of emergent habitat.

Australian Lesser Noddy (Vulnerable)

The Australian lesser noddy (*Anous tenuirostris melanops*) is usually only found around its breeding islands including the Houtman Abrolhos Islands and on Ashmore Reef and Barrow Island in WA (DoEE 2017b). This species may forage out at sea or in seas close to breeding islands and fringing reefs (Johnstone and Storr 1998; Storr et al. 1986; Whittell 1942). Given the distribution of the species and the breeding population at nearby Ashmore Reef and Cartier Island, this species may be present in the Operational Areas, although only in low numbers.

Curlew Sandpiper (Critically Endangered/Migratory)

In Australia, curlew sandpipers (*Calidris ferruginea*) occur around the coasts and are also quite widespread inland. In WA, they are widespread around coastal and subcoastal plains from Cape Arid to south-west Kimberley, albeit rarely encountered in the north-west of the Kimberley region (DoEE 2017b). Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, as well as around non-tidal swamps, lakes and lagoons near the coast, occurring in both fresh and brackish waters (DoEE 2017b).

Given the offshore location of activities and habitat preferences, the species is unlikely to be encountered within the Operational Areas other than occasional numbers during migration.

Eastern Curlew (Critically Endangered/Migratory)

Within Australia, the eastern curlew (*Numenius madagascariensis*) has a primarily coastal distribution. They have a continuous distribution from Barrow Island and Dampier Archipelago in WA, through the Kimberley and along the NT, Queensland, and NSW coasts and the islands of Torres Strait. They are patchily distributed elsewhere.

The species nests in the northern hemisphere, from early May to late June and does not breed in Australia. During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats (TSSC 2015). Given the offshore location of activities and habitat preferences, the species is unlikely to be encountered within the Operational Areas other than occasional numbers during migration.

Common Noddy (Migratory)

In Australia, the common noddy (*Anous stolidus*) occurs mainly in oceanic waters off the Queensland coast, although is also known from the north-west and central WA coast. The species is also rarely encountered off the coast of the NT, where only one breeding location of approximately 100-130 birds is documented (DoEE 2017b). During the breeding season, the species usually occurs on, or near islands, on rocky islets and stacks with precipitous cliffs, or on shoals or cays of coral or sand. During the non-breeding period, the species occurs in groups throughout the pelagic zone (DoEE 2017b).

Based on the distribution and habitat preferences the species may be encountered within the Operational Area.

Streaked Shearwater (Migratory)

The streaked shearwater (*Calonectris leucomelas*) is usually found over pelagic waters and is known to breed on the coast and offshore islands mainly around Japan and Korea (Ochi et al 2010). The streaked shearwater migrates south during winter to Australia (Birdlife International 2015). The species does not breed in Australia. Streaked shearwaters are known to forage in areas of high concentrations of subsurface predators (e.g., tuna and dolphins) in tropical oceans during non-breeding periods (Yamamoto et al 2010). Given the distribution of streaked shearwaters, this species may be present in the Operational Areas, albeit in low numbers.

Lesser Frigatebird (Migratory)

The lesser frigatebird (*Fregata ariel*) is considered the most common and widespread frigatebird over Australian seas (Lindsey 1986). They are commonly found in tropical seas, breeding on remote islands (Marchant and Higgins 1990). A BIA has been identified for this species at Ashmore Reef and Cartier Island to highlight breeding and foraging behaviours in the area (DoEE 2017b). The Operational Areas do not overlap with this BIA (Figure 3-8). Breeding is known to occur between March and September.

Given its distribution and the large breeding population at nearby Ashmore Reef and Cartier Island, this species may be encountered within the Operational Areas.

Great Frigatebird (Migratory)

Great frigatebirds (*Fregata minor*) are found in tropical waters globally. A BIA has been identified at Ashmore Reef and Cartier Island for the species to highlight breeding and foraging behaviours in the area (DoEE 2017b). The Operational Areas do not overlap with this BIA (Figure 3-8). Breeding is known to occur between May to June and in August (DoEE 2017b). Given the distribution of the species and its low population in nearby Ashmore Reef and Cartier Island, this species may be present in the Operational Areas in low numbers.

Common Sandpiper (Migratory)

The common sandpiper (*Actitis hypoleucos*) is a small, migratory species with a very large range through which it undertakes annual migrations between breeding grounds in the northern hemisphere (Europe and Asia) and non-breeding areas in the Asia-Pacific region (Bamford et al. 2008). The species congregates in large flocks and forages in shallow waters and tidal flats between spring and autumn. Specific critical habitat in Australia has not been identified due to the species' broad distribution (Bamford et al. 2008).

The common sandpiper is unlikely to occur in the Operational Areas, aside from individuals occasionally transiting through during migrations, due to the lack of emergent habitat.

Sharp-tailed Sandpiper (Migratory)

The sharp-tailed sandpiper (*Calidris acuminata*) is a migratory wading shorebird and undertakes long distance seasonal migrations between breeding grounds in the northern hemisphere and over-wintering areas in the southern hemisphere (Bamford et al. 2008). The species may occur in Australia between spring and autumn. The species is unlikely to occur within the Operational Areas due to the lack of suitable habitat.

Pectoral Sandpiper (Migratory)

The pectoral sandpiper (*Calidris melanotos*) breeds in the northern hemisphere during the boreal summer, before undertaking long distance migrations to feeding grounds in the southern hemisphere (Bamford et al. 2008). The species occurs throughout mainland Australia between spring and autumn. The pectoral sandpiper prefers coastal and near-coastal environments such as wetlands, estuaries and mudflats.

Given the species' preferred habitat the pectoral sand piper is not expected to occur within the Operational Area.

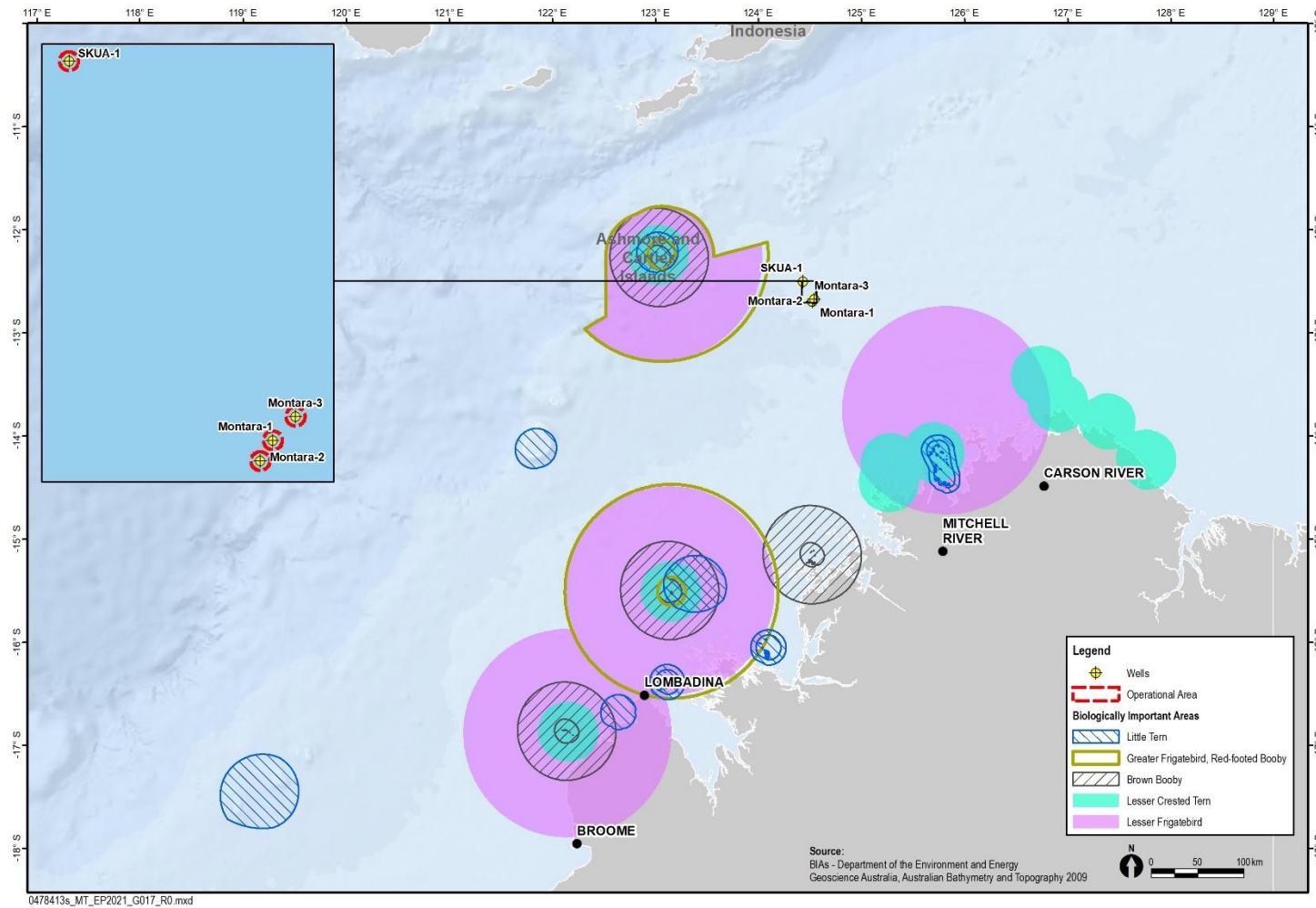


Figure 3-8: Biologically important areas for avifauna

3.6 Social Values

The socioeconomic environmental values and sensitivities (cultural and socio-economic) within the Operational Areas, which also include all relevant MNES protected under the EPBC Act, are summarised in Table 3-8.

Table 3-8 Socio-economic Values and Sensitivities within the Operational Area

Value/ Sensitivity	Description	Operational Areas Presence
World Heritage Properties	Sites accepted to the World Heritage listing are only inscribed if considered to represent the best examples of the world's cultural and natural heritage. There are no World Heritage properties that intersect with the Operational Areas.	-
Shipping	The Operational Areas are not located on a major international shipping route. Heavy vessels following the charted Osborn Passage will pass through both permits to the north of the Montara Field floating production storage and offtake facility. Support vessels servicing the nearby infrastructure do pass through the Operational Areas (AMSA, 2014) (refer Figure 3-9).	✓
Commercial Fishing	Based on the assessment of fisheries (Appendix B, Table 4) it is feasible that the Northern demersal scalefish managed fishery may operate in the Operational Areas (based on last 5 years of catch data). Figure 3-10 and Figure 3-11 show which fisheries are licenced to operate in the Operational Areas.	Minimal effort
Recreational Fishing	Remoteness of Operational Areas limits recreational fishing usage.	-
Traditional Fishing	Traditional Australian indigenous fishing activities are generally concentrated within 3 nm of the NT/WA coastline (DPIF 2015). Indonesian/Timor Leste indigenous fishing is concentrated in the vicinity of Sahul Bank, Echo Shoals and MoU Box and boats may pass through the Operational Areas to reach these fishing grounds.	Transit
Defence	No declared defence areas in Operational Areas.	—
Oil and Gas	Various petroleum exploration and production activities have been undertaken within the Timor Sea, including some within close proximity of the Operational Areas.	Adjacent
Tourism	No regular tourism activity occurs in the Operational Areas due to its remoteness.	—
Cultural Heritage	No known sites of shipwrecks or Aboriginal Heritage significance within the Operational Areas.	—

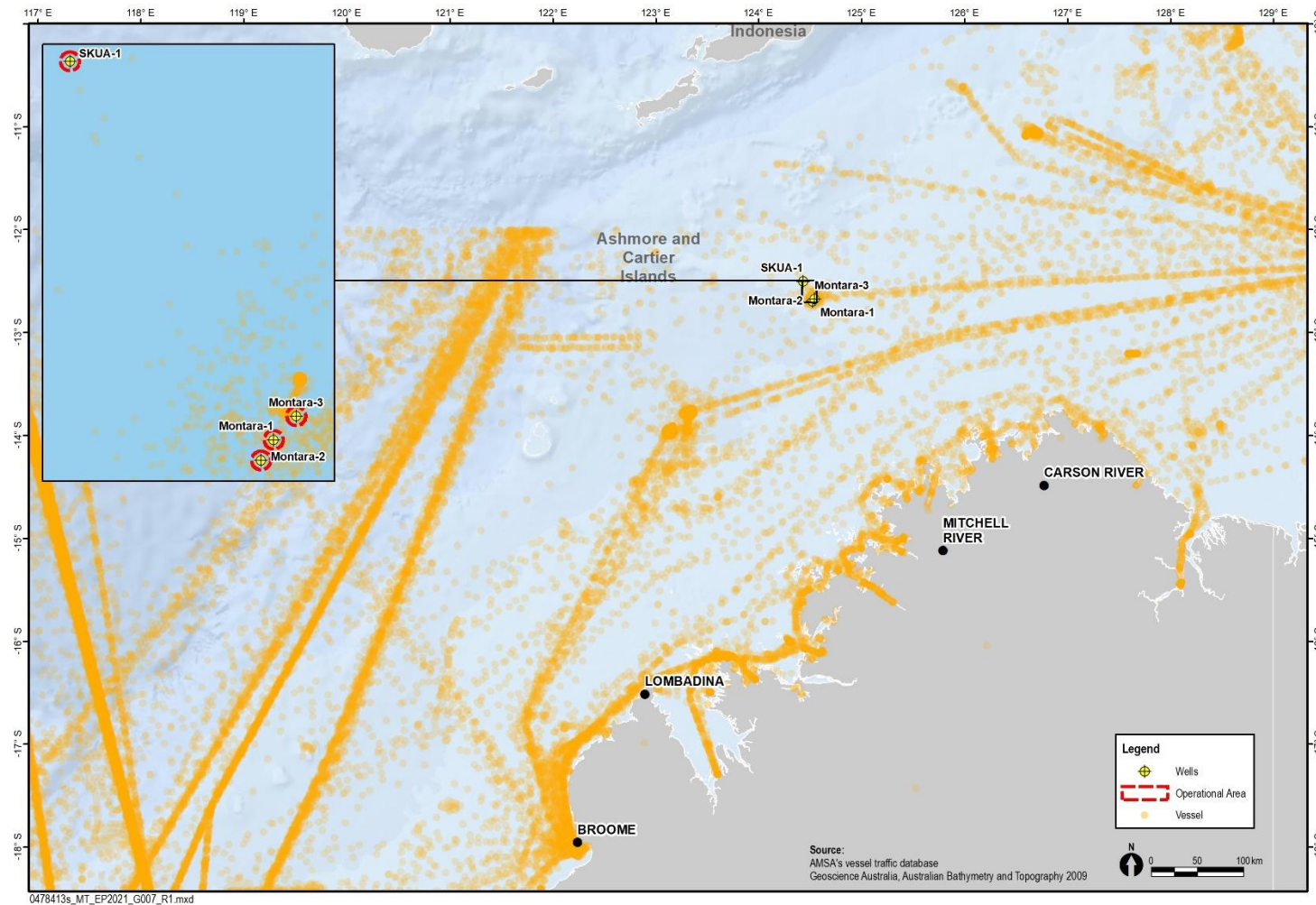


Figure 3-9 Shipping activity within the region

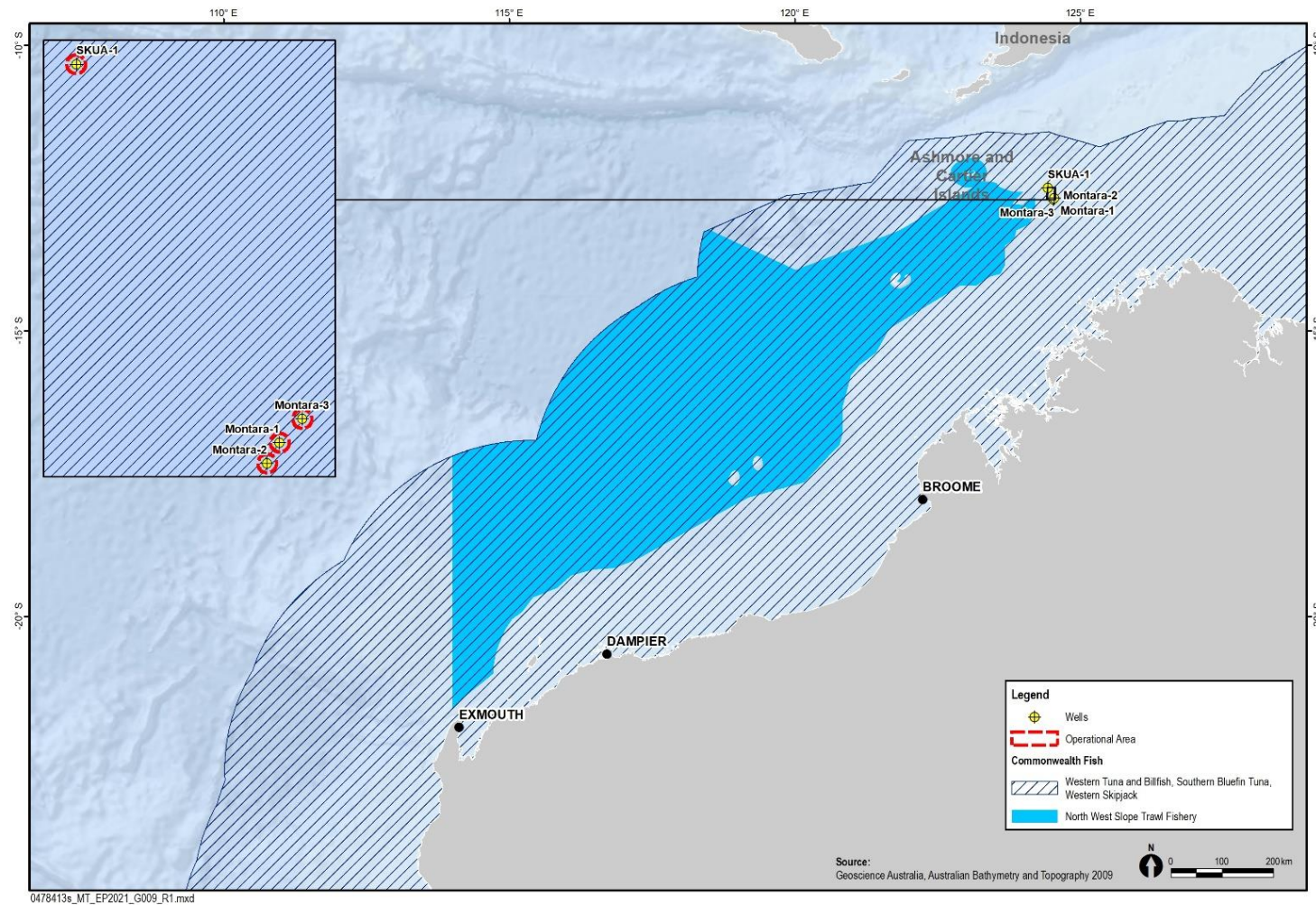


Figure 3-10 Commonwealth fisheries within the region

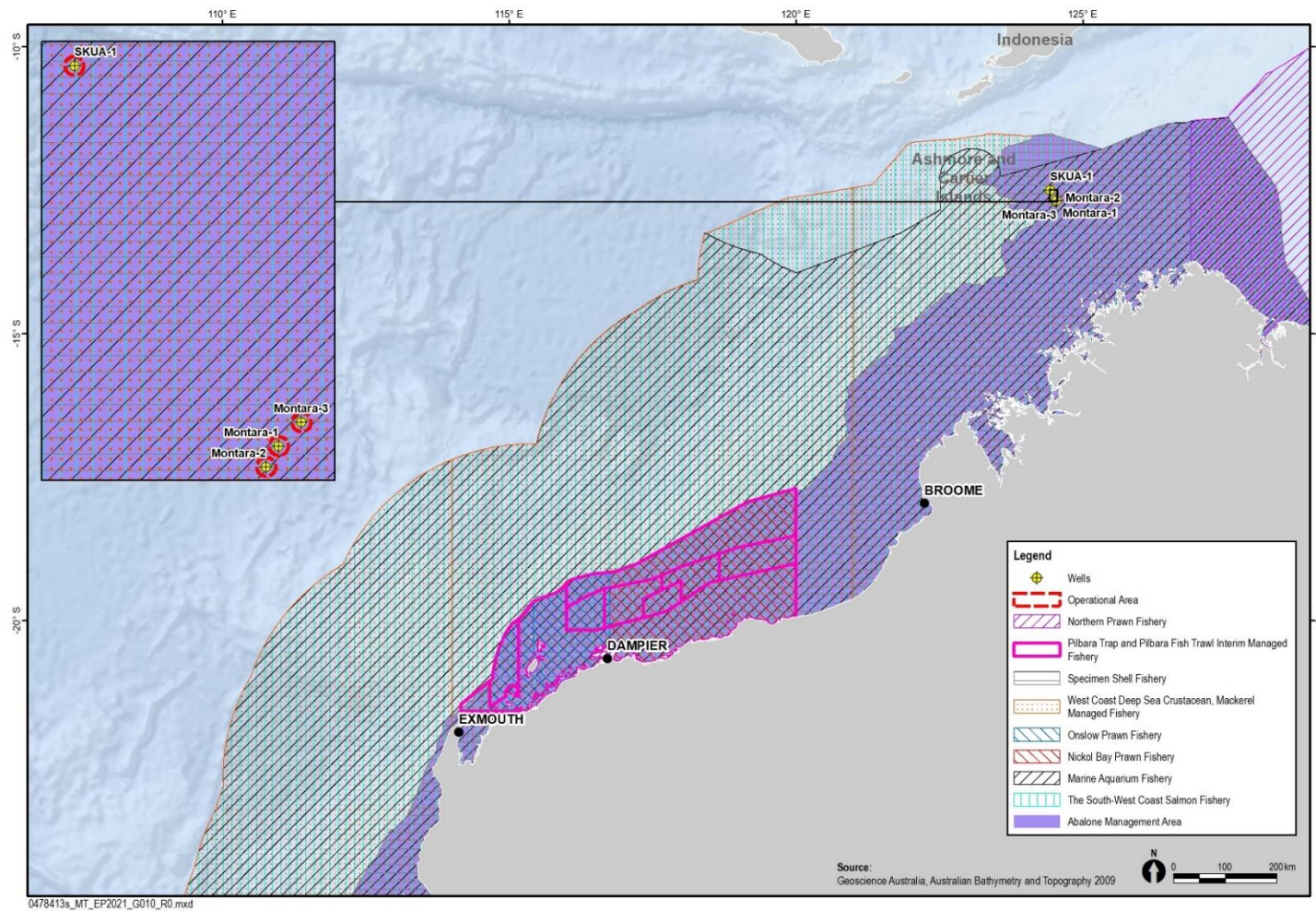


Figure 3-11 State fisheries within the region

4. CONSULTATION OF RELEVANT PERSONS

In the course of preparing the Environment Plan (EP), Jadestone is required to consult with the persons specified in the OPGGS(E) 2009 Regulations.

Jadestone has developed and followed a “Stakeholder Engagement Process for Regulatory Approvals” to assist in consistently engaging with Relevant Persons across its approvals. This provides a strategic and systematic approach to Relevant Person consultation aiming to foster an environment where ongoing, open dialogue and two-way communication is undertaken to build positive relationships. This approach is in line with the International Association for Public Participation (IAP2) spectrum. The process followed is summarised in Figure 4-1.

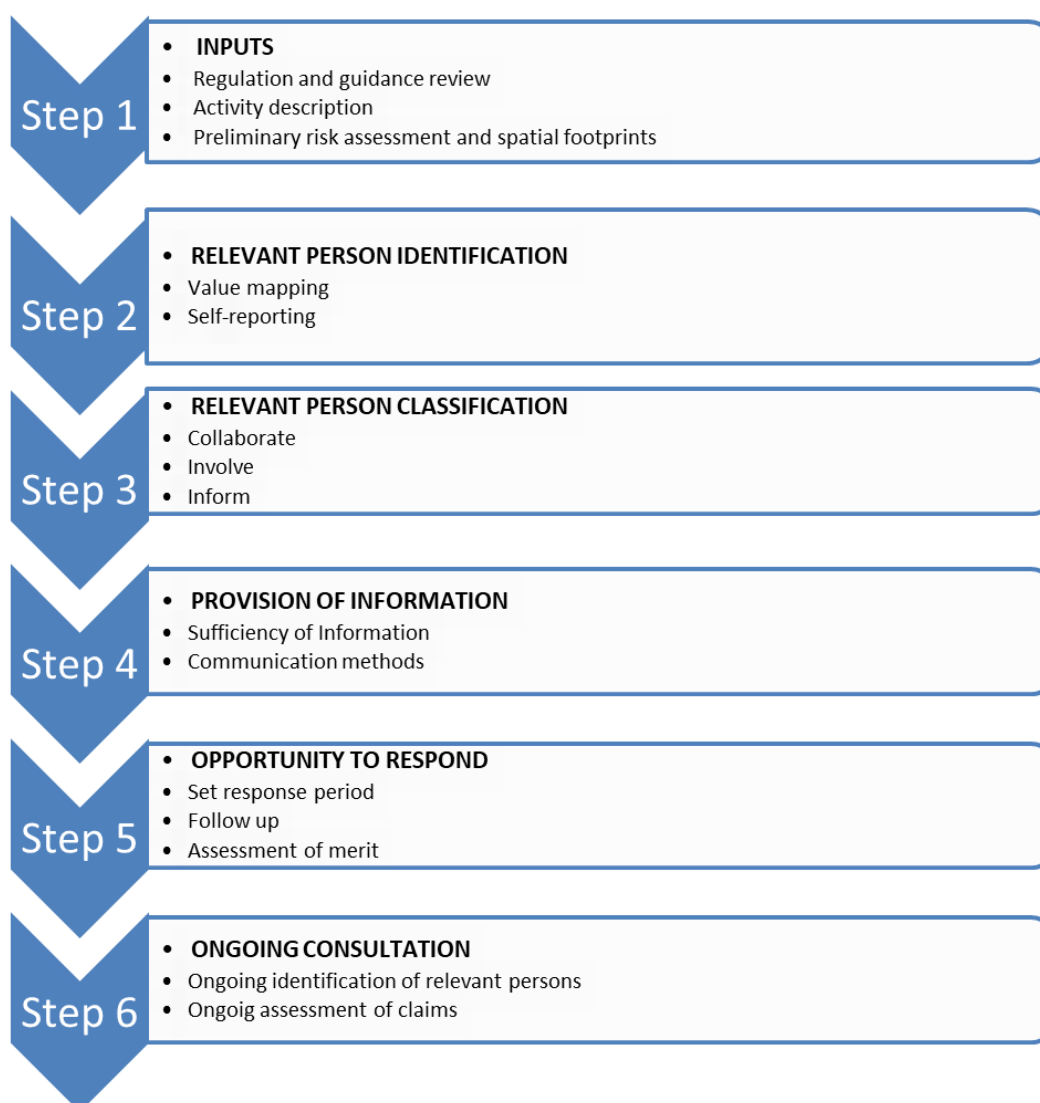


Figure 4-1: Summary of the Jadestone Relevant Person Engagement process

4.1 Fulfilment of Regulatory Requirements

The *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* stipulate a number of requirements in relation to consultation associated with an EP (Table 4-1).

Table 4-1: Regulatory Requirements

Regulation	Description	Fulfilment
11A(1)	<p>In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a relevant person):</p> <p>(a) each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;</p> <p>(b) each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;</p> <p>(c) the Department of the responsible State Minister, or the responsible Northern Territory Minister;</p> <p>(d) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan, being limited to the conduct of the activity that is authorised under the environment plan and not extending to a hypothetical, remote or speculative consequence from an activity such as a major oil spill;</p> <p>(e) any other person or organisation that the titleholder considers relevant.</p>	<p>Section 4.2 of the EP outlines the process (as per Jadestone Stakeholder Engagement Process for Regulatory Approvals) that was used to identify relevant persons in each of the five groups required under the regulations. A list of the relevant persons can be found in Table 4-4 of this EP.</p> <p>A log of engagement with each of the relevant persons identified is provided in the Sensitive Information Report (not published for privacy reasons).</p>
11A(2)	<p>For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.</p>	<p>For key stakeholders (particularly government agencies) email and phone discussions between staff were undertaken on specific issues. In addition to this all stakeholders were provided with targeted information fact sheets (Appendix B).</p>
11A(3)	<p>The titleholder must allow a relevant person a reasonable period for consultation.</p>	<p>To every extent possible, Jadestone has allowed at least 30 days for relevant persons to review and respond to new information regarding the proposed activity.</p>
14(9)	<p>The implementation strategy of the environment plan must provide for appropriate consultation with:</p> <p>(a) Relevant authorities of the Commonwealth, a State or Territory; and</p> <p>(b) Other relevant interested persons or organisations.</p>	<p>The implementation section (Section 8.1.4) includes notification and ongoing consultation triggers.</p>
16(b)	<p>A report on all consultations between the titleholder and any relevant person, for regulation 11A, that contains:</p> <p>(a) A summary of each response made by a relevant person;</p>	<p>a) A log of all engagement undertaken with relevant persons is provided in the NOPSEMA sensitive information report (not published for privacy reasons).</p> <p>b) An assessment of merits including Jadestone's response to all claims is provided in Table 4-6 of this EP.</p>

Regulation	Description	Fulfilment
	(b) An assessment of the merits of any objections or claim about the adverse impact of each activity to which the environment plan relates; (c) A statement of the titleholder's response, or proposed response, if any, to each objection or claim; and (d) A copy of the full text of any response by a relevant person.	c) Full text of correspondence can be found in the NOPSEMA sensitive information report (not published for privacy reasons).
27	Storage of records: <ul style="list-style-type: none"> Records must be stored in a way that makes retrieval reasonably practicable; Records must be kept for five years; and Records generated through preparation of the environment plan, demonstrating environmental performance, incidents, emissions and discharges, calibration and maintenance, and in relation to the implementation strategy arrangements must be kept. 	The Jadestone Stakeholder Engagement Process stipulates internal requirements for the storage of records.

Jadestone also undertook a review of consultation guidance provided by relevant government agencies and industry bodies to ensure effective consultation; this is listed in Table 4-2.

Table 4-2: Consultation Guidance

Agency	Guidance	Requirements	Fulfilment
COMMONWEALTH			
NOPSEMA	Clarifying statutory requirements and good practice consultation (nopsema.gov.au)	This Bulletin describes NOPSEMA's regulatory interpretation of relevant persons, provides clarification on definitions and advice on public comment, community engagement and relevant persons consultation.	Jadestone has used the descriptions of relevant persons to categorise stakeholders and also provided information within this section.
	Consultation with agencies with responsibilities in the Commonwealth marine area (nopsema.gov.au)	This Guideline provides insight into determining which agencies may be considered relevant for the purposes of statutory consultation.	Jadestone has considered the identified agencies per the guide as part of relevant person identification.
Parks Australia - Director of National Parks (DNP)	Petroleum activities and Australian marine parks (nopsema.gov.au)	This guidance document outlines process for engaging with the DNP throughout all stages of petroleum activity. For the preparation of an EP this includes considerations prior to consultation, timing of consultation, what constitutes sufficient information, and expectations of ongoing consultation.	Jadestone has ensured that the consultation with DNP and the information included in the EP is in accordance with this guidance.

4.2 Relevant Person Identification

Central to Jadestone's business is maintaining positive and constructive relationships with a comprehensive group of stakeholders in the community, government, non-government, other business sectors and other users of the marine environment. Jadestone has targeted its EP engagement to those defined as a relevant person under the NOPSEMA guidance (*Clarifying Statutory Requirements and Good Practice Consultation* (A696998)).

Jadestone used standardised identification methods (in accordance with its Stakeholder Engagement Process for Regulatory Approvals) to compile a list of relevant persons across these categories.

To identify relevant persons, Jadestone utilised the largest spatial extent whereby persons may be affected by the planned activities (the Operational Areas).



For each of the five groups of relevant persons identified in Regulation 11A (1) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009, four pathways were used to identify contacts:

1. **Beneficial Use/Value Mapping:** This process involved listing the potential receptors (with a focus on socio-economic receptors) that may be affected by the proposed activity, then determining relevant persons that may have functions, interests or activities. This process is captured in Appendix B.
2. **Regulatory Review:** This process involved undertaking a review of Ministers of regulatory portfolios of relevance and for region.
3. **Benchmarking:** This process involved identifying persons through benchmarking with other similar in-house or external projects, including cross referencing the stakeholder identification process for this EP with a review of the consultation undertaken for Montara Drilling and Operational activity EPs.
4. **Self-reporting:** This process made available and encouraged opportunities for self-reporting, including the provision of contact details on Jadestone's website and information sheets.

Relevant persons identified for the activity, categorised according to the OPGGS(E)R Regulation 11A, are listed and assessed in Table 4-4. A detailed description of the assessment underpinning this process can be found in (Appendix B).

In undertaking an assessment of the relevant persons, and to inform what constitutes sufficient information under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*, each relevant person was classified according to the categories in Table 4-3 based on the combination of potential for impact and the level of interest of the person or group. A summary table of all relevant stakeholders and their classification is found in Table 4-4 of this EP.

Table 4-3: Classification and associated levels of engagement

		Goal	Strategies
	Category 1: Regulatory agencies who have legislated requirements or decision-making powers	Consult Aim is to work directly with relevant persons to ensure their concerns and needs are understood and considered.	Targeted consultation material specific to relevant persons, legislation, regulations or guidance. Follow up to ensure receipt and seek feedback
	Category 2: Relevant persons with response actions Or	Involve Aim is to ensure information on the project is conveyed and to obtain feedback on alternatives or	Targeted consultation material specific to relevant persons.


		Goal	Strategies
	Relevant persons with high interest	outcomes where possible with follow-up to ensure any required actions are undertaken.	Follow up to ensure receipt and seek feedback
	Category 3: Relevant persons with low interest Or Any other person identified with ongoing interest	Inform The level of engagement is primarily aimed at conveying information, rather than seeking input.	Generic consultation material meeting the minimum requirements No follow up to ensure receipt or seek feedback

Table 4-4: Assessment of Relevance of Identified Stakeholders

Stakeholder	Relevant to Activity	Relevance/ Reason for Engagement	Relevant Person Category
Commonwealth government departments/ agencies			
Australian Hydrographic Office (AHO)	Considered relevant persons under Regulation 11A(1) (a)	AHO is the part of the DoD responsible for publication and distribution of nautical charts, including Notice to Mariners. The Operational Areas are in Commonwealth waters.	1
Australian Fishers Management Authority (AFMA)	Considered relevant persons under Regulation 11A(1) (a)	AFMA is responsible for the management of Commonwealth fisheries. The Operational Areas are in commonwealth waters. AFMA guidance is to engage through representative bodies and individual licence holders but will still keep them informed.	3
Australian Maritime Safety Authority (AMSA)	Considered relevant persons under Regulation 11A(1) (a)	AMSA is the statutory and control authority for maritime safety and vessel emergencies in Commonwealth Waters. The Operational Areas are in commonwealth waters.	1
Department of Defense (DoD)	Considered relevant persons under Regulation 11A(1) (a)	Defence activities may occur within the region.	2
Department of Agriculture, Water and the Environment – Fisheries, Forestry and Engagement (Fisheries)	Considered relevant persons under Regulation 11A(1) (a)	The activity has the potential to impact fishing operations and/or fishing habitats in Commonwealth waters.	1
Department of Agriculture, Water and	Considered relevant persons under Regulation 11A(1) (a)	The activity has the potential to require a sea dumping permit.	1

Stakeholder	Relevant to Activity	Relevance/ Reason for Engagement	Relevant Person Category
the Environment – Sea Dumping			
Director of National Parks (DNP)	Considered relevant persons under Regulation 11A(1) (a)	The DNP is the statutory authority responsible for administering, managing and controlling Commonwealth marine reserves (CMRs). The Operation Area does not intersect any Australian Marine Parks. Notified as a courtesy	1
State Government Agencies – WA			
Department of Transport	Considered relevant persons under Regulation 11A(1) (b)	Relevant state government authority for maritime transport.	2
Western Australian Museum	Considered relevant persons under Regulation 11A(1) (c)	Relevant organization for samples and marine biology	2
Department of Primary Industries and Regional Development (Fisheries)	Considered relevant persons under Regulation 11A(1) (b)	Relevant state government authority for fisheries management including biosecurity	2
Commonwealth fisheries			
Commonwealth Fisheries Association (CFA)	Considered relevant persons under Regulation 11A(1) (d)	Peak representative group for Commonwealth fisheries. The Operational Areas are in commonwealth waters. CFA advice was to engage through state representative bodies but will still keep them informed.	3
Australian Southern Bluefin Tuna Industry Alliance (ASBTIA)	Considered relevant persons under Regulation 11A(1) (d)	Representative body for Commonwealth Bluefin Tuna fishery (upwelling of interest to the fishery in vicinity of operations area). No risk of spill or impact to this fishery and therefore not considered a RP. Notified as a courtesy.	N/A
State fisheries (WA)			
WAFIC	Considered relevant persons under Regulation 11A(1) (d)	Primary representative body for WA fisheries.	1
Northern Demersal Scalefish Fishery (WA)	Considered relevant persons under Regulation 11A(1) (d)	Individual license holders consulted directly as catch history in last 5 years in grids of activity	1

Stakeholder	Relevant to Activity	Relevance/ Reason for Engagement	Relevant Person Category
Pearl Producers Association	Considered relevant persons under Regulation 11A(1) (d)	Representative body for pearl license holders	1
Oil and Gas			
Australian Petroleum Production and Exploration Association (APPEA)	Considered relevant persons under Regulation 11A(1) (d)	Oil and gas industry representative body	3
Santos	Considered relevant persons under Regulation 11A(1) (d)	Titleholder of several exploration permits, production licences and retention leases in adjacent areas.	3
Shell	Considered relevant persons under Regulation 11A(1) (d)	Titleholder of several exploration permits, production licences and retention leases in adjacent areas.	3
Inpex	Considered relevant persons under Regulation 11A(1) (d)	Titleholder of several exploration permits, production licences and retention leases in adjacent areas.	3
Conservation and Research			
Australian Institute of Marine Science	Considered relevant persons under Regulation 11A(1) (d)	Organisation concerned with conservation and research outcomes in the area.	2
CSIRO	Considered relevant persons under Regulation 11A(1) (d)	Organisation undertaking marine conservation research in the area	2
Western Australian Marine Science Institute	Considered relevant persons under Regulation 11A(1) (d)	Organisation undertaking marine conservation research in the area	2
Recreation			
Recfishwest	Considered relevant persons under Regulation 11A(1) (d)	Representative body for recreational fishing in WA	3
Others			
Hon Sussan Ley MP - Minister for Environment	Considered relevant persons under Regulation 11A(1) (d)	Relevant government portfolio holder	3

Stakeholder	Relevant to Activity	Relevance/ Reason for Engagement	Relevant Person Category
Hon Jonathon Duniam - Assistant Minister for Forestry and Fisheries	Considered relevant persons under Regulation 11A(1) (d)	Relevant government portfolio holder	2
Hon Greg Hunt - Minister for Industry, Innovation & Science	Considered relevant persons under Regulation 11A(1) (d)	Relevant government portfolio holder	2

4.3 Engagement Process

The engagement process adopted by Jadestone is in line with the International Association for Public Participation (IAP2) spectrum, which is considered best practice for stakeholder engagement.

Engagement was undertaken concurrently for this EP and the Sea Eagle-1 and Tahbilk-1 vessel based activities Environment Plan (a separate EP). The information provided to relevant persons clearly delineated the scope and risks associated with each activity. It was decided to undertake concurrently to reduce stakeholder fatigue and avoid confusion of two engagement processes in such a close timeframe.

4.3.1 Sufficiency of Information

Jadestone is committed to ensuring adequate and open information with relevant persons and its investors Table 4-5.

Table 4-5: Information provided to relevant persons

Format	Description
Information sheets	Two information sheets (One specific to fisheries and a general information) were used to support this EP and were developed with sub-regulation 11A(2) and associated guidance in mind to ensure it adequately described the activity – including the risks associated with the activities. Copies of all information sheets provided can be found in Appendix B.
Individual Responses	Jadestone provided written responses to all written enquires received from stakeholders to address their specific concerns throughout the duration of EP development. A separate sensitive information report submitted to NOPSEMA contains all individual responses provided to stakeholders as part of this process.
Email and Telephone	Email and telephone were used to consult with relevant persons as part of the development of the EP. The sensitive information report contains all individual records captured as part of relevant person consultation.

4.3.2 Reasonable period

Jadestone commenced consultation with relevant persons on 18 August 2021 with a general notification to most relevant persons (Department of Transport (DoT) was at a later date to provide information to meet guidelines).

Relevant persons were encouraged to provide comment within a 30 day period from receipt of any update or information (by 20 September 2021). Comments provided outside of this time were still considered and incorporated into the approvals process. The criteria used to determine if engagement was sufficient and no more follow up was required included:

- If no response was received following this period from a category 1 relevant person it was followed up via email or telephone (with the exception of fishing licence holders where only postal details were available) and if no further response was received, then it was considered that no comment was to be provided and it was closed out; and
- If a response was received from any relevant, it was assessed for merit and then a response provided to the relevant person.

This was subsequently assessed as:

- The relevant person acknowledged Jadestone's response and they were satisfied with the way their concerns had been addressed; and
- The relevant person was not satisfied with how the comments were addressed but were made aware of how their views were being reflected to NOPSEMA and how Jadestone was responding to them.

4.4 Assessment of Relevant Persons Objections and Claims

Prior to engaging with relevant persons, Jadestone reviewed the comments, objections and claims raised through the previous Montara Drilling and Operations EPs.

For all responses received by Jadestone during the engagement, the merit of each of these responses was assessed. For minor/administrative changes these are noted in the sensitive information report. Assessment of merit for all other responses is found in Table 4-6.

The Stakeholder Engagement Process for Regulatory Approvals process helped to guide the assessment of merit process.

Table 4-6: Assessment of Merit

Stakeholder	Stakeholder Concern, Objection or Claim	Jadestone Assessment of merit	Jadestone Response
Australian Maritime Safety Authority	Stakeholder Engagement <ul style="list-style-type: none"> To notify AMSA's Joint Rescue Coordination Centre (JRCC) (rccaus@amsa.gov.au, Ph 1800 641 792) 24–48 hrs prior to operations commencing and at cessation of operations Australian Hydrographic Office (datacentre@hydro.gov.au) to be contacted no less than four working weeks prior to operations commencing for the promulgation of related notices to mariners. To plan to provide updates to both the Australian Hydrographic Office and the JRCC on progress and, importantly, any changes to the intended operations. 	Jadestone considers this comment was relevant to the monitoring EP that was consulted on simultaneously and not decommissioning activities.	No change to the EP except to include trigger to re-consult if there is a material change to EP (refer to Table 8-1).
	<ul style="list-style-type: none"> Reminder on obligations to comply with COLREGs especially in regard to appropriate lights and shapes and ensuring their navigation status is set correctly in the ship's AIS unit 	Jadestone considers this comment was relevant to the monitoring EP that was consulted on simultaneously and not decommissioning activities.	No change to EP.
Australian Hydrographic Office (AHO)	<ul style="list-style-type: none"> Acknowledged and noted will be included in charting information. 	Noted	No further action required.

Stakeholder	Stakeholder Concern, Objection or Claim	Jadestone Assessment of merit	Jadestone Response
Australian Fisheries Management Authority (AFMA)	<ul style="list-style-type: none"> Unable to comment on individual proposals but noting resources for consultation with representative bodies or licence holders 	Comment has merit and has been actioned.	In accordance with this guidance, as part of Jadestone's standard approach to consultation the representative bodies for Commonwealth fisheries have been engaged with during the development of the EP.
Australian Institute of Marine Science (AIMS)	<ul style="list-style-type: none"> Providing details of previous research undertaken of infrastructure in the area in conjunction with industry Noting AIMS previous experience in modelling of fish production on the north-west shelf and contaminant monitoring 	Services available relevant to activity and reviewed	Jadestone reviewed the information provided but has chosen to undertake the monitoring activities under other contractual arrangements. Response provided to AIMS.
Department of Biodiversity, Conservation and Attractions (DBCA)	<ul style="list-style-type: none"> No comments on the activity 	Noted	No action required
Department of Agriculture, Water and the Environment (Sea Dumping)	<ul style="list-style-type: none"> Sought further information on the decommissioning of the wellheads, including: <ul style="list-style-type: none"> Assessment options for the decommissioning of the wellheads Associated identification of risks to the environment across short, medium and long term 	Jadestone considers these comments have merit	Jadestone has sought advice from APPEA and is meeting with DAWE to understand the requirements further.
Director of National Parks (DNP)	<ul style="list-style-type: none"> Sought further information on the decommissioning of the wellheads, including: 	Comment has merit	A response was sent to DNP outlining the options assessment undertaken in the EP and the associated risks on 20/10/21. Refer

Stakeholder	Stakeholder Concern, Objection or Claim	Jadestone Assessment of merit	Jadestone Response
	<ul style="list-style-type: none"> ○ Assessment options for the decommissioning of the wellheads ○ Associated identification of risks to the environment across short, medium and long term 		to Sensitive Information Report for a copy of the information provided.
	<ul style="list-style-type: none"> • Sea dumping permit may be required 	Comment has merit	Advice was sought from DAWE as to whether a sea dumping permit will be required.
	<ul style="list-style-type: none"> • 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 and include specified details. 	The wells are considered abandoned with no risk of spill; therefore comment is not considered to have merit.	No change to the EP. DNP notified of intention not to include a notification of this nature on 20/10/21 (Refer to Sensitive Information Report for full text of correspondence).
WAFIC	<ul style="list-style-type: none"> • Contacted all Northern Demersal Scalefish Fishery regarding EP with only one response from a fisher that “happy for them to be left behind”. Noting that this only reflects the position of one fisher and cannot be extrapolated to represent the views of all fishers in the fishery. 	Noted	Feedback noted
	<ul style="list-style-type: none"> • Sought confirmation that the wellheads, given the Montara incident, are secure and pose no risk to marine environment 	Comment has merit and response provided	Response provided to WAFIC that both primary and secondary barrier envelopes were verified, and wells confirmed to be plugged and abandoned as per the NOPSEMA accepted WOMP which was accepted on 22 June 2021 and previous documentation to regulatory authorities (in the case of Skua-1). Therefore, it was

Stakeholder	Stakeholder Concern, Objection or Claim	Jadestone Assessment of merit	Jadestone Response
			considered that there is no risk to the marine environment from an integrity perspective.
	<ul style="list-style-type: none"> Sought confirmation that the wellheads are marked on navigational charts 	Comment has merit and response provided	Response provided that wells are marked on charts already.
	<ul style="list-style-type: none"> Clarification sought as to why in this case Jadestone are proposing to leave the wellheads in situ given the total removal of is the base case as stated in NOPSEMA's policy Section 572 Maintenance and removal of property "Section 572(3) requires titleholders to remove property when it is neither used, nor to be used, in connection with the operations. NOPSEMA applies the following principles when considering compliance with this requirement: the Complete removal of all property is the base case for all offshore operations and should inform the basis for field development planning (as outlined in section 2.3 of the Australian Government's Offshore petroleum decommissioning guideline)" 	Comment has merit and response provided	A response was provided to WAFIC which included a copy of the options assessment undertaken as part of this EP. This showed that based on this assessment the option to leave the infrastructure in-situ was considered the most suitable option.
	<ul style="list-style-type: none"> Clarification sought on if any other infrastructure will remain 	Comment has merit and response provided	A response was provided to WAFIC clarifying small miscellaneous items (debris) recorded around wellhead in ROV surveys which will also remain.
	<ul style="list-style-type: none"> A description of the wellheads, including height above seabed was requested. 	Comment has merit and response provided	The height above seabed was provided in the original information sheets. This along with additional details (including photographs of infrastructure) were provided to WAFIC.

5. EVALUATION OF ENVIRONMENTAL IMPACTS AND RISKS

As required by Regulation 13(5) of the OPGGS(E) Regulations, this section of this EP provides an outline of Jadestone Energy's approach to the evaluation of impacts and risks due to the activity (Section 5.1), and the outcomes of the impact and risk assessment undertaken (Section 5.6).

5.1 Assessment Method

The environmental impacts and risks associated with the proposed abandonment of the wellheads in production licence AC/L7 and AC/L8 have been assessed using the Jadestone Impact and Risk Management Framework (JS-70-PR-F-00009) and methods consistent with HB 203:2012 and AS/NZS ISO 31000:2009.

'Impact' is evaluated in terms of the extent, duration, severity and certainty pertaining to the effect that will or may occur in the environment due a planned event associated with the activity.

'Risk' is evaluated in terms of likelihood and consequence. Likelihood is defined as the probability or frequency of the unplanned event occurring, and consequence, like 'impact', is defined as the extent, duration, severity and certainty pertaining to the effect that will or may occur in the environment due to the event associated with the activity.

The assessment methodology provides a framework to demonstrate:

- That the identified impacts and risks are reduced to as low as reasonably practicable (ALARP) (Regulation 10A(b)); and
- The impacts and risks are acceptable (Regulation 10A I).

The impact and risk management process is shown in Figure 5-1.

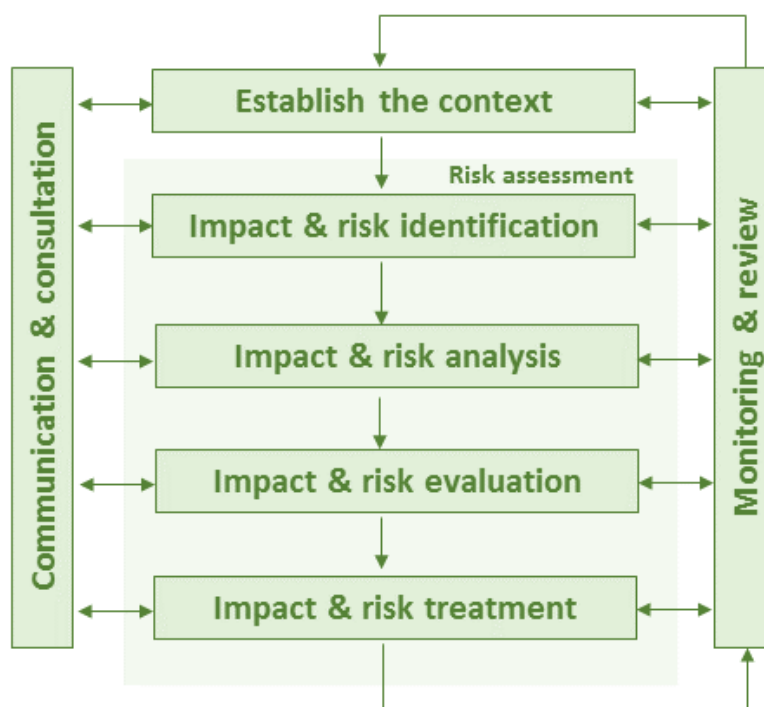


Figure 5-1: Impact and risk evaluation process

Further detail on the steps involved in the impact and risk evaluation process is provided below.

5.2 Risk Assessment

The assessment process evaluates impacts and risks associated with planned and unplanned events that will or have the potential to impact the environment. Impacts and risks are identified through several activities:

- The Risk Workshop was attended by a team that includes relevant technical knowledge and experience in the activities being assessed;
- Information relating to previous environmental performance relevant to the activity being assessed such as findings of audits and inspections, incident investigations and performance reports;
- Consultation with relevant persons; and
- Industry related information of decommissioning activities relevant to the activity being assessed.

Analysis of the impacts and risks identified for the activity includes steps intended to treat the impacts and risks to levels that are acceptable and as low as reasonably practicable for the business. The steps are:

- Identification of appropriate control measures (preventative and mitigative) to treat likelihood and consequence; and
- Determination of the residual impact/risk ratings (Section 5.5).

5.2.1 Identification of control measures

The following framework tools are applied, as appropriate, to assist with identifying control measures:

- **Legislation, Codes and Standards** – identifies the requirements of legislation, codes and standards which are to be complied with for the activity;
- **Good Industry Practice** – identifies further engineering control standards and guidelines which may be applied over and above that required to meet the legislation, codes and standards;
- **Professional Judgement** – uses relevant personnel with the knowledge and experience to identify alternative controls. When formulating control measures for each environmental impact or risk, the ‘Hierarchy of Controls’ philosophy (see below) is applied. This Hierarchy is used in the industry to minimise or eliminate exposure to impacts and risks;
- **Risk Based Analysis** – assesses the results of probabilistic analyses such as modelling, quantitative risk assessment and/or cost benefit analysis to support the selection of control measures identified during the assessment process;
- **Company Values** – identifies values referenced in Jadestone Energy’s HSE Policy; and
- **Societal Values** – identifies the views, concerns and perceptions of relevant persons and addresses their concerns as gathered through the ongoing consultation process.

The Hierarchy of Control philosophy is used by Jadestone Energy to help evaluate potential management controls to ensure alternative reasonable and practicable solutions have not been overlooked:

- **Elimination** – it is preferable to remove the impact or risk altogether;
- **Substitution** – substitute the impact or risk for a lower one;
- **Engineering control measures** – use engineering solutions to prevent or detect the hazard or control the severity of consequences/ impacts;
- **Administrative control measures** – use of procedures, JHA etc. to assess and minimise the environmental impacts or risks of an activity; and
- **Protective** – use of protective equipment (e.g., the use of appropriate containers).

5.2.2 Risk ranking process for unplanned events

Risks are ranked using the Jadestone Qualitative Risk Matrix (Table 5-1). Environmental ranking of a measure between **Low** to **Extreme** is determined by evaluating the likelihood of the unplanned event occurring, and evaluation the expected severity of the consequence with standard expected control measures in place.

Table 5-1: Jadestone Qualitative Risk Matrix

Rating		Consequence				
		Negligible	Minor	Moderate	Major	Critical
Likelihood	Expected	Medium	Medium	High	Extreme	Extreme
	Probable	Medium	Medium	Medium	High	Extreme
	Likely	Low	Medium	Medium	Medium	High
	Unlikely	Low	Low	Medium	Medium	Medium
	Rare	Low	Low	Low	Medium	Medium

Consequence levels for unplanned events are assigned based on the expected extent of area that may be affected, the duration of effect and the severity of the effect. A consequence level of **Negligible** to **Critical** may be assigned (Table 5-2).

Table 5-2: Definition of consequence level

Consequence	Consequence description	Socio-economic
5. Critical	Massive effect; recovery in decades; ecosystem collapse	Extensive damage International impact
4. Major	Major effect; recovery in 1 to 2 years; impact to population	Major damage National reputation impact
3. Moderate	Local effect; recovery in months to a year; impact to localised community	Local damage Considerable reputation impact
2. Minor	Minor effect; recovery in weeks to months; death of individuals	Minor damage Limited reputation impact
1. Negligible	Slight effect; recovery in days to weeks; injury to organism	Slight damage Slight reputation impact

Likelihood levels for unplanned events are assigned based on preceding performance in relation to the specific activity, within the region or in industry. A likelihood level of **Rare** to **Expected** may be assigned to unplanned events (Table 5-3).

Table 5-3: Definition of likelihood levels

Likelihood	
5. Expected	Happens several times a month in similar exploration and production operations
4. Probable	Happens several times a year in similar exploration and production operations
3. Likely	Event has occurred in similar exploration and production operations
2. Unlikely	Heard of in the exploration and production industry
1. Rare	Never heard of in the exploration and production industry

Once assessed and treated, an assessment as to whether the risks recorded can be demonstrated as being acceptable and ALARP is made. The processes for determining if risks and impacts have been reduced to ALARP and acceptable levels are described below.

5.3 Impact Assessment

Environmental impacts that will occur as a result of planned activities may cover a wider range of issues, multiple species, persistence, reversibility, resilience, cumulative effects and variation in severity. The degree of impact and the corresponding level of acceptability is assessed against several guiding principles:

- Principles of ecologically sustainable development (ESD);
- Conservation and management advice;
- Stakeholder feedback;
- Reputational ramifications;
- Environmental context; and
- Jadestone's HSE Policy and Management System.

The application of the guiding principles within the acceptability matrix are outlined in Table 5-4.

The following process has been applied to demonstrate acceptability in the reduction of planned impacts:

- **GREEN** residual impacts are Tolerable, if they meet management requirements, stakeholder requirements, environmental context, and the Jadestone Energy HSE Policy and management system requirements; and
- **ORANGE** residual impacts are Intolerable and therefore unacceptable. Planned impacts with this rating will require further investigation and mitigation to reduce them to a lower and acceptable level. If after further investigation the impact remains in the unacceptable category, the impact requires appropriate business sign-off to accept the impact.

A reduction of impacts to as low as reasonably practicable (ALARP) follows the process described in Section 5.5.

5.4 Demonstration of Acceptability

An acceptable level of risk of an unplanned event occurring must be scored with a low or medium rating. Risks receiving a score of high (orange) or extreme (red) risk ratings in Table 5-4 are unacceptable. For those risks found to have an unacceptable rating, a return to the planning process for the activity is required to determine if an alternative approach to undertaking the activity can be identified.

Table 5-4: Jadestone Energy's acceptability matrix

Guiding principles		Impact level				
		1	2	3	4	5
A	Principles of ESD	Discharges/ emissions have slight effect – recovery in days to weeks	Discharges/ emissions have minor effect – recovery in weeks to months	Discharges/ emissions have local effect – recovery in months to a year	Discharges emissions have major effect – recovery in multiple years	Discharges emissions have catastrophic effect – recovery in decades
B	Conservation and management advice	Activity does not contact/ interact with sensitivities protected by conservation and management advice	Activity Triggered and adopts conservation and management advice of affected sensitivities	Activity must be modified to uphold conservation and management requirements of affected sensitivities	Activity as planned cannot uphold conservation and management requirements of affected sensitivities	Activity as planned will contravene conservation and management requirements of affected sensitivities
C	Stakeholders	No issues raised by stakeholders	Concern/ query received by stakeholders due to activity	Delay in commencement of activity due to stakeholder consultation	Modification of planned activity to achieve negotiated outcome	Executive involvement in resolving stakeholder concerns
D	Reputation	Slight impact – no media coverage	Limited impact – State media coverage	Considerable impact – national coverage	National impact – persistent national coverage	International impact – international coverage
E	Environmental context	Slight effect – recovery in days to weeks	Minor effect – recovery in weeks to months	Local effect – recovery in months to a year	Major effect – recovery in multiple years	Catastrophic effect – recovery in decades
F	Policy and Management System compliance	Proposed activity complies with JSE HSE Policy and Management System	Parts of the activity will not align with JSE HSE Policy and Management System	Proposed activity must be modified to align with JSE HSE Policy and Management System	Proposed activity cannot uphold intent of JSE HSE Policy and Management System	Proposed activity does not comply with JSE HSE Policy and Management System

5.5 Demonstration of as Low as Reasonably Practicable (ALARP)

Regulation 10A(b) of the Environment Regulations requires a demonstration that risks are reduced to ALARP.

The ALARP principle states that it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent attempting to reduce a risk to zero. An iterative evaluation process is employed until such time as any further reduction in the residual ranking is not reasonably practicable to implement. Following identification of the residual ranking, the ALARP principle is applied:

Where the residual rank is **LOW** as:

- Good industry practice or comparable standards have been applied to control the risk, because any further effort towards reduction is not reasonably practicable without sacrifices grossly disproportionate to the benefit gained.

Where the residual rank is **MEDIUM**:

- Good industry practice is applied for the impact or risk; and
- Alternatives have been identified and the control measures selected to reduce the risks to ALARP. This may require assessment of company and industry benchmarking, review of local and international codes and standards, consultation with stakeholders, etc. to demonstrate that alternatives have been considered, and reasons for adoption/rejection provided.

Where the residual rank is **HIGH** or **EXTREME**, the risk is not considered to be acceptable, and the activity cannot continue as described. Further control measures must be applied such that an acceptable risk is demonstrated; and the residual risk is reduced to 'Medium' or lower as described above. The activity should not be carried out if the residual risk remains 'High or Extreme'.

The process of evaluating the reduction of risks to ALARP is illustrated in Figure 5-2.

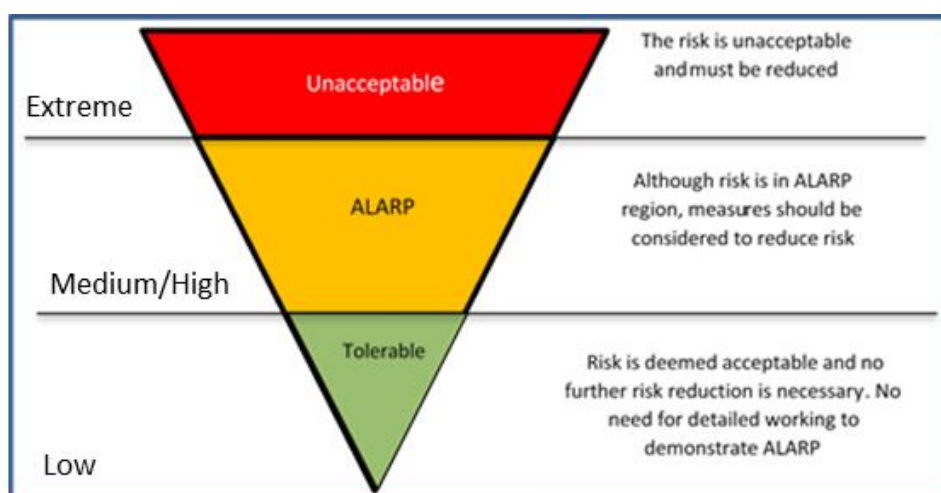


Figure 5-2: ALARP triangle

5.6 Evaluation Summary

An impact and risk assessment was conducted by Jadestone Energy in September 2021 to reflect the Jadestone Energy Impact and Risk Management Framework (JS-70-PR-F-00009). The assessment was undertaken by a multidisciplinary team with sufficient breadth of knowledge, training and experience to reasonably assure that risks and impacts were identified and assessed. The assessment team included management, drilling and environmental personnel.

The assessment process undertaken by Jadestone Energy for the activity identified one planned aspect and one unplanned hazard and their associated environmental impacts and risks that will or may occur during the activities.

The output of the assessment process is documented in this EP and summarised in Table 5-5 .

Table 5-5: Summary of the environmental impact and risk assessment rankings for aspects and hazards associated with planned activities and unplanned events

Aspect/Hazard	Residual Assessment
Planned activities	
Physical presence – other users, marine fauna, seabed disturbance	Acceptable
Unplanned events	
Interaction with other marine users	Low

5.7 Risk Assessment Approach for Worst-case Hydrocarbon Spill Response

The wellheads have been accepted as plugged and abandoned and therefore do not present a risk of hydrocarbon release. No WOMPs will be in place for these wells when the Final Abandonment Report is accepted by NOPSEMA, and there is no requirement for an oil pollution emergency plan (OPEP). No further assessment is required for this aspect.

6. ASSESSMENT – PLANNED ACTIVITIES

6.1 Physical Presence

6.1.1 Description of aspect

Physical presence	<p>Seabed disturbance from scouring around the wellheads will occur from their ongoing presence.</p> <p>As the wellheads degrade, they may introduce contaminants to the water column and sediment surrounding the wellheads, and larger pieces may break off to the immediate vicinity of the wellhead.</p> <p>The physical presence of infrastructure may alter marine fauna behaviour such as avoidance or attraction as it provides a hard substrate resulting in the creation of new habitat.</p>
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6.1.2 Impacts

Sensitive Receptor	Impact description
Social receptors	
Environmental receptors	

Sensitive Receptor	Impact description
Fauna – benthic fauna, fish	<p>The presence of subsea infrastructure (wellheads) has the potential to act as artificial habitat or hard substrate for the settlement of marine organisms that would not otherwise be successful in colonising the area. Since the wellheads have been in situ for a number of years, the wellheads are expected to have become a stable benthic habitat with higher marine life abundance and diversity (notably fish) than the surrounding naturally flat, sandy sediments. This ‘reef effect’ of anthropogenic structures has been well documented (e.g., Love and York 2005; Pradella et al 2014). The value of the wellheads as artificial benthic habitat will continue until the wellhead has completely degraded (i.e., potentially in excess of a hundred years).</p> <p>As shown in Figure 2-1 to Figure 2-4, ROV inspections indicate a limited amount of marine growth on the wellheads, likely due to the depths that they are in and distance from other areas of high benthic coverage, and no significant differences in the surrounding seabed were discerned from ROV footage. It is also clear there has been some scouring and accretion of the sediments around the base of the wellheads which is likely to fluctuate over time.</p> <p>The release of breakdown compounds into the water column and accumulation in sediments may affect marine fauna, particularly infauna species surrounding the wellhead. Due to the high concentrations of compounds such as sodium chloride and magnesium chloride in the seawater of marine environments, corrosion of metal components is highly likely to occur (Anderson et al, 2012). Iron from the wellheads and casing material, is not considered a significant contaminant in the marine environment and is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997) and is an abundant element in marine sedimentary systems (Taylor et al, 2011) as it is naturally occurring and generally has low toxicity to marine biota. The components will rapidly disperse in the ocean currents, and it is unlikely that high contaminant levels will be reached due to the slow breakdown of the wellheads. Impacts to larger fauna such as larger pelagic fish and sharks, marine reptiles and marine mammals is not expected; only fauna in the immediate vicinity such as local fish and benthic communities could be impacted.</p> <p>The Operational Areas overlap the whale shark distribution BIA, and given the low toxicity of any components released, the rapid dispersion in the water column and the surface feeding behaviour of whale sharks, no significant impacts are expected.</p> <p>Impacts to marine fauna are considered <i>negligible</i>.</p>
Benthic communities	<p>The degradation of the wellheads over time releasing degradation products (predominantly iron oxides which are considered non-toxic) may impact a highly localised area through an alteration in sediment and water quality.</p> <p>As the wellhead integrity reduces over time, sections of the wellhead may break off and fall onto the surrounding seabed. This would only affect habitat (i.e., unconsolidated sediments) within approximately 5 m of the wellhead, given the water depths and relatively flat featureless sediment. It is likely they would bury/rebury over time as can be seen happens to other small amounts of debris in the ROV footage taken at the locations. Changes are not expected to occur in the short to medium term, given the low rate of degradation of the wellheads.</p> <p>The Operational Areas are distant from key habitats of ecological importance such as coral reefs or shoals (detailed in Section 3), the nearest being the Goeree and Vulcan Shoals located > 28 km to the southwest.</p> <p>There are no sensitive or unique marine habitats in the area and the diversity and coverage of epibenthos is low (ERM 2011).</p> <p>Given the small footprint of the wellheads, the slow rate of degradation and the widespread distribution and abundance of benthic communities within the surveyed areas and the NW Marine Bioregion, the consequence to benthic communities will be highly localised, negligible, and reversible change to a very small proportion of the of the overall benthos.</p>

Sensitive Receptor	Impact description
	Corrosion is likely to be a relatively slow process about 0.2mm/year (Melchers, 2005). Based on the composition of the wellhead and the low corrosion rate of the wellhead materials, impacts to benthic communities are considered negligible .
Socio-economic receptors	<p>The physical presence of the wellhead is likely to have a localised increase in the diversity and abundance of some fish species; thereby providing the potential for fish assemblages. ROV footage shows some accumulation of fish around the wellheads, although species were not determined in the footage.</p> <p>Adverse impacts to commercial fisheries' target species are not predicted given the small size and inherent properties of the wellhead. The wellhead provides a hard substrate habitat on a seabed predominantly comprised of soft sediment.</p> <p>Several studies undertaken on wellheads on the NWS have observed a diverse range of reef dependant and transient pelagic species associating with structures including commercially fished species (Pradella et al. 2014). Wellheads in the NWS at depths between 82 and 135 m were found to sustain full populations of <i>Prurizonatus</i> from juveniles through to adults (Fowler and Booth, 2012).</p> <p>No commercial fisher or stakeholder concerns have been raised to date.</p> <p>Therefore, impacts to socio-economic receptors are assessed as negligible (A).</p>
Consequence	Ranking
Negligible	Acceptable

6.1.3 Environmental performance

As the potential impacts are considered to be acceptable and changes to the marine environment as a result of leaving the wellheads in situ considered to be negligible, environmental performance outcomes relating to physical presence are not required. There are also no environmental performance standards or measurement criteria for this aspect.

6.1.4 ALARP assessment

<p>Based on the impact and risk assessment completed, Jadestone considers the potential impacts to be negligible. Additional controls considered but rejected are detailed below in relation to the 'Base Case' option for complete removal of the wellheads.</p> <p>The potential impacts are considered Acceptable (negligible to minor impacts). No further controls are required and therefore ALARP has been demonstrated.</p>				
Rejected control	Hierarchy	Practicable	Cost effective	Justification
Remove the wellheads	Eliminate	No	No	Removing the wellhead will result in the environment returning to a similar undisturbed state over a short period of time following removal of the wellheads, debris and cement patio. However, given the size of the wellheads and the limited additional marine growth and habitat that has accrued around the wellheads, the environmental benefits are expected to be small. Additionally, wellhead components are considered

Based on the impact and risk assessment completed, Jadestone considers the potential impacts to be negligible. Additional controls considered but rejected are detailed below in relation to the 'Base Case' option for complete removal of the wellheads.

The potential impacts are considered Acceptable (negligible to minor impacts). No further controls are required and therefore ALARP has been demonstrated.

Rejected control	Hierarchy	Practicable	Cost effective	Justification
				<p>to have a negligible impact when released to the surrounding environment</p> <p>It is estimated that wellhead removal costs would be approximately \$10MM to remove all four, assuming complete removal of all wellheads and associated debris in one campaign.</p> <p>The removal operations would, amongst other environmental effects, cause localised seabed disturbance, generate metal cuttings and remove artificial habitat. Offshore vessel operations would generate environmental emissions (e.g. Greenhouse Gas (GHG), noise, etc.) for approximately four weeks (assuming one week per wellhead to remove them).</p> <p>The operation would also result in health and safety risks to the workforce, particularly with the unknowns around the wellhead integrity and whether they would be able to be pulled in one piece.</p> <p>As such, the costs and health and safety risks to remove the wellheads are considered disproportionately high to the low environmental effects of leaving the wellheads in situ.</p>
Cap the wellheads	Substitute	No	No	<p>Installation of a wellhead cap would not result in an additional benefit as it would only reduce, but not remove the negligible hazard posed by the wellheads. As the wellheads remain marked on nautical charts, installing a wellhead cap is considered to provide little benefit over the base case.</p>
Wellhead monitoring	Administrative	No	No	<p>Monitoring of the wellhead would assist in validating the environmental assessment that concluded only negligible impacts. It is estimated that a monitoring campaign to undertake ROV surveys on all four wellheads would be approximately \$200K (~\$30K/day for a suitable vessel with ROV for up to a week) and would have to be undertaken for multiple years to observe any potential impacts.</p> <p>Numerous monitoring campaigns would be required to collect meaningful data.</p>

Based on the impact and risk assessment completed, Jadestone considers the potential impacts to be negligible. Additional controls considered but rejected are detailed below in relation to the 'Base Case' option for complete removal of the wellheads.

The potential impacts are considered Acceptable (negligible to minor impacts). No further controls are required and therefore ALARP has been demonstrated.

Rejected control	Hierarchy	Practicable	Cost effective	Justification
				<p>Impacts are unlikely to be detectable beyond the immediate area surrounding the wellhead</p> <p>Impacts are also unlikely to be detected for a number of years based on the slow rate of wellhead corrosion (0.2 mm/year) (Melchers, 2005).</p> <p>Similar to above, offshore vessel operations would generate environmental emissions (e.g., Greenhouse Gas (GHG), noise, etc.) and result in health and safety risks to the workforce.</p> <p>There is no compelling reason for wellhead monitoring given the environmental assessment is predicting negligible impacts. There is a low level of uncertainty associated with the impact prediction.</p> <p>As such, the costs and health and safety risks associated with an offshore monitoring program are considered disproportionately high to the low environmental benefits that a monitoring program would possibly provide.</p>
Ongoing maintenance	Protective	No	No	<p>There is no justification for maintaining the wellhead. The wellheads are not expected to be contaminated with any hazardous material. The wells have been permanently plugged and abandoned; hence, the wellhead is of no further use. The wellheads will slowly degrade, lose structural integrity and break apart. This is inevitable and the desired outcome.</p> <p>The costs associated with this would be approximately ~\$5MM each year to mobilise a vessel to undertake an inspection and undertake maintenance activities, with further costs for additional campaigns to rectify any issues. As the preference is for the wellhead to degrade in situ, ongoing maintenance would only prolong the integrity of the wellhead with no benefit. There is not considered to be any risk of hydrocarbon release from the wellheads either and therefore ongoing monitoring would be of no additional benefit.</p>

6.1.5 Acceptability assessment

The potential impacts of physical presence of the wellheads considered 'Acceptable' in accordance with Section 5, based on the acceptability criteria outlined below and the environmental consequence is considered negligible.	
Environmental context and ESD	<p>While the presence of the wellheads will result in some negligible impacts to the surrounding environment, the impact and risk assessment process indicates that the potential impact is localised and occurs at a location that is not likely to result in significant impacts to the low diversity benthic communities.</p> <p>The sites around the wellheads are already disturbed. Surveys in the area show soft sandy sediments with sparse benthic communities typical of the greater NW Bioregion. Impacts to protected species are negligible with no permanent or population effects, given the large area of similar habitat available and the relatively small Operational Areas. The disturbed seabed is negligible in comparison to the vast size of soft substrata habitats spanning the North-West Marine Bioregion.</p> <p>The potential impact is considered acceptable after consideration of:</p> <ul style="list-style-type: none"> • Potential impact pathways: the pathways and consequences from the localized presence of the wellheads are assessed in Section 6.1.2; • Preservation of critical habitats: localised disturbance is remote from Protected Areas; • Assessment of key threats as described in species and Area Management/ Recovery plans: see below under 'Conservation and Management Advice'; • Consideration of North-West Bioregional Plan: no impacts beyond 'negligible' (localized disturbance) predicted from the physical presence to KEFs, shipwrecks/ other heritage places or protected species that are listed as values within the NW Bioregional Plan; and <p>Principles of ecologically sustainable development: impacts are fully recoverable, biological diversity and ecological integrity are not impacted significantly.</p>
Conservation and management advice	<p>No management plans identified physical presence as described above as being a threat to marine fauna or habitats.</p> <p>Impacts from physical presence will have a negligible impact on any of the social and ecological objectives and values, of any AMPs, or state marine parks given the distance from them. This is consistent with the objectives of the protected area management plans and considered acceptable.</p>
Stakeholder reputation	Stakeholder consultation has been undertaken (Section 4), and no stakeholder concerns have been raised with regards to physical presence of the wellheads.
Policy management system compliance	Jadestone's HSE Policy objectives are met. Section 8 demonstrates that Jadestone's HSE Management System is capable of meeting environmental management requirements for this activity.
Law and industry best practice	In the preparation of this EP, the Offshore Petroleum Decommissioning Guideline (DISER, 2020) and Decommissioning Guidelines, and the Offshore Oil and Gas Decommissioning Decision-making Guidelines (APPEA, 2016) have been referred to ensuring the options assessment has been completed in line with industry best practice.

7. ASSESSMENT - UNPLANNED EVENTS

7.1 Interaction with other marine users

7.1.1 Description of hazard

Interaction with other marine users	The physical presence of the wellhead may interfere with third-party activities including: Current and future commercial fishing activities (accidental damage to trawling equipment), current and future oil and gas activities and current and future shipping activities
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7.1.2 Impacts and risks

Interaction between the wellheads and other marine users is expected to be minimal due to the remote location and low fishing effort expended within the Operational Areas. The wellheads have been present since 1974 (Skua-1) and 1988/ 1991 / 2002 (Montara-1, -2, -3) and marked on nautical charts.

In the immediate vicinity, the greater Montara facilities and PSZs have been established and effective since 2012. Any overlap with active fisheries is relatively small, with only the Northern Demersal Scalefish Managed Fishery having recent catch returns for the Operational Areas or its immediate vicinity, and the boundary of this fishery does not overlap the Operational Areas. There is the potential for interactions between fishing activities and vessels.

The Operational Areas are located northwest of the nearest designated shipping route with heavy vessels utilising the Osborne Passage in the northern part of the permit areas, however it is not anticipated there will be high commercial shipping traffic in the Operational Areas or immediate surrounds (refer to Section 3.6 and Figure 3-9 for details on commercial shipping, including designated shipping routes) (AMSA, 2021). The wellhead presence is unlikely to result in any required deviations by vessels due to the water depths around the wellheads.

A number of petroleum operators are present in the region and the presence of the wellheads on the seabed may interfere with future petroleum activities such as pipeline routes or MODU placement (e.g. jack-up MODU). However, due to the small footprints of the wellheads and known presence of the wellheads any such interference would be insignificant. Surveys conducted as routine precursors to drilling or development would identify the structures on the seabed, and they remain marked on charts.

As such impacts to other users are considered negligible.

Sensitive Receptor	Impact description
Socio-economic receptors	<p>The wellheads have been in situ since their plug and abandonment and have been marked on navigational charts since they were drilled. No incidents have been recorded between other marine users and the wellheads. As there is no exclusion zone around the wellheads, line fishing (which is permitted in the area) can still occur and may be enhanced by the presence of the wellheads as they provide a hard surface for accretion and fish may aggregate around the wellheads, albeit in small numbers due to the footprint of the wellheads.</p> <p>Given the small size of the wellheads and the water depths, no significant deviation from usual routes for commercial or other users is expected. The wellheads do represent a snag hazard but given the limited fishing effort in the area and the lack of trawling vessels, this is not expected to present a hazard.</p> <p>There is the potential for future impact to subsea infrastructure placement including offshore MODU or pipeline/ communications cables, but given the small size of the wellheads, the avoidance of the features during planning is not expected to significantly interfere with any planned development.</p>

	As the wellheads remain in situ, they are considered to have a minor effect on other marine users.		
Likelihood assessment			
Fish and fisheries	A review of the historical fishing vessel incident data from AMSA Monthly Domestic Vessel Incident Reporting Database (2-year data set) and Australian Transport Safety Bureau (ATSB) Marine Safety Investigations Reports (1982–2020) shows that there are no reported fishing vessel incidents confirmed as related to offshore subsea oil and gas infrastructure in Australia. Based on the low level of fishing effort in the Operational Areas and the fact that the wellheads have been marked on charts since their installation and no incidents have been reported, it is considered unlikely that any impacts to other marine users resulting in a minor consequence will occur.		
Consequence		Likelihood	Ranking
Minor		Unlikely	Low

7.1.3 Environmental performance

Hazard		Interaction with other marine users		
Performance outcome		Other marine users including recreational and commercial fishers, and shipping traffic, are aware of wellhead presence and are not significantly disrupted.		
ID	Management controls	Performance standards	Measurement criteria	Responsibility
01	Jadestone Energy Stakeholder Consultation procedure (JS-70-PR-I-00034) details consultation requirements to ensure other marine users are aware of the activity	Consultation undertaken with relevant stakeholders as described in Section 4.	Stakeholder communication records are kept, and assessments completed on any claims or objections.	HSE Manager
02	Jadestone Energy Stakeholder Consultation procedure (JS-70-PR-I-00034) details consultation requirements to ensure other marine users are aware of the activity	Other users who may be present in the area will continue to be advised of wellhead presence through cautionary areas delineation on Admiralty Chart.	Wellheads are delineated on Admiralty Charts.	Drilling and Wells Manager

7.1.4 ALARP assessment

Based on the impact and risk assessment completed, Jadestone considers the control measures described above are appropriate to reduce the imposition due to the physical presence of the wellheads to activities undertaken by relevant persons. Additional controls considered but rejected are detailed below. The potential impacts are considered Acceptable (negligible to minor impacts). No further controls are required and therefore ALARP has been demonstrated.

Rejected control	Hierarchy	Practicable	Cost effective	Justification
Removal of wellheads	Eliminate	No	No	<p>Removing the wellhead will result in the potential hazard to other marine users being removed from the Operational Areas. However, given the size of the wellheads and the limited fishing effort in the area, the environmental benefits are expected to be small.</p> <p>It is estimated that wellhead removal costs would be approximately \$10MM to remove all four, assuming complete removal of all wellheads and associated debris in one campaign.</p> <p>The removal operations would, amongst other environmental effects, cause localised seabed disturbance, generate metal cuttings and remove artificial habitat. Offshore vessel operations would generate environmental emissions (e.g., Greenhouse Gas (GHG), noise, etc.) for approximately 4 weeks (assuming one week per wellhead to remove them).</p> <p>The operation would also result in health and safety risks to the workforce, particularly with the unknowns around the wellhead integrity and whether they would be able to be pulled in one piece.</p> <p>Given the wellheads are in areas that are not actively trawled, will be marked on navigational charts and the other vessels are equipped with navigational equipment such as echo sounders, the risk of snagging is low.</p> <p>As such, the costs and health and safety risks to remove the wellheads are considered disproportionately high to the low socio-economic effects of leaving the wellheads in-situ.</p>
Cap the wellheads	Substitute	No	No	<p>Installation of a wellhead cap would not result in an additional benefit as it would only reduce, but not remove the navigational hazard posed by the wellheads. As the wellheads remain marked on nautical charts, installing a wellhead cap is considered to provide little benefit over the base case, particularly given the lack of trawling activities that occur in the operational area which are the only type of activity to have a snag risk.</p>

Based on the impact and risk assessment completed, Jadestone considers the control measures described above are appropriate to reduce the imposition due to the physical presence of the wellheads to activities undertaken by relevant persons. Additional controls considered but rejected are detailed below. The potential impacts are considered Acceptable (negligible to minor impacts). No further controls are required and therefore ALARP has been demonstrated.

Rejected control	Hierarchy	Practicable	Cost effective	Justification
Wellhead monitoring	Administrative	No	No	<p>Monitoring of the wellhead would assist in validating the environmental assessment that concluded only negligible impacts. It is estimated that a monitoring campaign to undertake ROV surveys on all four wellheads would be approximately \$200K (~\$30K/day for a suitable vessel with ROV for up to a week) and would have to be undertaken for multiple years to observe any potential impacts.</p> <p>Numerous monitoring campaigns would be required to collect meaningful data and would also require exclusion zones to be in place around the wellhead whilst conducting the activity which would temporarily exclude other users from the operational areas and require stakeholder consultation to ensure they are aware of the activity. Given the limited impact that this activity would have on fishers and other marine users, this level of consultation may be fatiguing, and no value is added.</p> <p>Impacts are unlikely to be detectable beyond the immediate area surrounding the wellhead.</p> <p>Impacts are also unlikely to be detected for a number of years based on the slow rate of wellhead corrosion (0.2 mm/year) (Melchers, 2005).</p> <p>Similar to above, offshore vessel operations would generate environmental emissions (e.g., Greenhouse Gas (GHG), noise, etc.) and result in health and safety risks to the workforce.</p> <p>There is no compelling reason for wellhead monitoring given the environmental assessment is predicting negligible impacts. There is a low level of uncertainty associated with the impact prediction.</p> <p>As such, the costs and health and safety risks associated with an offshore monitoring program are considered disproportionately high to the low environmental benefits that a monitoring program would possibly provide.</p>
Ongoing maintenance	Protective	No	No	<p>There is no justification for maintaining the wellhead. The wellheads are not expected to be contaminated with any hazardous material. The wells have been permanently plugged and</p>

Based on the impact and risk assessment completed, Jadestone considers the control measures described above are appropriate to reduce the imposition due to the physical presence of the wellheads to activities undertaken by relevant persons. Additional controls considered but rejected are detailed below. The potential impacts are considered Acceptable (negligible to minor impacts). No further controls are required and therefore ALARP has been demonstrated.

Rejected control	Hierarchy	Practicable	Cost effective	Justification
				<p>abandoned; hence, the wellhead is of no further use. The wellhead will slowly degrade, lose its structural integrity and break apart. This is inevitable and the desired outcome.</p> <p>This activity would also require exclusion zones to be in place around the wellhead whilst conducting the activity which would temporarily exclude other users from the operational area.</p> <p>The costs associated with this would be approximately ~\$5MM each year to mobilise a vessel to undertake an inspection and undertake maintenance activities, with further costs for additional campaigns to rectify any issues. As the preference is for the wellhead to degrade in situ, ongoing maintenance would only prolong the integrity of the wellhead with no benefit. There is not considered to be any risk of hydrocarbon release from the wellheads either and therefore ongoing monitoring would be of no additional benefit.</p>

7.1.5 Acceptability assessment

The potential impacts to other marine users are considered 'Acceptable' as the residual risk is Low and ALARP can be demonstrated (refer above), based on the acceptability criteria outlined below. The control measures proposed are consistent with relevant legislation, standards and codes.

Environmental context & ESD	<p>Section 7.1.2 notes it is unlikely that leaving the wellheads in situ will result in significant impacts to other users. The potential residual risk is considered acceptable after consideration of:</p> <ul style="list-style-type: none"> • Potential impact pathways: section 7.1.1 and 7.1.2 assess risks from leaving the wellheads in situ; • Preservation of critical habitats: activities are remote from Protected Areas and areas with high trawl fishing effort; • Assessment of key threats as described in species and Area Management/ Recovery plans: See 'Conservation and management advice' below; • Consideration of North-West Bioregional Plan: No impacts to socio-economic receptors identified as at risk in the plan; and <p>Principles of ecologically sustainable development (ESD): the proposed management minimizes the likelihood to adverse effects on biodiversity and ecosystem integrity.</p>
Conservation and management advice	<p>No management plans identified physical presence and the impact on other users as described above as being a threat.</p> <p>Impacts from physical presence will have a negligible impact on any of the social and ecological objectives and values, of any AMPs, or state marine parks given the distance</p>

	from them. This is consistent with the objectives of the protected area management plans and considered acceptable.
Stakeholder & reputation	Stakeholder consultation has been undertaken (see Section 4), and no stakeholder concerns have been raised. Jadestone will continue to liaise with WA DAWE regarding Sea Dumping Permit requirements and any further queries from other stakeholders.
Policy & management system compliance	Jadestone's HSE Policy objectives are met. Section 8 demonstrates that the minor impacts to other users are acceptable and align with Jadestone's HSE Management System.
Law and industry best practice	In the preparation of this EP, the Offshore Petroleum Decommissioning Guideline (DISER, 2020) and Decommissioning Guidelines, and the Offshore Oil and Gas Decommissioning Decision-making Guidelines (APPEA, 2016) have been referred to, to ensure the options assessment has been completed in line with industry best practice.

8. IMPLEMENTATION STRATEGY

As required under Regulation 14(1) of the OPGGS 2009 (Environment) Regulations, Jadestone must provide an implementation strategy that will ensure:

- All environmental impacts and risks of the activity will be continually identified and reduced to a level that is ALARP;
- Control measures identified in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and acceptable levels;
- That environmental performance outcomes and environmental performance standards are met; and
- Stakeholder consultation is maintained through the activity as appropriate.

To meet these requirements the implementation strategy outlined in this EP includes the following:

- Details on the systems, practices and procedures to be implemented (Section 8.1);
- Key roles and responsibilities (Section 8.2);
- Training, competencies and ongoing awareness (Section 8.2.3);
- Monitoring, auditing, management of non-conformance and review (Section 8.3);
- Record keeping (Section 8.3.3); and
- Stakeholder consultation (Section 4).

As Titleholder, Jadestone is responsible for ensuring that the wellheads are managed in accordance with this EP, as well as the implementation strategy, the Jadestone HSE Policy and the Business Management System.

8.1 Jadestone Business Management System

Jadestone applies an integrated Business Management System (BMS) that is aligned with ISO 55000: Asset Management. This covers all activities and includes provision for the systematic management of environment and safety and all other business functions. The Jadestone BMS ensures alignment between company objectives and the activities associated with management of the wellheads in a structure that is illustrated by Figure 8-1.

The management system sets a structured framework that provides governance across company processes for all organisational activities, with defined accountabilities and performance requirements for employees and contractors to deliver activities aligned to the vision and requirements of Jadestone

Energy, including those identified in this EP. At the highest level, environmental performance expectations are communicated by the Jadestone HSE Policy.

The structure of the management system is organised to describe the business activities by objective functions (Figure 8-2).



Figure 8-1: Business management system structure

LEAD	Operational Excellence	Value Discipline	People	Stakeholder Management	Risk Management
CORE	Explore	Drill	Develop	Produce	Abandon
HELP	Provide Commercial Guidance	Provide Information	Provide Goods & Services	Provide Customers	Provide Technical Guidance

Figure 8-2: Business activities and objective functions

The objective functions are organised into 'Lead', 'Core' and 'Help', which describe how the intent of the business is delivered. The Lead functions are the activities that provide direction to the Core functions, which represent the life cycle of oil and gas activities. The purpose of the Lead functions is to enact and inform strategy and to guide the Core functions in the delivery of their activities.

Delivery of HSE management and performance is fully integrated (including implementation of the EP) throughout the objective functions relevant to operation of the activity. The relevant functions are:

- Operational excellence;
- Value discipline;
- People;
- Stakeholder management;
- Risk management;
- Develop;
- Produce; and
- Provide goods and services.

Below is a summary of the mechanisms by which these functional areas contribute to HSE management and performance during the activity.

8.1.1 Operational Excellence

'Operational Excellence' provides the systems, tools and processes which ensure that all learning experiences that have the potential to improve operational safety, integrity and efficiency, and reduce negative impacts to the environment, to be captured, evaluated and disseminated for future implementation.

The Operational Excellence function is a continuous process and is summarised in Figure 8-3.

The Operational Excellence function addresses the key points of:

- Capturing of lessons learnt;
- Review of lessons learnt; and
- Incorporation of knowledge in future work.

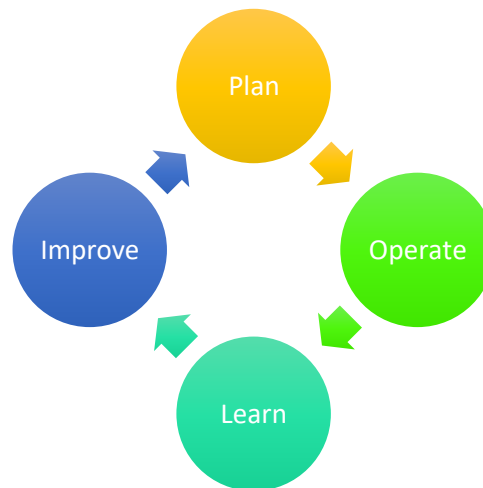


Figure 8-3: Operational and excellence business functions

Knowledge and best practices can be captured from many sources including internal and external, such as:

- Audits and inspections;
- Emergency response drills;

- Incident reviews;
- Technical papers, legislation and journals; and
- Prior experience.

Any actions arising from the assessment of information are incorporated into the Computerised Maintenance Management System (CMMS). Processes, procedures and systems are improved based on the historical lessons learnt and applied in subsequent phases.

8.1.2 Value Discipline

The 'Value discipline' function represents the processes – including annual budgeting, capital funding – that ensure value and capital requirements are met and support the management system functions delivering their business objectives including HSE performance. Commonly HSE performance is a proxy for business performance and therefore HSE management is of interest to the Value discipline function of the management system.

8.1.3 People

The Jadestone Energy Competency Assurance Framework provides the formal systems, tools and processes which ensure that personnel are appropriately trained and competent to complete assigned tasks to an expected standard. Competency assurance is a necessary component of any approach to reduce safety, integrity and environmental risks to a level that is ALARP.

The Competency Assurance Framework addresses the key points of:

- Competency requirements (qualification, experience and training) are maintained for all Jadestone Energy positions where the incumbent is required to undertake, supervise, review or verify critical tasks or where the incumbent has the technical authority to approve critical documents;
- Competent persons are members of the workforce who meet the competency requirements for the respective positions to perform critical tasks without direct supervision;
- Candidates being considered for appointment in a critical position are assessed against the applicable competency requirements before being formally appointed;
- Incumbents must be reassessed against the competency requirements as per the required frequency stipulated in the competency matrix; and
- All contractors with personnel in the field are prequalified in accordance with the Contractor Management Framework.

Jadestone Energy personnel are subject to the provisions of the Jadestone Competency Assurance Framework which outlines the training, development and assessment requirements necessary to ensure that all employees have the relevant knowledge and skills required to conduct their activities in a safe and environmentally responsible manner.

A training and skills matrix has been developed for all positions which identifies responsibilities, training and competency requirements. Personnel will complete relevant training and hold qualifications and certificates for their specific role (e.g. well control certificates, rigging and crane operator certificates etc.). Training records will be retained.

8.1.4 Stakeholder Management

Sub-regulation 11A(3) of the Environment Regulations provides that:

The Implementation strategy of the environment plan must provide for appropriate consultation with:

- a) *Relevant authorities of the Commonwealth, a State or Territory; and*
- b) *Other relevant interested persons or organisations*

Relevant Persons have been consulted as part of the preparation of this EP. Due to the nature of the activity covered by this EP (i.e. decommissioning with no residual risk or activities) there will be minimal ongoing consultation (Table 8-1).

Table 8-1: Standard consultation actions

ID	Activity	Frequency and method	Responsibility
03	Notification of cessation of EP to NOPSEMA	Within 4 weeks of EP acceptance	Environment Lead

Jadestone will undertake additional triggered consultation as outlined below (Table 8-2).

Table 8-2: Triggered consultation actions

ID	Trigger	Action	Responsibility
04	Deviation to the planned activity from those originally provided in consultation	Notification to relevant persons and consultation if change material.	HSE Manager
05	Feedback received from relevant person	Follow consultative process outlined in the Consultation for Environmental Approvals procedure.	HSE Manager

8.1.5 Risk Management

Jadestone has an integrated approach to risk management to cover all its business activities.

The Risk Management function provides a view of risk that is independent of production delivery. This includes strategic, commercial, and control and compliance risks. In addition, it manages Health Safety and Environment activities, including the preparation and approval of regulatory approvals (including this EP) and the management of change process, which addresses all change activities regardless of type – technical, organisational, software or procedural. Further information on the management of change process is provided in Section 8.3.3.

At the activity level, the risk management function includes all the planned activities and accidental events. Risk identification and assessment is a continuous process that identifies all the physical control measures necessary to manage the risks. Control measures are subjected to regular assurance activities. In a similar way, audits of the management system are conducted according to review cycle with timing agreed in the annual planning process. Findings from assurance activities, audits and ongoing review of performance are considered in the Operational Excellence process, which considers opportunities for continuous improvement (refer Section **Error! Reference source not found.**).

The Risk Management function is accountable for approval of facility level risk assessments and risk reduction measures; and by so doing, providing a view of risk that is independent from production delivery.

8.1.6 Produce

The Produce function delivers safe and reliable operations as well as environmental performance.

The Produce function works closely with the Operational Excellence and Risk Management functions to evaluate operational performance, including environmental performance, and reduce risk through

delivery of continuous improvement activities. Produce is responsible for asset optimisation, reliability, integrity and maintaining compliance. It thus interacts with most functions.

The Produce function delivers environmental management at the activity level via the Computerised Maintenance Management System (CMMS) including detailed work instructions and tasks allowing the activity to meet the environmental performance requirements of this EP. These instructions and tasks are monitored and reviewed to ensure appropriate close out of tasks is achieved as well as ensuring the required outcomes/ performance have been achieved.

8.1.7 Provide Goods and Services

HSE performance in all activities associated with operation is achieved either through management of personnel involved, or via management of contracted works.

The Jadestone Competency Management Framework provides personnel with a systematic and uniform approach for managing and improving Health, Safety and Environmental (HSE) performance throughout the life cycle of an individual's appointment, from their selection through to post-completion performance evaluation. The Personnel Management Framework addresses the key points of selection, competency, development requirements and management.

HSE performance is also achieved through Jadestone's Contractor Management Framework. The contract management life cycle follows four steps: pre-qualification; selection; engagement; and contract completion review process. Through each of these steps Jadestone and service provider/ supplier is evaluated for previous HSE performance and engaged in the mechanisms by which HSE performance will be achieved in the contract to be established.

8.2 Key Roles and Responsibilities

As per Regulations 14(4) and 14(5), a clear chain of command setting out the roles and responsibilities of personnel involved in operation is required as well as detail on what measures are in place to ensure personnel are aware of their role requirements and how Jadestone evaluates their competency and training needs in these roles. In response to these regulatory requirements, provided in this sub-section is information on:

- **Section 8.2.1 Organisational Chart:** outlines the key roles involved in the EP;
- **Section 8.2 Role responsibilities:** summarises the responsibilities of each key role involved in the EP;
- **Section 8.2.2 Communication requirements:** outlines how personnel fulfilling key roles are made aware of their responsibilities as described in the EP; and
- **Section 8.2.3 Assessment of Competency and Training:** outlines how Jadestone assesses and evaluate the competencies and training requirements of personnel responsible for achieving the commitments with this EP.

8.2.1 Organisational Structure and Responsibilities

The organisational structure for the activity is presented in Figure 8-4.

Each position has a position description outlining their HSE role and responsibilities, accountabilities and reporting lines (Table 8-3). It is the responsibility of all Jadestone personnel to ensure that the requirements of the HSE Policy are applied in their area of responsibility and that personnel are suitably trained and competent in their respective roles.

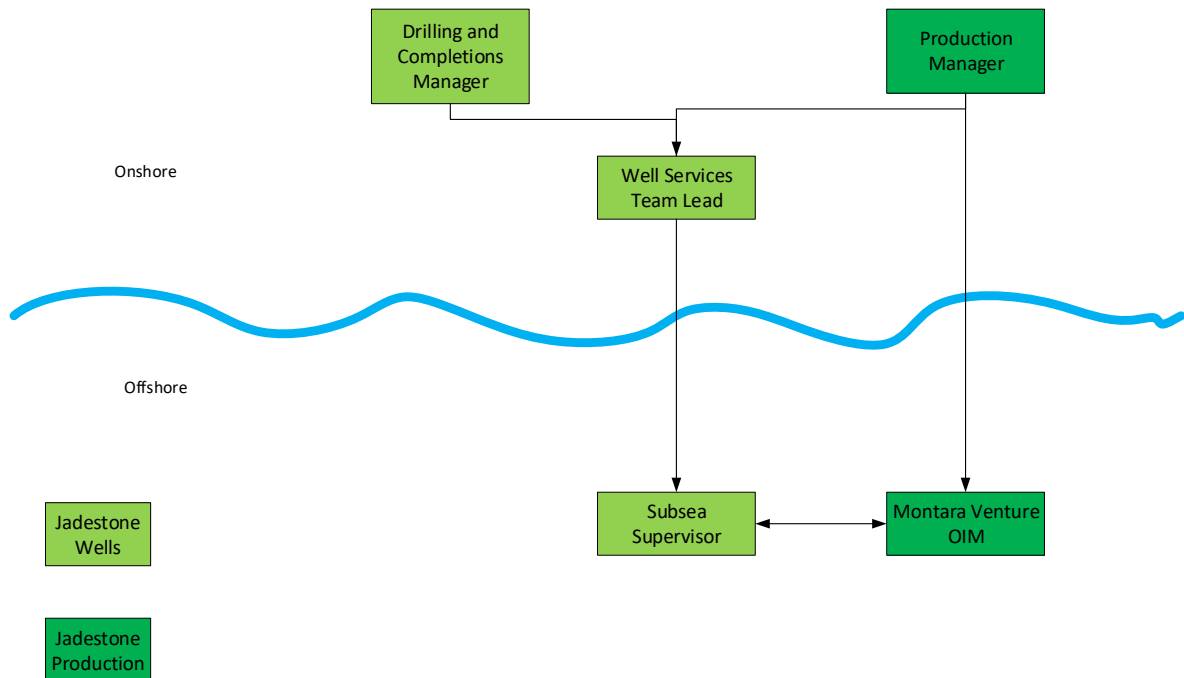


Figure 8-4: JSE organisation chart

Table 8-3: Responsibilities of Key Roles

Role	Key Responsibilities
Country Manager	<ul style="list-style-type: none"> Ensures that activities are conducted in accordance with the Jadestone's HSE Policy. Primary responsibility for Jadestone Australia operations and for meeting or exceeding corporate targets for all aspects of performance, including conducting activities in accordance with Jadestone's HSE Policy and this EP. Responsible for providing adequate resources for environmental management. Accountable for Operational Excellence. Responsible for compliance with the BMS. Maintains communication with company personnel, government agencies and the media, where appropriate.
Drilling and Well Manager	<ul style="list-style-type: none"> Responsible for ensuring that JSE policies, management principles and standards are followed. Ensure that the requirements of this EP are implemented
Well Services Lead	<ul style="list-style-type: none"> Manage HSE hazards and risks related to the wellheads by ensuring procedures and risk reduction processes have been employed for all activities under their control.
JSE Subsea Supervisor	<ul style="list-style-type: none"> Responsible for ensuring correct procedures and practices are followed. Responsible for HSE and operational support. Reports directly to the JSE Drilling Superintendent on all matters.
Offshore Installation Manager (OIM)	<ul style="list-style-type: none"> Responsible for day-to-day operations in the field.
HSE Manager	<ul style="list-style-type: none"> Ensures regulatory documents are prepared and meet regulatory requirements.

Role	Key Responsibilities
	<ul style="list-style-type: none"> Ensure environmental incident reporting meets regulatory requirements (as outlined in the EP) and incident reporting and investigation procedure. Ensures that proposed changes to environmental management activities are subject to Management of Change and approved prior to application.

8.2.2 Communication of Responsibilities

The primary mechanism for ensuring personnel involved in the EP are aware of the environmental commitments as listed in this EP are via:

- Provision of environmental performance commitments lists via the CMMS; and
- Management of service providers and suppliers (refer below)

As no activities are required under the EP, inductions are not provided to personnel on this EP.

8.2.3 Competencies and Training

There are no third-party contractors planned for this activity, however Jadestone Energy's Contractor Management Framework (JS-90-PR-G-00002) provides a process for ensuring that Contractors and Services Providers have the appropriate level of HSE capability. The assessment of Contractors and Service Providers competency provides a sound level of assurance that all key third-party personnel involved in operations have the necessary skills, knowledge, experience, and ability to perform their work in accordance with their company's training and competency systems.

Contractors and service personnel are assessed against their company's criteria and any additional criteria required by Jadestone Energy. Records of competent people are maintained in EDMS.

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

As required under sub-regulation 14(6), Jadestone must provide for sufficient monitoring, recording, audits, management of non-conformance and review of Jadestone's environmental performance and implementation strategy to ensure that environmental performance outcomes and standards in the EP are being met and continue to minimise impacts to the environment.

As the defined petroleum activity ends upon acceptance of the EP by NOPSEMA, there will be no ongoing monitoring, auditing and review.

8.3.1 Reporting

The reporting requirements under this EP are provided in Table 8-4 below. No other reporting is required under this EP.

Table 8-4: Summary of reporting requirements

Regulation	Requirement	Required Information	Timing	Type	Recipient
Before the Activity					
Regulation 29(1) Notifications	NOPSEMA must be notified that the Activity is to commence.	Complete NOPSEMA's Regulation 29 Start or End of Activity Notification form for both notifications.	At least 10 days before the Activity commences. In this case, as there is no activity, this notification will be assumed satisfied with EP acceptance.	Written	NOPSEMA
End of Activity					
Regulation 29(2) – Notifications	NOPSEMA must be notified that the Activity is completed	Complete NOPSEMA's Regulation 29 Start or End of Activity Notification form for both notifications	Within 10 days after finishing. In this case, as there is no activity, this notification will be completed within 4 weeks of EP acceptance.	Written	NOPSEMA
Regulation 26C – Environmental Performance	NOPSEMA must be notified of the environmental performance of the Activity	Report must contain sufficient information to determine whether or not environmental performance outcomes and standards in the EP have been met	Annual report submitted within 3 months of submission of the Regulation 29 notification	Written	NOPSEMA
Regulation 25A Plan ends when titleholder notifies completion	NOPSEMA must be notified that the Activity has ended, and all EP obligations have been completed	Notification advising NOPSEMA of end of the Activity	Within six months of the Regulation 29 (2) notification. In this case, as there is no activity, this notification will be assumed to be satisfied with submission of the performance report.	Written	NOPSEMA

8.3.2 Management of Change and Revisions of the Environment Plan

Regulation 17 of the *Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009* makes clear the following requirements in respect of a number of circumstances that may lead to the deviation of an activity from the EP, or a new activity requiring an EP.

17 Revision because of a change, or proposed change, of circumstances or operations	
New activity	
17(1)	A titleholder may, with the Regulator's approval, submit to the Regulator a proposed revision of an environment plan before the commencement of a new activity.
Significant modification or new stage of an activity	
17(5)	A titleholder must submit to the Regulator a proposed revision of the environment plan for an activity before the commencement of any significant modification or new stage of the activity that is not provided for in the environment plan as currently in force.
New or increased environmental impact or risk	
17(6)	A titleholder must submit a proposed revision of the environment plan for an activity before, or as soon as practicable after:
(a)	The occurrence of any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk, not provided for in the environment plan in force for an activity; or
(b)	The occurrence of a series of new environmental impacts or risks, or a series of increases in existing environmental impacts or risks, which, taken together, amount to the occurrence of:
(i)	A significant new environmental impact or risk; or
(ii)	A significant increase in an existing environmental impact or risk;
	That is not provided for in the environment in force for the activity.

Jadestone's Management of Change process will determine whether a proposed change to activities triggered the requirements of Regulation 17, which may result in a revision and resubmission of an EP to NOPSEMA. This process is described in the Jadestone's Change Management Procedure (MoC) (JS-90-PR-G-00017). The procedure describes a system for identifying, tracking, responding, progressing and closing out change requests or queries raised by any party involved in Jadestone Energy activities. It also directs and instructs activity owners on the environmental regulatory requirements relating to a change in operations.

The procedure provides for proper consideration of temporary or permanent changes to activities, including an impact and risk assessment, approved and communicated to all appropriate stakeholders together with providing a record of the change. In particular, the system ensures the following:

- All changes required to critical outputs will be identified, recorded, risk assessed and approved – internally and externally as required – before being implemented;
- Processes and procedures are in place to ensure requirements for change are identified and unauthorised changes are prevented;
- All changes must be assessed to determine if the change introduces a new risk or impact or increases an existing impact or risk, as required by Regulation 17;
- The MoC is prepared internally by Jadestone personnel which includes consultation with relevant parties as necessary such as technical/ subject matter experts and external stakeholders as required;

- Only authorised and competent members of the workforce can approve changes, including relevant Technical Authorities. Technical Authorities are deemed as authorised and competent via the Technical Authority Framework (GA-60-STD-Q-00001);
- Approval of a change internal to Jadestone requires confirmation that impacts and risks have been assessed and appropriate reduction measures implemented (if required) to manage risk to ALARP and impacts to acceptable levels;
- All approved changes that affect the EP are properly documented and communicated to all relevant internal and external members of the workforce, e.g., via toolbox talk or HSE meetings and JSA; and
- An audit trail is kept of all changes and documents and drawings are updated accordingly.

MOC must be designed to meet the particular requirements of the type of change required and will include:

- Risk assessment to assess potential impacts to the receiving environment as detailed in this EP, including MNES and those protected under the EPBC Act;
- Strategies and actions to mitigate any adverse effects; identify opportunities offered by the change; and determine how impacted interfaces shall be managed;
- Timeframes for implementation;
- Documents (e.g. drawing, plan, program, procedure) against which change is monitored;
- Outline drawings or controlled documents affected; and
- Responsibilities for execution, review and approval of the:
 - Justification for the change,
 - Assessment of the impact and risk to environment,
 - Detailed implementation requirements,
 - Dissemination of the change, training personnel and updating of documentation.

All alterations and updates to controlled documents, including regulatory approvals, procedures or drawings must be in accordance with Document Control requirements. If the change meets any of the criteria detailed by Regulation 17, a revision/resubmission of the EP to NOPSEMA will occur.

It is unlikely this will be required following the acceptance of this EP due to the nature of the activity.

8.3.3 Record Keeping

This section of the EP meets Regulation 27(2) by detailing a systematic, auditable record of the results of monitoring and auditing of the environmental performance of the activities. The records retained are linked to the performance outcomes, standards and measurement criteria, and monitoring and reporting requirements.

As a minimum, Jadestone will store and maintain the records for five years, where records include:

- Written reports including monitoring, audit and review regarding environmental performance or the business management system;
- Environmental performance reports and associated documentation; and
- Documentation generated through stakeholder consultation.

8.4 Emergency Preparedness and Response

Under the Environment Regulations 14(8) the Implementation Strategy must contain an oil pollution emergency plan and provide for the updating of the plan containing adequate arrangements for responding

to and monitoring oil pollution. As no oil pollution incidents are credible during this activity, this section of the regulations is not considered relevant.

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APPENDICES

Appendix A: PMST Reports for all Operational Areas (Montara-1,2,3 And Skua-1)

Appendix B: Stakeholder Consultation Documentation

Appendix A: PMST Reports for all Operational Areas (Montara-1,2,3 And Skua-1)



Australian Government
Department of Agriculture,
Water and the Environment

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: 05/10/21 17:10:49

[Summary](#)

[Details](#)

[Matters of NES](#)

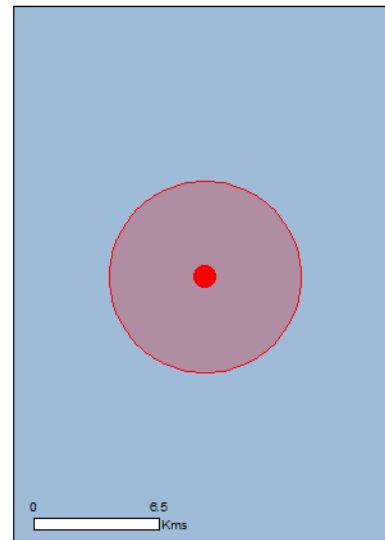
[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

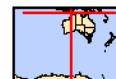
**Montara-1 Wellhead with a 5 km buffer to capture
Montara-2 and Montara-3 wellheads**



This map may contain data which are
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[Coordinates](#)

Buffer: 5.0Km



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](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	19
Listed Migratory Species:	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.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	58
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine):	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

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		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		

Name	Status	Type of Presence
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<u>Balaenoptera borealis</u> Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
<u>Balaenoptera edeni</u> Bryde's Whale [35]		Species or species habitat may occur within area
<u>Balaenoptera musculus</u> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<u>Balaenoptera physalus</u> Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
<u>Carcharhinus longimanus</u> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
<u>Carcharodon carcharias</u> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<u>Caretta caretta</u> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<u>Chelonia mydas</u> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<u>Eretmochelys imbricata</u> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<u>Isurus oxyrinchus</u> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<u>Isurus paucus</u> Longfin Mako [82947]		Species or species habitat likely to occur within area
<u>Lepidochelys olivacea</u> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<u>Manta alfredi</u> 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
<u>Manta birostris</u> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
<u>Megaptera novaeangliae</u> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<u>Natator depressus</u> Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
<u>Orcinus orca</u> Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis 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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribbened Pipehorse, Ribbened Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		

Name	Threatened	Type of Presence
<i>Acalyptophis peronii</i> Horned Seasnake [1114]		Species or species habitat may occur within area
<i>Aipysurus duboisii</i> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<i>Aipysurus laevis</i> Olive Seasnake [1120]		Species or species habitat may occur within area
<i>Astrotia stokesii</i> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<i>Caretta caretta</i> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<i>Chelonia mydas</i> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<i>Dermochelys coriacea</i> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<i>Disteira kingii</i> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<i>Disteira major</i> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<i>Enhydryna schistosa</i> Beaked Seasnake [1126]		Species or species habitat may occur within area
<i>Eretmochelys imbricata</i> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<i>Hydrophis coggeri</i> Slender-necked Seasnake [25925]		Species or species habitat may occur within area
<i>Hydrophis elegans</i> Elegant Seasnake [1104]		Species or species habitat may occur within area
<i>Hydrophis omatus</i> Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
<i>Lepidochelys olivacea</i> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<i>Natator depressus</i> Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
<i>Pelamis platurus</i> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		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

-12.68917 124.53167

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.

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Australian Government
Department of Agriculture,
Water and the Environment

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: 05/10/21 17:08:34

[Summary](#)

[Details](#)

[Matters of NES](#)

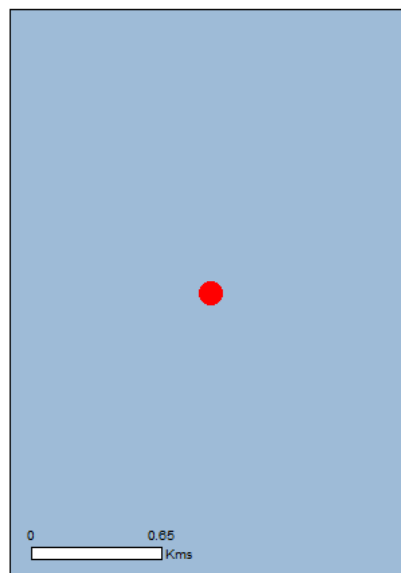
[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Skua-1 Wellhead



This map may contain data which are
©Commonwealth of Australia
(Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 0.0Km



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](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	20
Listed Migratory Species:	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.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	60
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	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

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		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Papasula abbotti		
Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species

Name	Status	Type of Presence
habitat likely to occur within area		
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki		
Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species

Name	Threatened	Type of Presence
<u>Balaenoptera borealis</u> Sei Whale [34]	Vulnerable	habitat may occur within area Species or species habitat may occur within area
<u>Balaenoptera edeni</u> Bryde's Whale [35]		Species or species habitat may occur within area
<u>Balaenoptera musculus</u> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<u>Balaenoptera physalus</u> Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
<u>Carcharhinus longimanus</u> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
<u>Carcharodon carcharias</u> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<u>Caretta caretta</u> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<u>Chelonia mydas</u> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<u>Eretmochelys imbricata</u> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<u>Isurus oxyrinchus</u> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<u>Isurus paucus</u> Longfin Mako [82947]		Species or species habitat likely to occur within area
<u>Lepidochelys olivacea</u> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<u>Manta alfredi</u> 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
<u>Manta birostris</u> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
<u>Megaptera novaeangliae</u> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<u>Natator depressus</u> Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
<u>Orcinus orca</u> Killer Whale, Orca [46]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis 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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribbioned Pipehorse, Ribbioned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatissimus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

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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

-12.50528 124.43278

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.

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Appendix B: Stakeholder Consultation Documentation

Appendix B – Consultation Report

1. INTRODUCTION

This Appendix outlines some additional detail underpinning the Relevant Person engagement undertaken in support of this EP. This appendix has been redacted prior to publishing to preserve the privacy of those persons or organisations consulted with. This can include the removal of personal information (as defined by the Privacy Act 1988) and the removal of any information that was provided during consultation where that person has requested for that information not to be published as per OPGGS(E) Regulations sub-regulation 11(A). Jadestone has made reasonable efforts to inform each relevant person consulted that they may request for particular information not to be published during all stages of the consultation.

The separate sensitive information report (Appendix D) containing a log of all communications and copies of communications with relevant persons has not been published due to privacy reasons. Copies of the fact sheets provided during consultation are contained in Attachment 1 to this Appendix.

2. IDENTIFICATION OF RELEVANT PERSONS

2.1 Value mapping

Regulation 11A (1) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* identifies five groups as relevant persons who must be consulted with in the course of preparing an environment plan. The Beneficial Use/Value Mapping process involves listing the potential receptors (with a focus on socio-economic receptors) that may be affected by the proposed activity, and identifying the appropriate area of potential impact (which for this EP is the Operations Area as there is no spill risk potential and therefore no EMBA). Then this spatial area is used to determine relevant persons that may have functions, interests or activities in the area. This process was captured in a matrix (Table 1).

Marine-based Tourism and Recreation

Recreational activities (including surfing, diving, recreational fishing and swimming) and tourism activities are very limited due to the remoteness of the location and lack of features in the operational area.

Fishing and dive charter operators provide deeper water recreational opportunities in offshore areas, such as the water depths around the operational area. A search of potential operations showed that Ashmore and Pandora reefs appear to be the closest targeted area, with very limited opportunities offered to these. With the sporadic nature of trips to this locale and the snagging/navigational hazard addressed through engagement with AHO engagement was conducted through the peak charter association of Western Australia and Northern Territory.

Table 1: Beneficial use and value mapping process

Potential Receptors	Potential impact or risk pathways	Area used to identify stakeholders	Known and Potential Risks that may affect a Relevant Person or has been identified by a relevant person	Relevant Persons Category a (Commonwealth), b (State or Territory) and c (Adjacent State or Territory)	Relevant Persons Category d (function, activity or interests that may be affected)	Relevant Persons Category e (any other person)
Aboriginal Heritage	No potential impact pathways identified	Operational Area	There are no known sites of Aboriginal Heritage significance within the Operational Area. No identified risks from routine activities.	None identified	None identified	None identified
Native Title	No potential impact pathways identified	Operational Area	There are no known registered native title claims in the Operational Area. No identified risks from routine activities.	None identified	None identified	None identified
Maritime Archaeological Heritage	No potential impact pathways identified	Operational Area	There are no recorded historic shipwrecks or shipwreck protection zones within the Operational Area. No identified risks from routine activities.	None identified	None identified	None identified
Offshore Energy Exploration and Production	Physical presence	Operational Area	There is no oil and gas infrastructure within the Operational Area. Adjacent titleholders included as courtesy.	None identified	<ul style="list-style-type: none"> Santos Shell Inpex 	APPEA
Tourism (including diving and marine based activities)	No potential impact pathways identified	Operational Area	Water depths exclude dive activities. Charter fishing may occur but unlikely.	None identified	None identified	None identified
Commercial Fisheries (Commonwealth)	Physical presence Interaction with other marine users	Operational Area	Some fisheries licenced to operate in the area with limited catch data	<ul style="list-style-type: none"> Australian Fisheries Management Authority (AFMA) Department of Agriculture, Water and the Environment – Biosecurity and Compliance Department of Agriculture, Water and 	<ul style="list-style-type: none"> Commonwealth Fisheries Association (CFA) 	None identified




Potential Receptors	Potential impact or risk pathways	Area used to identify stakeholders	Known and Potential Risks that may affect a Relevant Person or has been identified by a relevant person	Relevant Persons Category a (Commonwealth), b (State or Territory) and c (Adjacent State or Territory)	Relevant Persons Category d (function, activity or interests that may be affected)	Relevant Persons Category e (any other person)
				the Environment – Fisheries, Forestry and Engagement (Fisheries)		
Commercial Fisheries (WA)	Physical presence Interaction with other marine users	Operational Area	Commercial Fishing licence holders have recorded catch and effort in the operational area.	<ul style="list-style-type: none"> DPIRD 	<ul style="list-style-type: none"> Northern Demersal Scalefish Fishery (WA) WAFIC 	None identified
Commercial Fisheries (NT)	No potential impact pathways identified	Operational Area	Not in NT waters but some vessels may transverse operational area	<ul style="list-style-type: none"> Department of Primary Industry and Resources - Mines and Energy and Fisheries Department of Environment and Natural Resources (NT) 	<ul style="list-style-type: none"> NT Seafood Council 	None identified
Commercial Shipping	No potential impact pathways identified	Operational Area	Not a major shipping route but vessels may transverse	<ul style="list-style-type: none"> Australian Hydrographic Office (AHO) 	<ul style="list-style-type: none"> Managed through AHO who issue notifications to individual companies and users 	
Defence activities	No potential impact pathways identified	Operational Area	Not a defence force area but activities may transverse	<ul style="list-style-type: none"> Department of Defence 	None identified	None identified
Recreational Vessels (including yachts)	No potential impact pathways identified	Operational Area	Recreational vessels utilising the activity area safety considerations	<ul style="list-style-type: none"> Australian Hydrographic Office (AHO) AMSA Dept of Transport 	<ul style="list-style-type: none"> None identified 	

Potential Receptors	Potential impact or risk pathways	Area used to identify stakeholders	Known and Potential Risks that may affect a Relevant Person or has been identified by a relevant person	Relevant Persons Category a (Commonwealth), b (State or Territory) and c (Adjacent State or Territory)	Relevant Persons Category d (function, activity or interests that may be affected)	Relevant Persons Category e (any other person)
Recreational Fishing	Physical presence	Operational Area	Limited numbers due to remoteness and no shoreline	<ul style="list-style-type: none"> DPIRD Department of Environment and Natural Resources (NT) 	<ul style="list-style-type: none"> Recfishwest Amateur Fisherman's Association of the NT 	None identified
Marine Parks	No potential impact pathways identified	Operational Area	None	Director of National Parks (Parks Australia - Australia Marine Parks) notified as a courtesy	None identified	None identified
Biological Environment	Physical presence	Operational Area	Impact on biological values	Department of Agriculture, Water and the Environment – Sea Dumping	None identified	None identified

3. CLASSIFICATION OF RELEVANT PERSONS

In undertaking an assessment of the relevant persons, and to inform what constitutes sufficient information under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*, each relevant person was classified according to the categories in Table 3 based on the combination of potential for impact and the level of interest of the person or group. A summary table of all relevant stakeholders and their classification is found in Section 3 of the EP.

Table 2: Classification and associated levels of engagement

		Goal	Strategies
	Category 1: Regulatory agencies who have legislated requirements or decision making powers	Consult Aim is to work directly with relevant persons to ensure their concerns and needs are understood and considered.	Targeted consultation material specific to relevant persons, legislation, regulations or guidance. Follow up to ensure receipt and seek feedback
	Category 2: Relevant persons with response actions Or Relevant persons with high interest	Involve Aim is to ensure information on the project is conveyed and to obtain feedback on alternatives or outcomes where possible with follow-up to ensure any required actions are undertaken.	Targeted consultation material specific to relevant persons. Follow up to ensure receipt and seek feedback
	Category 3: Relevant persons with low interest Or Any other person identified with ongoing interest	Inform The level of engagement is primarily aimed at conveying information, rather than seeking input.	Generic consultation material meeting the minimum requirements No follow up to ensure receipt or seek feedback

4. FISHERIES STAKEHOLDER ASSESSMENT

4.1 Relevant person identification

A separate assessment of relevant fisheries was undertaken to identify which fisheries should be considered relevant parties (Table 4). The Operational Area overlapped by the jurisdiction of several Commonwealth and State-managed fisheries.

Figures identifying relevant fisheries are contained in Section 3.6 of the EP. To complete this summary in the EP the Commonwealth and State managed fisheries outlined above were researched further to identify actual fishing effort within the operational area over the last five years.

Fisheries were deemed to be relevant persons if they:

- Have jurisdiction to fish within the Operational Area;
- Have recent catch history within the Operational Area (within last 5 years); and
- Fishing methods would mean it was feasible to operate in the water depth or Operational Area.

Table 3: Fisheries Relevant Party Assessment

Jurisdiction	Name	Relevant party assessment?
Commonwealth	Western Tuna Billfish	✗ This fishery overlaps the Operations area. In recent years, fishing effort has concentrated off south-west Western Australia, with occasional activity off South Australia (Abares, 2019) https://www.awe.gov.au/abares/research-topics/fisheries/fishery-status/western-tuna-billfish-fishery
Commonwealth	Northwest slope fishery	✗ This fishery does not overlap the Operations area.
Commonwealth	Southern Bluefin tuna	✗ There is no effort in WA. The spawning grounds for this fishery occur off the northwest of WA however there is no risk of significant hydrocarbon spill.
Commonwealth	Western Skipjack Fishery	✗ Effort within this fishery is mainly confined to the southern coast of Australia. No fishing effort has been recorded since the 2008-2009 season and so there is no expected effort.
WA	Mackerel managed fishery (Area 1)	✗ This fishery overlaps the Operations area. No recorded fishing effort in the operational area grid cells for last 5 years.
WA	Northern shark fishery-joint authority	✗ This fishery overlaps the Operations area. No recorded fishing effort in the operational area grid cells for last 5 years.
WA	Northwest demersal scalefish managed fishery	✓ This fishery overlaps the Operations area. Commercial fishers will be potentially active in this region.
WA	Specimen shell managed fishery	✗ This fishery is primarily a dive and hand collect fishery, which excludes many operators, and there are no ROV fishers active in the area.
WA	Abalone managed fishery	✗ This fishery does not overlap the Operations area
WA	Kimberly prawn fishery	✗ Whilst the fishery overlaps the Operations area effort occurs in the coastal areas and does not overlap the Operations area.
WA	Pearl oyster fishery Zone 3	✗ This fishery is primarily a dive and hand collect fishery, which excludes many operators, and there are no ROV fishers active in the area. However, the industry association for this fishery has been contacted for consultation.

Jurisdiction	Name	Relevant party assessment?
WA	Mackerel managed fishery (Area 2) Marine aquarium fish managed fishery North coast shark fishery Nicol Bay Prawn Onslow Prawn Pearl oyster zone 4 Pilbara line Pilbara trap Pilbara fish trawl West coast deep sea crustacean managed fishery Beche der mer Broome managed prawn Trochus	X These fisheries do not overlap the Operations area.
NT	Coastal Line Fishery Coastal Net Fishery Spanish Mackerel Fishery Offshore Net and Line Fishery Demersal Fishery Barramundi Fishery Mud Crab Fishery Aquarium Fish/Display Fishery Trepang Fishery Timor Reef Fishery Fishing Tour Operator Fishery	X These fisheries do not overlap the Operations area.

4.2 Responding to merits of objections or claims

In assessing the consultative feedback a number of considerations need to be made, often depending on the response received. Jadestone implemented the following approach when determining if further follow-up was required regarding correspondence with relevant persons:

No response: Where no response has been received from the relevant person, Jadestone needs to have strong grounds for accepting the relevant person had no response or feedback. The lack of a response can be a function of insufficient time, not understanding the material, not having received the material, etc. If a category 1 relevant person a follow up call or contact was undertaken to confirm that the relevant person had no response.

No issues: Where a relevant person has responded to consultative information and has no concerns or questions regarding the proposed activity, often this allows Jadestone to consider the consultative process for that relevant person and activity to have been satisfactorily closed out and no further follow up for a response required.

Clarification: Where a relevant person sought further information or clarification of information received, this was an opportunity to confirm acceptance of proposed activity and arrangements or if there are any issues that can be identified or may arise.

Objection: Where a relevant person raised an objection regarding the proposed activity, Jadestone representatives sought to understand the issue(s) held by the relevant person and undertake to negotiate arrangements that satisfy both parties. Negotiation processes in the instance an objection was raised were achieved through discussion with the direct parties involved.

For all responses received by Jadestone during the engagement, the merit of each of these responses was assessed. Assessment of merit for all other responses is found in Table 5.

4.3 Record keeping

All activities pertaining to relevant person consultation, including actions and commitments, are recorded and tracked using Jadestone's stakeholder management tool. The live consultation log that is systematically updated as consultation activities are undertaken. Jadestone's stakeholder engagement practice is to keep ongoing records of engagement with stakeholders, as such this practice will be continued post EP submission.

Attachment 1: Fact Sheets



Invitation for Consultation Montara Field Wellhead Abandonment and Monitoring

Fishing sector

Invitation for Consultation

Jadestone Energy (Jadestone) is the operator of the existing Montara Field in the Timor Sea. Jadestone is preparing for assessment by the National Offshore Petroleum Regulatory Authority (NOPSEMA) two Environment Plans for the

- ***activity associated with monitoring of 2 wellheads (Sea Eagle-1 and Tahbilk-1); and,***
- ***the permanent abandonment of 4 wellheads (Montara-1, Montara-2, Montara-3 and Skua-1) proposed to be left in-situ.***

We invite you to provide comment for consideration in this process.

Jadestone Energy (Jadestone) is an Asia Pacific based oil and gas exploration and production company listed on the AIM market of the London Stock Exchange (JSE).



What is an Environment Plan?

The purpose of an Environment Plan (EP) is to identify the proposed petroleum activity's impacts on and risks to the receiving environment. The EP also sets out measures to reduce identified environmental impacts and risks due to the activity and describe how and to what level of performance those measures will be implemented throughout the activity; this includes emergency situations. There will be two EPs covering:

- The Sea Eagle and Tahbilk vessel based activity EP will describe the proposed ongoing monitoring of the wellheads by annual surveys and the installation of a remote monitoring system.
- The Montara and Skua Wellhead abandonment EP will describe the potential impacts of leaving four wellheads in situ, no further activity is required as the wells are confirmed to be plugged and abandoned as per the NOPSEMA accepted WOMP.

Location

The Montara development is located in the Timor Sea, approximately 690 km west of Darwin (Figure 1). The permit areas AC/L7 (Montara wells and Tahbilk-1) and AC/L8 (Sea Eagle-1 and Skua-1) are in Australian waters.

All operational activities managed under the EP are in ~72-90 m water depth. Location details are shown on Figure 1.

In the event of an accidental event (e.g. hydrocarbon spill), the values in a broader Environment that May be Affected (EMBA) have been identified to enable key habitats or locations of particular value in the region to be responded to as protection priorities. There is no risk of a loss of hydrocarbons from the Montara or Skua wellheads.

"Jadestone Energy is committed to preventing all health, safety and environmental incidents and complying with all regulatory requirements. Incidents of this nature are preventable, and we will strive to operate in a way that does not harm the environment."

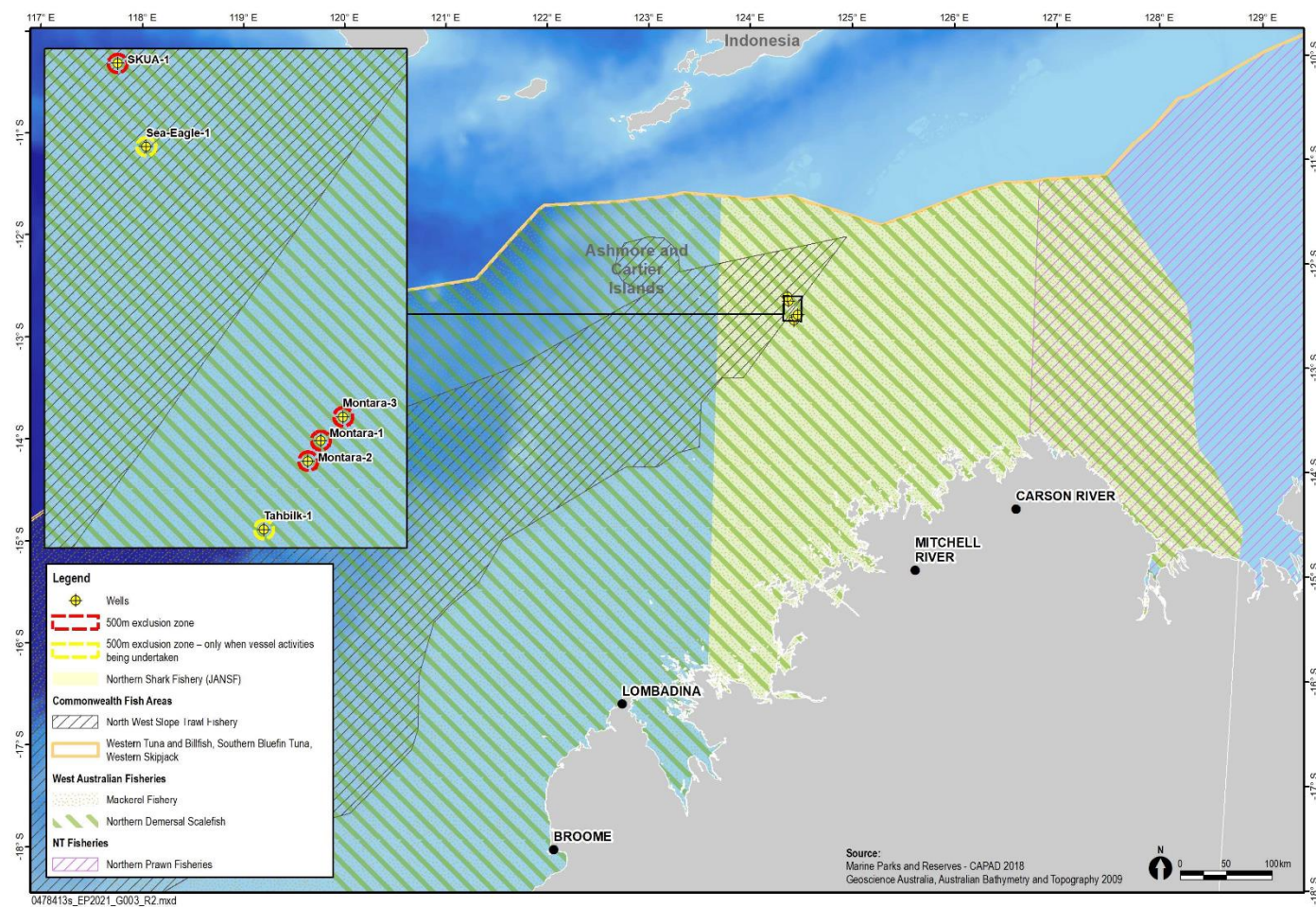


Figure 1 – Location and fisheries that may utilise the Operations Area

What fisheries may be affected?

As Figure 1 indicates, there are a number of fisheries permitted to operate in the operations area. However, Jadestone understands from the Department of Primary Industry and Resources that the **Northern Demersal Scalefish** is the only state managed fishery active since 2016 in the two 10 nM grids where the wellheads are located. Other fisheries that are licensed to operate and were assessed as having a potential to utilise this area in the future (based on catch history over the last 5 years) include:

- **Western Tuna and Billfish (Commonwealth)**
- **North West Slope Trawl Fishery (Commonwealth)**
- **Mackerel Fishery (WA)**

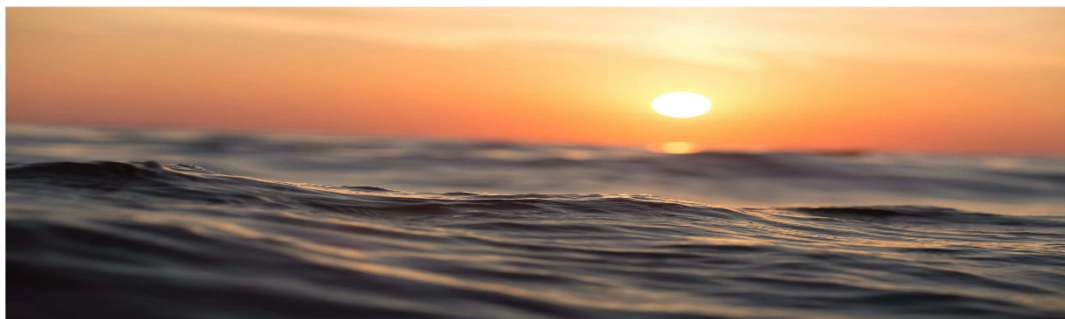
These fisheries will be Jadestone's focus for consultation. Consultation for other fisheries regarding the development of the EP will take place through notification of State and Commonwealth representative bodies. In the unlikely event of a hydrocarbon spill, Jadestone will conduct extensive and immediate consultation with other fisheries licensed to operate within the broader Environment that May be Affected.

Vessel Based Activity Environment Plan

Sea Eagle-1 (AC/L8) was drilled and subsequently suspended with cement plugs in 2008, and Tahbilk-1 (AC/L7) in 1990. The wellheads sit between 3.1-4.3m from the seafloor. Both exploration wells were shut in and suspended with no gauges or pressure monitoring, therefore annual ROV surveillance has been used to visually check for any indications of mechanical damage (or change), or emission of fluids or gas that would indicate a barrier has failed. No indications have been noted. Jadestone proposes to continue surface vessel inspections surveys until a remote monitoring system is installed which will then require ongoing data retrieval, monitoring and maintenance. These monitoring activities are vessel-based and will involve:

Activity	Duration	Timing
Surface vessel inspection on location, no intervention at wellhead	<0.5 days	Frequently (up to every 2 weeks) until RMS installed
ROV survey visual inspection	1 day	Annually
Monitoring system installation	21 days for 24hr/day	2023
Ongoing Data retrieval via vessel	<1 day	Frequently (up to every 2 weeks)
Ongoing monitoring and maintenance	<1 week per well	Annually (possible ROV ¹)

These activities are proposed to monitor for any hydrocarbons whilst the future of these wells is determined. The Sea Eagle-1 and Tahbilk-1 EP will be valid for up to five years to allow for the annual monitoring, RMS installation and ongoing monitoring and maintenance.



¹ ROV – remotely operated vehicle

Risks and Impacts to Fishers

Risks from this activity are those associated with vessel movements on the surface. As the wellheads have not been permanently abandoned, the EP will also consider the risk of loss of well control.

Unplanned risks	
Vessel collision	During vessel-based activity in the field (e.g. monitoring system installation and data retrieval), a 500 m PSZ will be implemented around the vessel(s) and communicated via Notice to Mariners. No fishing vessels are to enter this zone.
Hydrocarbon spill	<ul style="list-style-type: none"> Oil Pollution Emergency Plan Appropriate vessel spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Introduced Marine Species (IMS)	<ul style="list-style-type: none"> IMS Management will meet legal requirements and reduce risks to ALARP and Acceptable levels.

Abandonment Environment Plan

The drilling of Montara-1 (AC/L7), Montara-2 (AC/L7), Montara-3 (AL/L7) occurred between 1988 and 2002. These wells have been formally abandoned, with both the primary and secondary barriers verified as per the NOPSEMA accepted WOMP (accepted 22/06/21). Skua-1 (AC/L8) was drilled and abandoned in 1974. The abandonment was approved by the regulator at the time, with no WOMP required. No further activities are proposed on these wellheads with the wellheads remaining in-situ indefinitely at 4.4 m, 4.1m, 2.8m and 1.08m respectively from the seafloor.

Jadestone is seeking permanent abandonment of the four wellheads in situ and therefore once the EP is accepted, it will be closed out and no further activities required under the EP.

Risks and Impacts to Fishers

Interference with fishing equipment due to the infrastructure left on the seafloor has been identified as the key risk to fishing operations. There is no risk of damage to the wellhead due to any interaction.

Unplanned risks	
Interference with fishing equipment and/or snagging	There is currently no Petroleum Safety Zones (PSZ) or exclusion zones around any of the wellheads, however the wellheads are marked on nautical charts and will continue to be going forward. A cautionary zone of 2.5 NM radius is maintained around subsea structures including the wellheads. This information has been notated on Admiralty Charts covering the region (#314), and although vessels are requested to avoid navigating, anchoring and fishing, it is not an exclusion zone.

Providing Feedback

If you would like to comment on the proposed activities outlined in this fact sheet or would like additional information, please contact Jadestone before 20 September 2021.

Email: consult@jadestone-energy.com

Phone: 08 9486 6600

L8, 1 William Street, Perth, Western Australia, 6000

In September 2021 we are moving to:
The Atrium, Level 2, 168 St Georges Terrace, Perth WA 6000



Invitation for Consultation Montara Field Wellhead Abandonment and Monitoring

Invitation for Consultation

Jadestone Energy (Jadestone) is the operator of the existing Montara Field in the Timor Sea. Jadestone is preparing for assessment by the National Offshore Petroleum Regulatory Authority (NOPSEMA) two Environment Plans for the

- **activity associated with monitoring of 2 wellheads (Sea Eagle-1 and Tahbilk-1); and**
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- The Sea Eagle-1 and Tahbilk-1 vessel-based activity EP will describe the proposed ongoing monitoring of the wellheads by annual surveys and the installation of a remote monitoring system.
- The Montara and Skua-1 Wellhead abandonment EP will describe the potential impacts of leaving the four wellheads in situ, no further activity is required as the wells are confirmed to be plugged and abandoned as per the NOPSEMA accepted Wellhead Operations and Management Plan (WOMP).

Location

The Montara development is located in the Timor Sea, approximately 690 km west of Darwin (Figure 1). The permit areas AC/L7 (Montara wells and Tahbilk-1) and AC/L8 (Skua-1 and Sea Eagle-1) are in Australian waters. All operational activities managed under the EP are in ~72–90 m water depth. Location details are shown on Figure 1, including key features in the area. The distance to Australian Marine Parks is summarised in Table 1.

Table 1: Distance to Australian Marine Parks (AMPs)

Australian Marine Park	Minimum distance from Wellheads
Ashmore AMP	131.9km
Cartier AMP	89.5km
Kimberley AMP	108.3km

In the event of an accidental event (e.g. hydrocarbon spill), the values in a broader Environment that May be Affected (EMBA) have been identified to enable key habitats or locations of particular value to be responded to as protection priorities. There is no risk of a loss of hydrocarbons from the Montara or Skua-1 wellheads.

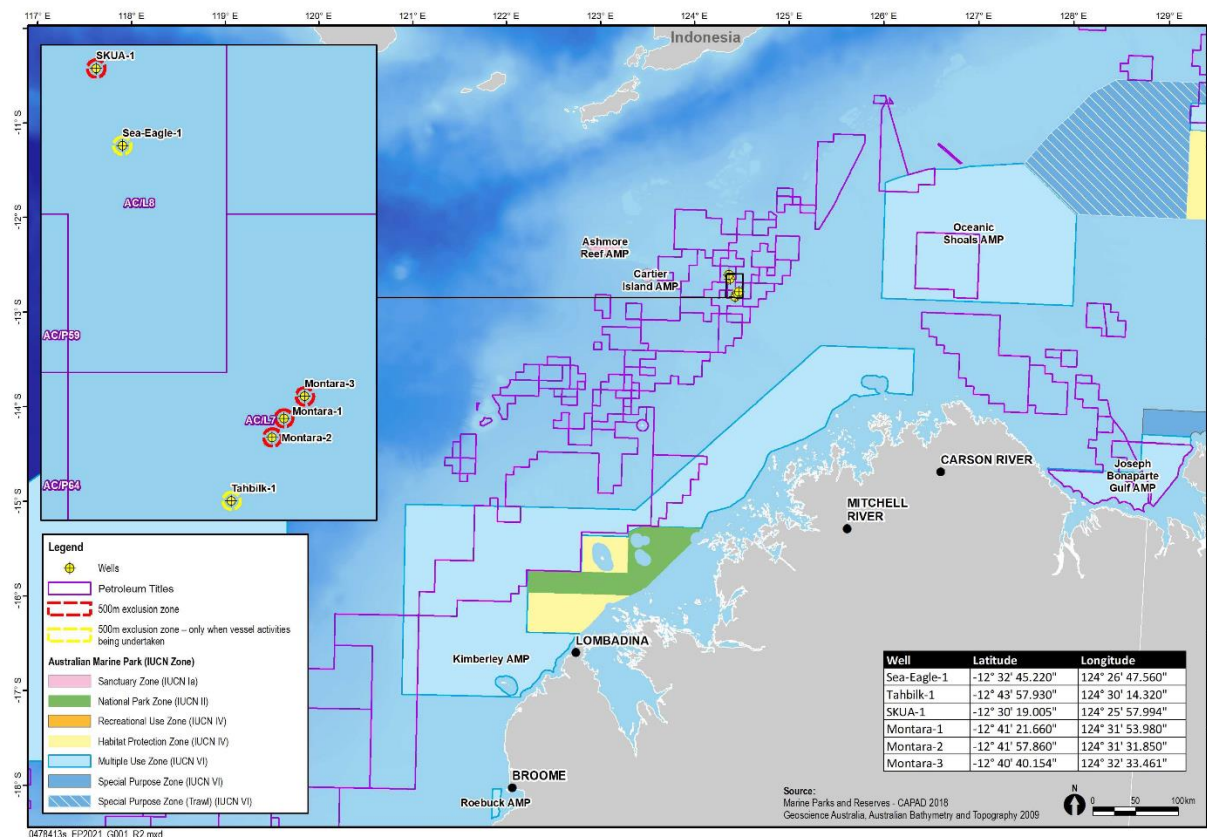


Figure 1 – Location map

Vessel Based Activity Environment Plan

Sea Eagle-1 (AC/L8) was drilled and subsequently suspended with cement plugs in 2008, and Tahbilk-1 (AC/L7) in 1990. The wellheads sit between 3.1 and 4.3m above the seafloor. Both exploration wells were shut in and suspended with no gauges or pressure monitoring, therefore annual ROV surveillance has been used to visually check for any indications of mechanical damage (or change), or emission of fluids or gas that would indicate a barrier has failed. No indications have been noted. Jadestone proposes to continue surface vessel inspection surveys until a remote monitoring system is installed which will then require ongoing data retrieval, monitoring and maintenance. These monitoring activities are vessel-based and will involve:

Activity	Duration	Timing
Surface vessel inspection on location, no intervention at wellhead	<0.5 days	Frequently (up to every 2 weeks)
ROV survey visual inspection	1 day	Annually
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Ongoing monitoring and maintenance	<1 week per well	Annually (possible ROV ¹)

These activities are proposed to monitor for any hydrocarbons whilst the future of these wells is determined.

The Sea Eagle-1 and Tahbilk-1 EP will be valid for up to five years to allow for the annual monitoring, installation of the remote monitoring system, and ongoing monitoring and maintenance.

Risks and Impacts

Risks from this activity are those associated with vessel movements on the surface. As the wellheads have not been permanently abandoned, the EP will also consider the risk of loss of well control.

Unplanned risks	
Vessel collision	During vessel-based activity in the field (e.g. monitoring system installation and data retrieval), a 500 m petroleum safety zone will be implemented around the vessel(s) and communicated via Notice to Mariners. No fishing vessels are to enter this zone.
Hydrocarbon spill	<ul style="list-style-type: none"> Oil Pollution Emergency Plan Appropriate vessel spill response plans, equipment and materials will be in place and maintained Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment
Introduced Marine Species (IMS)	IMS Management will meet legal requirements and reduce risks to ALARP and Acceptable levels.

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Abandonment Environment Plan

The drilling of Montara-1 (AC/L7), Montara-2 (AC/L7), Montara-3 (AL/L7) occurred between 1988 and 2002. These wells have been formally abandoned, with both the primary and secondary barriers verified as per the NOPSEMA accepted well operations management plan (WOMP) (accepted 22/06/21). Skua-1 (AC/L8) was drilled and abandoned in 1974. The abandonment was approved by the regulator at the time, with no WOMP required. No further activities are proposed on these wellheads, with the wellheads remaining in-situ indefinitely at 4.4 m, 4.1 m, 2.8 m and 1.08 m, respectively, from the seafloor.

Jadestone is seeking permanent abandonment of the four wellheads in situ. Once the EP has been accepted, it will be closed out and no further activities will occur under this EP.

Risks and Impacts

Interference with fishing equipment due to the infrastructure left on the seafloor has been identified as the key risk. There is no risk of damage to the wellhead due to any interaction. Jadestone understands from the Department of Primary Industry and Resources that the **Northern Demersal Scalefish** is the only state managed fishery active since 2016 in the two 10 nautical mile grids where the wellheads are located. Other fisheries that are licensed to operate and were assessed as having a potential to utilise this area in the future (based on catch history over the last 5 years) include:

- Western Tuna and Billfish (Commonwealth)
- North West Slope Trawl Fishery (Commonwealth)
- Mackerel Fishery (Western Australia)

Unplanned risks	
Interference with fishing equipment and/or snagging	There is currently no Petroleum Safety Zones or exclusion zones around any of the wellheads listed, and the wellheads are marked on nautical charts and will continue to be in the future. A cautionary zone of 2.5 nautical mile radius is maintained around subsea structures including the wellheads. This information has been notated on Admiralty Charts covering the region (#314), and although vessels are requested to avoid navigating, anchoring and fishing, it is not an exclusion zone.

Providing Feedback

If you would like to comment on the proposed activities outlined in this fact sheet or would like additional information, please contact Jadestone before 20 September 2021.

Email: consult@jadestone-energy.com
Phone: 08 9486 6600

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In September 2021 we are moving to:
The Atrium, Level 2, 168 St Georges Terrace, Perth WA 6000