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1 INTRODUCTION

1.1 BACKGROUND

PTTEP Australasia (Ashmore Cartier) Pty Ltd is the 100% titleholder of AC/RL12 and PTTEP Australia Timor Sea Pty Ltd is the 100% titleholder of AC/RL4. The titleholders (collectively, PTTEP AA) propose to decommission two wells within the petroleum title areas AC/RL12 and AC/RL4. The AC/RL12 title area (formerly AC/P33) contains the Oliver-2 exploration well and the AC/RL4 title area contains the Tenacious West-1 ST1 appraisal well. The wells are permanently plugged with independent verified barriers in place, and the wellheads for both wells remain on the seabed (refer to Section 5.5).

This EP is a revision to the Timor Sea Well Suspension Environment Plan (EP) (EP document: A736166), which covered the ongoing suspension of the wells. This EP revision (Revision 1) has been triggered by a new stage of activity (i.e. wellhead abandonment) under Regulation 17(5) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009. It is noted that Revision 0 of the EP included the ongoing suspension of the Oliver-1 ST1 well; however, it has since been determined that this well has been permanently abandoned and the wellhead removed. It is therefore no longer included in this Revision 1 EP scope. The EP revision history is presented in Table 1-1.

Table 1-1: Environment Plan Revision History

Revision	Description	Year of Revision
0	EP submitted to cover the ongoing suspension of the Oliver-2, Tenacious West-1 ST1 and Oliver-1 wells including an ROV inspection of the wellheads.	2020
1 (this EP)	EP developed to cover the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads	2022

1.2 PURPOSE

This EP has been prepared to meet the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations) and to demonstrate to NOPSEMA that PTTEP AA:

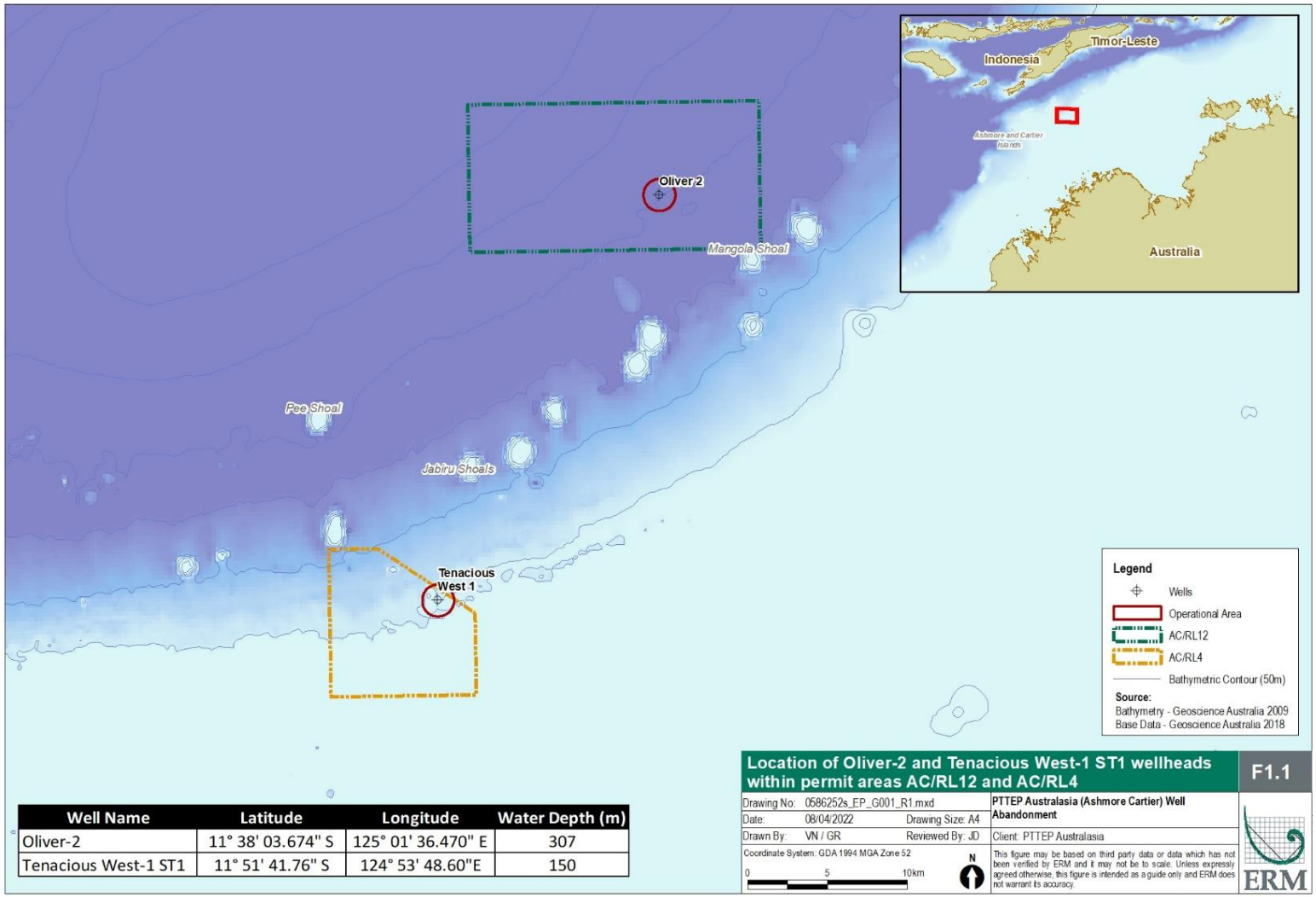
- Understands the requirements of the OPGGS (E) Regulations and other applicable environmental legislation;
- Has identified and evaluated environmental risks and impacts associated with the activity;
- Has identified appropriate management controls, environmental performance objectives, environmental performance standards and measurement criteria to reduce risks and impacts to as low as reasonably practicable (ALARP) and acceptable levels;
- Has implemented, or will implement, appropriate systems, processes and procedures to support the execution of environmental performance objectives, environmental performance standards and measurement criteria;
- Has ensured the Petroleum Activities Program is performed in a manner consistent with the principles of ecologically sustainable development (ESD), as defined in Section 3A of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Has consulted with potentially affected stakeholders.

1.3 SCOPE

This EP applies to the decommissioning phase of two wellheads, Oliver-2 and Tenacious West-1 ST1 (Figure 1-1). The scope of the EP covers the permanent abandonment of the two wellheads in situ, including immediate and ongoing relevant environmental and socio-economic impacts.

The decommissioning options for the wells were evaluated via a comparative assessment (refer to Section 4), and the leave in situ option is demonstrated to provide the best balance of factors, with negligible environmental and socio-economic impacts and risks and no technical or health and safety risks. The leave in situ option provides equal or better outcomes across all the assessment criteria compared to the base case of complete removal, and therefore meets PTTEP AA's decommissioning obligations under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*.

All activities associated with the Oliver-2 and Tenacious West-1 ST1 wellheads will cease following acceptance of this EP. The activities associated with this phase are described in Section 5.



Well Name	Latitude	Longitude	Water Depth (m)
Oliver-2	11° 38' 03.674" S	125° 01' 36.470" E	307
Tenacious West-1 ST1	11° 51' 41.76" S	124° 53' 48.60"E	150

Figure 1-1: Location of Oliver-2 and Tenacious West-1 ST1 wellheads within permit areas AC/RL12 and AC/RL4

1.4 THE TITLEHOLDER

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

Address:	PTTEP Australasia (Ashmore Cartier) Pty Ltd/PTTEP Australia Timor Sea Pty Ltd Level 5, 225 St Georges Terrace Perth WA 6000
Telephone Number:	0439 728 555
Website:	www.au.pttep.com
ACN:	004210164
Nominated Liaison Person:	Ryan Hartfield – ryanh@pttep.com

If there is a change in the titleholder, the titleholder's nominated liaison person or the contact details for the titleholder or liaison person, NOPSEMA will be notified in writing and the updated details provided.

1.5 ENVIRONMENT PLAN SUMMARY

An EP summary is presented in Table 1-2 as required by Regulation 11(4) of the Commonwealth OPGGS (E) Regulations 2009.

Table 1-2: Environment Plan Summary

EP Summary Requirement	Relevant EP Section
Details of the titleholder's nominated liaison person for the activity	Section 1.4
A description of the activity	Section 3.2.1
The location of the activity	Section 5.3
A description of the receiving environment	Section 6
Consultation already undertaken and plans for ongoing consultation	Section 7
Details of the environmental impacts and risks	Section 9
The control measures for the activity	Section 9
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 11
Response arrangements in the oil pollution emergency plan	**Not applicable** (there is no credible spill scenario associated with EP scope)

1.6 ENVIRONMENT PLAN STRUCTURE AND CONTENT

The EP structure is summarised below.

- **Section 1** *Introduction* presents background, document scope and purpose.
- **Section 2** *PTTEP SSHE Policy* presents PTTEP's corporate Safety, Security, Health and Environment (SSHE) Policy.
- **Section 3** *Legislation and Regulatory Framework* outlines the legislative requirements and other non-legislative requirements that apply to the activities of the EP.
- **Section 4** *Comparative Assessment of Decommissioning Options* describes the evaluation of decommissioning options against environmental, socioeconomic, health and safety and technical criteria.
- **Section 5** *Description of Activities* provides a detailed description of the planned activities within the scope of the EP.
- **Section 6** *Description of the Environment* describes the physical and biological environment, environmental receptors and social, cultural and economic receptors that may be within the 'environment that may be affected' (EMBA), and identifies the values and sensitivities of the environment.
- **Section 7** *Stakeholder Consultation* outlines and reports on the consultation process undertaken with relevant stakeholders as part of the environmental assessment for the EP.
- **Section 8** *Environmental Impact and Risk Assessment Methodology* describes the risk assessment process (including ALARP and acceptability assessments), relevant to the scope of the EP.
- **Section 9** *Environmental Impact and Risk Assessment* presents the outcomes of the impact and risk assessment process applied to the wellhead abandonment scope of the EP.
- **Section 10** *Environmental Performance Objectives, Environmental Performance Standards and Measurement Criteria* presents the environmental performance objectives (EPOs), environmental performance standards (EPSs) and measurement criteria (MC) developed for the EP.
- **Section 11** *Implementation Strategy* describes the processes and practices that will be implemented by PTTEP AA to ensure that the EPOs and EPSs in this EP are met; and that the environmental impacts and risks are identified and reduced to ALARP and are acceptable.

2 PTTEP SSHE POLICY

2.1 SSHE POLICY

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

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

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

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

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Safety, Security, Health and Environment (SSHE) Policy

Safety, Security, Health and Environment (SSHE) is fundamental for PTTEP's sustainable business. We put in place and adhere to an effective SSHE management system in order to ensure the safety and health of everyone involved in our operations and communities where we operate, environmental protection and the security of our people and assets.

To achieve our vision of being a zero incident organization, PTTEP shall:

- Work to achieve and sustain a generative SSHE culture through accountable leadership and involvement of all employees and contractors. Fundamentally SSHE performance is a line management accountability.
- Set measurable SSHE objectives, key performance indicators and targets that are used for continuous improvement for top quartile performance and achievement of applicable sustainable development goals (SDGs).
- Fulfil compliance obligations with all applicable SSHE laws, regulations, national and international standards as well as internal requirements of the PTTEP SSHE management system.
- Manage SSHE risks by identifying, analyzing, evaluating and treating them to As Low As Reasonably Practicable (ALARP) throughout PTTEP business lifecycle.
- Promote health of employees and contractors as part of an effective health management system.
- Reduce environmental footprints in alignment with low carbon pathway, circularity concept, and positive environmental value creation.
- Assess, monitor, and manage security risk and situation at all locations.
- Plan and prepare for emergencies and crises by providing resources, training, and holding regular drills and exercises.
- Apply Management of Change principles to operational, organizational, administrative, and regulatory changes to ensure that the risk is identified, assessed, and controlled.
- Empower and reinforce employees' and contractors' right to use of the Stop Work Authority (SWA).
- Enforce zero drugs and alcohol programs in workplace to all employees and contractors.
- Improve SSHE performance continuously by workforce participation and consultation, learning from incidents, audits and reviews.

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

(Phongsthorn Thavisin)
Chief Executive Officer
Date.....23/06/2021.....

11038-PCY-SSHE-001-R08, Effective Date: 23 June 2021

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

3 LEGISLATION AND REGULATORY FRAMEWORK

3.1 COMMONWEALTH LEGISLATION

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

3.1.1 Offshore Petroleum and Greenhouse Gas Storage Act

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

The OPGGS Act provides a regulatory framework for all offshore petroleum exploration, production and greenhouse gas activities in Commonwealth waters, beyond three nautical miles (nm) of the mainland (and islands) to the outer extent of the Australian Exclusive Economic Zone (EEZ) at 200nm. The objective of the OPGGS (E) Regulations is to ensure that any petroleum or greenhouse gas activity in an offshore area is carried out in a manner consistent with the principles of ecologically sustainable development and in a manner by which the environmental impacts and risks of the activity are ALARP and of an acceptable level.

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

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

As part of NOPSEMA's assessment of an EP, it must be shown that the proposed activity does not contravene the values and objectives set out for any sensitive feature of the environment proclaimed under the EPBC Act.

Under subsection 572(2) of the OPGGS Act, a titleholder must maintain all property in good condition and repair from the point the property is brought into the title area until the property is removed, or a deviation from the requirement to remove is approved by NOPSEMA. PTTEP AA carried out an ROV visual survey inspection of the wellheads on 13/03/2022, which observed the wellheads to be intact with corrosion caps in place and secured (Figure 5-2 Figure 5-3).

Under subsection 572(3) of the OPGGS Act, a titleholder must remove all equipment and other property in their title area that is neither used, nor to be used, for operations authorised by their title. The complete removal of infrastructure is the 'base case' decommissioning requirement under the OPGGS Act. This is consistent with Australia's international obligations, primarily under the United Nations Convention on the Law of the Sea (UNCLOS) and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and associated Protocol, to remove disused installations and structures and to preserve and protect the marine environment. However, this requirement is subject to other provisions of the OPGGS Act and regulations, directions given by NOPSEMA or the responsible Commonwealth Minister, and other applicable laws (e.g. the Environment Protection (Sea Dumping) Act 1981).

This means options other than complete removal may be considered, however the titleholder must demonstrate that the alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared to complete removal, and that the approach complies with all other legislative and regulatory requirements, including requirements under other Commonwealth laws (Department of Industry, Science, Energy and Resources (DISER), 2022).

The DISER Offshore Petroleum Decommissioning Guidelines (2022) clarify the application, operation and interaction between components of the commonwealth regime for decommissioning offshore petroleum infrastructure in Commonwealth waters under the OPGGS Act, associated regulations and, where applicable, other Commonwealth laws. Decommissioning must be completed before the end of title.

An Environment Plan (EP) is the key permissioning document assessed by NOPSEMA through which titleholders can demonstrate compliance with the majority of decommissioning obligations under subsection 270(3) of the OPGGS Act (relating to surrender of title). An EP relating to decommissioning must address the following matters:

- the complete removal of all property to which the plan relates, or alternative arrangements for that property (e.g. partial or complete decommissioning in situ).
- the protection and conservation of natural resources (as they relate to environmental management) in the area to which the environment plan relates.
- any measures necessary to make good any damage to the seabed or subsoil in the title area.

Identification and evaluation of decommissioning options may be undertaken through an options assessment process, taking into account criteria relating to environmental and socio-economic impacts and risks, technical feasibility and safety. The options assessment for the Oliver-2 and Tenacious West-1 ST1 wellheads is presented in Section 4.

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

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

3.1.3 Environment Protection (Sea Dumping) Act 1981

Australia regulates the loading and dumping of waste at sea under the *Environment Protection (Sea Dumping) Act 1981* (the Sea Dumping Act). This Act also fulfils Australia's international obligations under the London Protocol to prevent marine pollution by controlling dumping of wastes and other matter. Under the Sea Dumping Act, the Commonwealth aims to minimise pollution threats by:

- prohibiting ocean disposal of waste considered too harmful to be released in the marine environment.
- regulating permitted waste disposal to ensure environmental impacts are minimised.

The Act is also supplemented by guidelines published by the International Maritime Organisation (IMO) which provide national bodies guidance on regulating dumping of wastes, including the *Revised specific guidelines for assessment of platforms or other man-made structures at sea*, (IMO, 2019).

Permits are required from DAWE for all ocean disposal activities and include dredging operations, dumping of vessels and platforms or other man-made structures, and burial at sea. DAWE is currently reviewing its regulatory arrangements for abandonment of offshore oil and gas infrastructure and considers proposals to abandon infrastructure at sea on a case-by-case basis. Through consultation with DAWE, PTTEP has established that the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads will require a Sea Dumping Permit (refer to Section 7 and Appendix A).

3.2 INTERNATIONAL TREATIES, AGREEMENTS AND CONVENTIONS

Australia is signatory to various international treaties, agreements and conventions that are relevant to the decommissioning of the Oliver-2 and Tenacious-1 ST1 wellheads. These treaties are given force by their inclusion into Australian legislation at the Federal and State/Territory level.

The key international treaties, agreements and conventions that apply to the proposed activity are outlined in Table 3-1.

Table 3-1: Applicable International Treaties, Agreements and Conventions

Treaties, Agreements and Conventions	Summary	Relevance to Proposed Activity
The 1997 Treaty between the Government of Australia and the Government of the Republic of Indonesia establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries (Perth 14 March 1997) (the 1997 Perth Treaty), signed but not yet ratified	When ratified, the treaty will finalise the Exclusive Economic Zone (EEZ) boundary between Australia and Indonesia. Under the 1997 Perth Treaty, there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights (the Perth Treaty area). While the Perth Treaty has yet to enter into force, the Australian Government acts consistently with its obligations under the Perth Treaty. The obligations relevant to this activity are that i) Australia and Indonesia must take effective measures to prevent, reduce and control pollution of the marine environment; and ii) each of Australia and Indonesia is liable in accordance with international law for pollution of the marine environment caused by activities under its jurisdiction. Communications with the Government of the Republic of Indonesia on these matters is conducted by the Department of Foreign Affairs and Trade (DFAT).	The wellheads are located within the 1997 Perth Treaty Area. Any advice to Indonesia is handled by DFAT.
1981 Memorandum of Understanding (MoU)	Establishes the Provisional Fisheries Surveillance and Enforcement Line (PFSEL) between Australia and Indonesia, which is non-binding but both Governments have agreed will continue to apply until the 1997 Perth Treaty enters into force.	The wellheads are located within the PFSEL. Any advice to Indonesia is handled by DFAT.
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979	The aim of the Bonn Convention is to conserve terrestrial, marine and avian species over the whole of their migratory range. The convention commits 'range states' to take action to conserve migratory species, especially those under threat.	Migratory species listed under the EPBC Act that may occur in the EMBA are identified in Section 6.5.4.
United Nations Convention on the Law of the Sea 1982	The convention imposes obligations on State parties to prevent, reduce and control marine pollution from the various major pollution sources including pollution from the land, from the atmosphere, from vessels and from dumping.	In the case of a pollution occurrence, the Convention will apply as implemented by the Protection of the Sea (Powers of Intervention) Act 1983 and *Environmental Protection (Sea Dumping) Act 1981*.

Treaties, Agreements and Conventions	Summary	Relevance to Proposed Activity
IMO Resolution A.672 (16)	Relevant paragraphs of IMO Resolution A.672 (16) contain the following requirements: • Infrastructure within specified water depths (above 75 and 100 m) should be completely removed (paragraphs 3.1 and 3.2). • Infrastructure left in situ should not cause unjustifiable interference with other uses of the sea (paragraph 3.4.2). • Structures left in situ should be marked on navigational charts (paragraph 3.8). • Structures left in situ should remain on location and not move (paragraph 3.9). • Structures left in situ should be monitored, as necessary, for compliance against these guidelines (paragraph 3.10). • Responsibility for maintenance and liability for future damages from structures left in situ should be clearly established (paragraph 3.11).	Leaving the Oliver-2 and Tenacious West-1 ST1 wellheads in situ meets all the relevant requirements of IMO Resolution A.672 (16) as follows: • The depth of the wellheads is deeper than the depths specified in paragraph 3.1 and 3.2, within which removal is recommended. • Interference with other users has been assessed as 'low' in Section 9.3.1, as supported by the absence of feedback from relevant stakeholders during consultation (Section 7) (paragraph 3.4.2). • The Oliver-2 and Tenacious West-1 ST1 wellheads are marked on navigation charts (paragraph 3.8). • The wellheads are located in a fixed position and will not move from these locations (paragraph 3.9). • Periodic monitoring is not required to ensure ongoing compliance against IMO Resolution A.672 (16) (paragraph 3.10). This is on the basis the wellheads are marked on navigational charts and the degradation of the wellheads is not expected to result in release of material that will result in a risk to navigation. • No ongoing maintenance is required for the wellheads. Long term impacts and risks as the wellheads degrade over time are assessed in Section 9 to be low (paragraph 3.11).

3.2.1 Jurisdictional Arrangements with Indonesia

As outlined in Table 3-1, the Oliver-2 and Tenacious West-1 ST1 wellheads are located within Australia's 200 nm EEZ as defined by the "*1972 Seabed Boundaries Agreement between the Commonwealth of Australia and the Republic of Indonesia on Seabed Boundaries in the Area of the Timor and Arafura Seas*" (Figure 6-3). However, in practice, the wellheads are located outside the Australian EEZ within an area of shared jurisdiction with Indonesia due to the 1997 Perth Treaty.

In 1997, the Australian and Indonesian Governments established an EEZ boundary and certain seabed boundaries, labelled the 1997 Perth Treaty. The 1997 Perth Treaty remains unsigned by the Indonesian government and has not officially entered into force; however, both Australia and Indonesia act consistently with the arrangements established under the Treaty (Australian Fisheries Management Authority (AFMA), 2014). Under the 1997 Perth Treaty, there is an area of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights (the Perth Treaty Area). Both wellheads are located within this area of overlapping jurisdiction (Figure 6-3). The northern boundary of the Perth Treaty Area is contiguous with the seabed boundary set in the 1972 Seabed Boundaries Agreement.

Article 7 of the Perth Treaty lists several rights and obligations that apply where Indonesia's water column overlaps Australia's seabed (areas of overlapping jurisdiction). Rights and obligations potentially relevant to the consideration of the decommissioning of oil and gas infrastructure are contained in paragraphs (f), (j), (k), (m) and (n) as follows:

(f) (i) any installation or structure which is abandoned or disused shall be removed by the Party which authorised its construction in order to ensure the safety of navigation, taking into account any generally accepted international standards established in this regard by the competent international organisation

(ii) such removal shall also have due regard to fishing and to the protection of the marine environment. Appropriate publicity shall be given to the depth, position and dimensions of any installations or structures not entirely removed;

(j) the Parties shall take effective measures as may be necessary to prevent, reduce and control pollution of the marine environment;

(k) each Party shall be liable in accordance with international law for pollution of the marine environment caused by activities under its jurisdiction;

(m) neither Party shall exercise its rights and jurisdiction in a manner which unduly inhibits the exercise of the rights and jurisdiction of the other Party; and

(n) the Parties shall cooperate with each other in relation to the exercise of their respective rights and jurisdiction.

Stakeholder consultation undertaken between PTTEP AA, the Australian Department of Foreign Affairs (DFAT) and the Indonesian Government in relation to obligations under the Perth Treaty for the proposed wellhead abandonment activity is detailed in Section 7.

4 COMPARATIVE ASSESSMENT OF DECOMMISSIONING OPTIONS

The 'base case' for decommissioning is the complete removal of infrastructure, under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act). Other options may however be considered, if the alternative options deliver equal or better environmental, safety and well integrity[1] outcomes compared to the base case of complete removal. A comparative assessment of decommissioning options (Options Assessment) was undertaken for the Oliver-2 and Tenacious West-1 ST1 wellheads. The purpose of the Options Assessment process is to establish the option that provides the most benefits or the least risk of impacts to the environment as a whole, and provides the greatest level of safety and well integrity outcomes, in the long term as well as in the short term. The preferred option for decommissioning is the one with the best balance of factors, including overall performance to achieve the objective, i.e. minimising risk, providing least negative impacts and most positive impacts. The preferred option must comply with all legislative and regulatory requirements identified in Section 3, including the guidance from the DISER Offshore Petroleum Decommissioning Guideline (DISER, 2022). Impacts and risks from the preferred option must also be ALARP and acceptable, as demonstrated in Section 8.

4.1 OPTIONS ASSESSMENT PROCESS

The key steps in evaluating the decommissioning options were:

- Options screening to identify the potentially feasible decommissioning options for the wellheads and the activities associated with the decommissioning options.
- Evaluation of options based on compliance with relevant legislation and guidelines.
- Review the engineering and scientific information to understand the existing environment of the EMBA and how the wellheads may interact with the marine environment if removed or left in situ.
- Assess the practicability of each option from a technical feasibility perspective.
- Assess the practicability of each option from a health and safety risk perspective.
- Assess the environmental impacts and risks associated with the activities required to implement each decommissioning option.

4.2 OPTIONS SCREENING

The following options have been identified for decommissioning of the Oliver-2 and Tenacious West 1 ST1 wellheads:

- Base case: Complete removal of wellheads;
- Option 1: Leave wellheads in situ and;
- Option 2: Leave wellheads in situ and install anti-snag structures or rock dumps

These options are described in Table 4-1 and screened for inclusion in the full Options Assessment presented in Section 4.3**.**

[1] The Oliver 2 and Tenacious West-1 ST1 wells are permanently abandoned as described in Section 5.5. Well integrity was therefore not a consideration in the Options Assessment as there is no credible spill risk associated with the wells.

Table 4-1: Decommissioning options description and screening assessment

Option	Details of Option	Included in Options Assessment	Comments
Base Case: Complete removal of Oliver-2 and Tenacious West-1 ST1 wellheads	In accordance with subsection 572(3) of the OPGGS Act, the base case must be assessed in which the titleholder must remove, or cause to be removed, all equipment and other property brought into the title area by the titleholder. Removal of Oliver-2 and Tenacious West-1 ST1 at depths ranging from approximately 150 m to approximately 310 m would require vessel-based wellhead removal using a dynamically positioned multi-purpose sub-sea construction vessel. The wellheads would be cut and removed using high pressure or abrasive water jet cutting. The cutting tool skid would have dimensions measuring approximately L10 m x W0.70 m x H0.4 m and weigh approximately 1.5 tonnes. The wellheads would be cut at around 1-3 m below the mudline in accordance with international Well standard practice, e.g. Oil and Gas UK Well Decommissioning Guidelines (OGUK Issue 6 ,2018). Up to approximately 1.5 days would be required per wellhead, from arrival to demobilisation. Activities conducted during this time period include dynamic positioning trials, launching ROV, wellhead location and site survey, debris recovery/wellhead preparation, cutting tool deployment, wellhead cutting and wellhead recovery.	Yes	Complete removal of the Oliver-2 and Tenacious West-1 ST1 wellheads is the base case under the OPGGS Act and is required to be included in the Options Assessment for comparison against alternative options.
Option 1: Leave Oliver-2 and Tenacious West-1 ST1 wellheads in situ	Leaving Oliver-2 and Tenacious West-1 ST1 wellheads in situ would require no physical activities. The AHO would be advised to allow for the wellheads to be marked on their electronic navigation charts. Stakeholder consultation on decommissioning options being considered must be undertaken and clearly taken into account when evaluating any options other than complete removal (i.e. a deviation from the 'base case').	Yes	Leaving the wellheads in situ may have environmental benefits and presents no health and safety risk exposure to personnel. Risks to other marine users if left in situ, such as commercial fishers, will need to be assessed. This option may provide equal or better environmental and safety outcomes when compared to the base case and will be included in the Options Assessment.
Option 2: Leave Oliver-2 and Tenacious West-1 ST1 wellheads in situ and install anti-snag structure or rock dump	This option would involve the installation of a trawler board deflecting structure or rock dumping over the wellheads to reduce the long-term snagging risk to commercial bottom trawl vessels.	No	There is considered no benefit in installing anti-snag structures or rock dumping compared to the base case of complete removal. In-field vessel activities would be required for both options with similar risk profiles and costs. For this reason this option is not considered further.

4.3 OPTIONS ASSESSMENT

The decommissioning options for the Oliver-2 and Tenacious West-1 ST1 wellheads were assessed against a range of criteria and sub-criteria described in Table 4-2. The impacts, risks and benefits of the base case (complete removal) and Option 1 (leave in situ) were identified and ranked to enable evaluation of whether Option 1 delivers equal or better environmental and safety outcomes compared to the base case of complete removal. Evaluations are made principally on a qualitative basis using the risk ranking scale shown in Table 4-3. The assessment criteria were ranked on a scale of 1-10 with higher figures indicating higher impacts/risk and less desirable outcomes.

Table 4-2: Assessment criteria for comparison of wellhead management

Criteria	Sub-criteria	Description of sub-criteria
Environment	Water quality and sediment impacts	Assessment of water quality and potential impacts to sediment, including potential for short term and long term contamination.
	Benthic habitat impacts	Assessment of potential biodiversity and habitat impacts and benefits due to physical presence/seabed disturbance as a result of the activity.
	Marine fauna impacts	Impacts to threatened and/or migratory species
	Emissions	Emissions as a result of operations.
	Waste	Volume of waste due to operations and potential impact on end points (e.g. landfill, recycle).
	Hydrocarbon spill risk	Risk of hydrocarbon spill event.
Socio-economic	Short-term impact on commercial fisheries	Short-term commercial impacts of the option on present commercial fisheries.
	Short-term impact on other marine users	Short-term impacts on recreational marine users and shipping.
	Long-term impact on commercial fisheries	Long-term commercial impacts of the option on future commercial fisheries.
	Long-term impacts on other marine users	Long-term impacts on recreational marine users and shipping.
Technical feasibility	Technical feasibility	Assessment of the technical feasibility of each option, including consideration of the extent to which technology required is proven.
	Industry experience	Is the decommissioning technique common practice (industry) and has it been done before in a similar location.
Health and Safety	Risk to project personnel offshore	Safety risk to project personnel offshore.
	Short-term safety risk to other marine users	Short-term safety risk to commercial vessels (fishing and shipping) during field activities.
	Long-term safety risk to other marine users	Long-term safety risk to commercial vessels (fishing and shipping).

Table 4-3: Ranking scale for assessment of wellhead management options

	1	2	3	4	5	6	7	8	9	10
Favourability	Most favourable				Neutral					Least favourable
Impacts	No impact		Negligible impact		Minor impact		Moderate impact			High impact
Risk	No risk		Negligible risk		Minor risk		Moderate risk			High risk
Feasibility	Proven technology, no concerns		Proven technology, minor concerns				Unproven, minor concerns			Unproven, major concerns
Industry Practice	Common practice									Not likely to be acceptable
Public Perception	Common practice									Not likely to be acceptable

4.4 OPTIONS ASSESSMENT OUTCOME

Detailed outcomes of the Options Assessment are provided in Appendix D, including a description of the key impacts, risks and benefits identified for each option. A summary of rankings is provided below in Table 4-4 and Figure 4-1. Findings of the Options Assessment are discussed below.

Table 4-4: Options Assessment of the decommissioning options for the Oliver-2 and Tenacious West-1 ST1 wellheads

Assessment Criteria	Sub-criteria	Base Case: Complete removal of Oliver-2 and Tenacious West-1 ST1 wellheads	Option 1: Leave Oliver-2 and Tenacious West-1 ST1 wellheads in situ
Environment	Water quality and sediment impacts	3	3
	Benthic habitat impacts	4	3
	Marine fauna impacts	3	1
	Emissions	3	1
	Waste impact	4	1
	Hydrocarbon spill risk	7	1
Socio-economic	Short-term impact on commercial fisheries	1	1
	Short-term impact on other marine users	3	1
	Long-term impact on commercial fisheries	1	3
	Long-term impacts on other marine users	1	1
Technical Feasibility	Technical feasibility risk	3	1
	Industry experience risk	3	1
Health and Safety	Risk to project personnel offshore	7	1
	Short-term safety risks to other marine users	3	1
	Long-term safety risks to other marine users	1	3

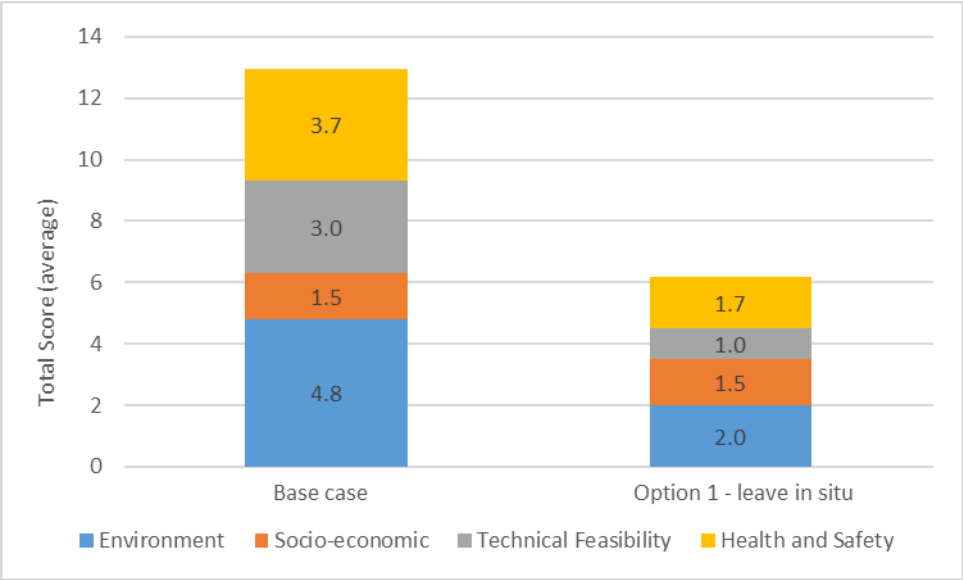


Figure 4-1 Options assessment for the Oliver-2 and Tenacious West-1 ST1 wellheads

4.4.1 Base Case

4.4.1.1 Environment

Wellhead removal activities have been assessed as having negligible to moderate environmental impacts and risks (Table 4-4). Impacts to the seabed and water column from cutting and removal of the wellheads would be significant but would remain highly localised to the wellhead location. Removal of the wellheads would also remove existing marine growth and result in permanent removal of hard substrate for benthic habitat growth that has been shown to support local fish assemblages (Figure 5-2 and Figure 5-3). However, this would be a very minor impact given the limited surface area of the wellheads and water depths (~150 to 310 m). Waste would also be generated through disposal of the wellheads onshore.

Removal of the wellheads would result in minor, localised impacts to the environment typical of a vessel based activity, including generation of atmospheric emissions and routine discharges (e.g. sewage and grey water, deck and bilge water, cooling water and brine). Generation of noise from the project vessel (including dynamic positioning systems), ROV equipment and cutting tool may result in localised avoidance or behavioural changes in marine fauna. Given the duration of activities associated with complete removal of the Oliver-2 and Tenacious West-1 ST1 wellheads, noise impacts to marine fauna are negligible. Similarly, the potential for vessel collision with marine fauna is negligible given the short duration of the activity.

The use of a vessel for the activity would introduce a moderate risk of hydrocarbon spill in the highly unlikely event of a vessel collision with a third party vessel.

4.4.1.2 Socio-Economic

Wellhead removal activities have been assessed as having negligible socio-economic impacts (Table 4-4). The primary impact to socio-economic activities is the potential for temporary (up to 3 days) and localised disturbance of other marine users due to the physical presence of the project vessel during wellhead cutting and removal. The wellheads are located outside of any major shipping channels and there is no commercial fishing in the area. (Section 6.6). Due to the remote location and duration of the activity, the potential for interaction with other vessels is minimal.

4.4.1.3 Technical Feasibility

Complete removal of the Oliver-2 and Tenacious West-1 ST1 wellheads has been assessed as having negligible technical feasibility risks (Table 4-4). PTTEP would contract an experienced subsea contractor with a track record of successful operations in similar programs of work (refer Table 4-1).

Cutting of wellheads via water jet cutting is a proven technology, with minor risk of project failure. Scenarios involving a failed cut (or perceived failed cut) are possible, where the crane operator would need to pull on the wellhead with more overpull to try and work the wellhead free. If this is not effective, another cut would need to be attempted and the process repeated.

Multiple attempts may also be required to successfully cut and lift the wellhead if large volumes of excess cement are present around the conductor, which may also be covered by seabed sediment. Excess cement may restrict the ability to cleanly cut and pull the cut wellhead free (even if the initial cut is completely successful), and would require the crane operator to work the wellhead and attached cement pancake up and down with increasing overpulls or drop-off weights until the cement pancake cracks and the wellhead can be pulled free. This scenario would require disturbance to a larger area of seabed and would increase health and safety risks to offshore personnel. Furthermore, if the cement pancake is carried to the surface, the additional size, weight and shape can present a problem for deck space and onshore disposal. However, it is noted that an ROV inspection of the wellheads conducted on 13/03/2022 did not observe cement around the Oliver-2 wellhead (although the PGB was flush with the seabed obscuring visibility), and cement observed around the Tenacious West-1 ST1 wellhead was mostly broken into smaller pieces.

4.4.1.4 Health and Safety

Wellhead removal activities have health and safety risks associated with lifting and general operation of a vessel in an offshore environment. Lifting of the two wellheads presents inherent health and safety risks with high potential consequences, such as loss of load onto the vessel deck and potential injury to personnel. Health and safety risks may increase under certain scenarios, such as the presence of a large cement pancake around the wellheads as described above. However, an appropriately qualified and experienced subsea contractor would be contracted for the activity, and PTTEP have the ability to manage these risks similar to other field operations. Health and safety risks are therefore considered moderate.

4.4.2 Option 1: Leave wellheads in situ

4.4.2.1 Environment

Option 1 has been assessed as having negligible to minor impacts and risks to the environment as a result of the long-term presence and eventual degradation of the wellheads (Table 4-4). The Oliver-2 and Tenacious West-1 ST1 would remain in situ and would eventually corrode over time. The mainly steel construction of the wellheads is designed with very stable, non-biodegradable materials that are expected to have a service life of many decades. However, the wellheads will slowly corrode into the water column at a rate of about 0.2 mm/year (Melchers, 2005), and small amounts of steel rust may accumulate in the sediment surrounding the wellheads. At the slow rate of corrosion identified, most steel material may have disintegrated after about 120 years.

Steel is primarily comprised of iron with minor concentrations of alloying elements. For example, AISI 4130 alloy steel is comprised of the following:

- iron (98%)
- carbon (trace) 0.28-0.33%
- chromium 0.80-1.10%
- manganese 0.40-0.60%
- silicon (trace) 0.15 – 0.35%
- sulphur (trace) 0.040%
- molybdenum (trace) 0.15 – 0.25% and
- phosphorus (trace) 0.035%.

Iron, as the main component of the wellheads is an abundant element in marine sedimentary systems (Taylor et al., 2011). It is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). The very minor quantities chromium and zinc may result in localised elevations of these heavy metals (within tens of metres of the wellheads) but will mix with surrounding sediments, reducing the concentration and may become permanently covered in sediments if the corroded wellhead material becomes buried over time.

Given the composition of the steel wellhead, the expected rate of corrosion and the very minor quantities of elastomeric materials present, impacts to marine sediments, organisms and water quality would be negligible and highly localised.

The Oliver-2 and Tenacious West-1 ST1 wells are as classified as having a “permanent independent verified barrier”, as outlined in the Well Operation Management Plan. Fluids remaining above the top cement plug consist of water-based displacement fluids described in Section 5.5. In the event of exposure of the well fluids to the marine environment, the water pressure above the wellhead would be expected to prevent the release of residual well fluids. Any fluids released to the marine environment over time would be rapidly dispersed with negligible effects. Well fluids would be similarly exposed following wellhead removal and this is therefore not considered a differentiator.

Leaving the wellheads in situ would provide hard substrate in an environment generally consisting of soft sediments, and there is potential for a small positive impact due to localised increase in marine productivity introduced via biofouling communities and attraction of fish to the area, as documented in the ROV inspection conducted on 13/03/2022 (Figure 5-2 and Figure 5-3). However, this would be very minor given the limited surface area of the wellheads and water depths (~150 to 310 m).

During stakeholder consultation on the decommissioning options, the Western Australian Fishing Industry Council (WAFIC) requested PTTEP AA to consider the potential for cumulative impacts from multiple titleholders looking to abandon wellheads in situ. There are no other wellheads or other property present within title areas AC/RL12 and AC/RL4 as outlined in Section 5.6. Based on the assessment above that corroded steel and minor quantities of elastomeric materials will be confined to sediments immediately surrounding the wellheads as the wellheads degrade over time, potential impacts will be highly localised (within tens of metres of the wellheads) and will not result in cumulative impacts.

4.4.2.2 Socio-Economic

Option 1 was assessed as having negligible socio-economic risk (Table 4-4) on the basis that the wellheads are located in water depths that would not interfere with vessel navigation and are not expected to present a snag risk to fishing gear such as bottom-trawl nets. No bottom trawling occurs in the area by either Australian or Indonesian fisheries (refer to Section 6.6). The wellheads are located outside the Australian Fishing Zone, and bottom trawling by Indonesian fishing vessels is not expected as the wellheads are located within a relatively deep area of the Timor Sea which is closed to trawling by Indonesian vessels (Section 6.6.2). No objections or concerns have been raised through stakeholder consultation as described in Section 7.3.

4.4.2.3 Technical Feasibility

The Oliver-2 and Tenacious West-1 ST1 wells are classified as having adequate barriers in place for permanent abandonment, as outlined in the accepted Well Operation Management Plan (WOMP; Revision 4, PTTEP Technical Document CORP-DR-D41-868269 (HQ202103848.1). Final abandonment reports have been accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for both wells. As such, no technical issues associated with leaving Oliver-2 and Tenacious West-1 ST1 wellheads in situ have been identified as no physical activities are required (Table 4-4).

4.4.2.4 Health and Safety

No health and safety risks to personnel occur under Option 1 given that no on-the-water activities will be necessary (Table 4-4).

4.4.3 Conclusion

The base case option to remove the wellheads introduces potential environmental, socio-economic, technical feasibility and health and safety impacts and risks associated with a typical vessel-based activity and the cutting and removal of the wellheads. These impacts and risks have been ranked as negligible to moderate. The moderate risks include a potential hydrocarbon spill in the highly unlikely event of a vessel collision, and health and safety risks to personnel due to the nature of the pulling/lifting activity required to remove the wellheads. However, PTTEP have the ability to manage these risks similar to other field operations.

The leave in situ option requires no on-water activity, therefore there are no activity or vessel-based impacts and risks. Negligible impacts to water and sediment quality are expected as the wellheads corrode over time, with small amounts of steel rust accumulating in the sediment in a localised area surrounding the wellheads. No cumulative impacts from the abandonment of infrastructure by other operators would occur. While the wellheads remain intact, they would continue to provide an area of hard substrate for marine growth in an environment generally consisting of soft sediments, as observed during an ROV inspection on 13/03/2022 (Figure 5-2 and Figure 5-3). Although benefits would be very minor given the limited surface area of the wellheads and water depths (~150 - 310 m). The leave in situ option was also assessed to present negligible socio-economic risks on the basis that the wellheads are located in water depths that would not interfere with vessel navigation and are not expected to present a snag risk to fishing gear such as bottom-trawl nets. No bottom trawling occurs in the area by either Australian or Indonesian fisheries and this is not expected to change in the future under current arrangements. Furthermore, the Australian Hydrographic Service have been notified through consultation of the presence of the wellheads for marking on navigation charts (Section 7.3).

The leave in situ option (Option 1) is demonstrated to provide the best balance of factors, with negligible environmental and socio-economic impacts and risks and no technical or health and safety risks.

The base case for the OPGGS Act is complete removal as per subsection 572(3); however, subsection 270(3) of the Act allows for alternative arrangements, including leaving the wellheads in situ, as long as the option delivers equal or better environment, health and safety, social and well integrity outcomes when compared to complete removal. The Options Assessment has demonstrated that environmental, socio-economic and health and safety impacts and risks from the leave in situ option would be negligible. The leave in situ option provides equal or better outcomes across all the assessment criteria compared to the base case of complete removal, and therefore meets PTTEP AA's decommissioning obligations under the OPGGS Act.

Article 7 of the Perth Treaty (Section 3.2.1) requires any installation or structure which is abandoned or disused to be removed in order to ensure the safety of navigation, taking into account any generally accepted international standards established in this regard by the International Maritime Organisation. Such removal must also have due regard to fishing and to the protection of the marine environment, with appropriate publicity given to the depth, position and dimensions of any installations or structures not entirely removed. Given the water depths of the wellheads, they do not pose a navigation hazard. PTTEP has provided relevant information to the Indonesian Government via the Australian Department of Foreign Affairs and Trade (DFAT) on the depth, position and dimensions of the wellheads to fulfil its obligations under the Treaty and to date no objections or concerns have been raised (refer to Section 7.3).

Through consultation with DAWE, PTTEP has established that the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads will require a Sea Dumping Permit under the *Environment Protection (Sea Dumping) Act 1981* as described in Section 3.1.3.

The leave in situ option for the wellheads has been demonstrated to comply with legislative and regulatory requirements, including demonstration that it provides equal or better environment, health and safety, social and well integrity outcomes compared to the base case of complete removal. The outcome of the Options Assessment therefore does not warrant the cost and increase in risks of conducting a field-based operation to remove the wellheads. Leaving the wellheads in situ has been selected by PTTEP AA as the preferred decommissioning option for the Oliver-2 and Tenacious West-1 ST1 wellheads and forms the basis of this EP.

5 DESCRIPTION OF THE ACTIVITY

5.1 OVERVIEW

This EP covers the decommissioning of two permanently plugged wells in petroleum title areas AC/RL12 and AC/RL4. The AC/RL12 title area (formerly AC/P33) contains the Oliver-2 appraisal well and the AC/RL4 title area contains the Tenacious West-1 ST1 appraisal well. The Oliver-2 and Tenacious West-1 ST1 wells are classified as having adequate barriers in place for permanent abandonment, as outlined in the accepted Well Operation Management Plan (WOMP; Revision 4, PTTEP Technical Document CORP-DR-D41-868269 (HQ202103848.1). Final abandonment reports have been accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for both wells. The wellheads for both wells remain on the seabed. It is noted that the wellheads were inspected by a dedicated ROV on 13/03/2022. No gas bubbles or leaks were observed, consistent with the permanent abandonment status. From the ROV inspection, it was noted that both in situ wellheads have developed over the years as mini artificial reefs, being almost completely covered in biofouling, creating a habitat for attracting significant localised quantities of fish. The ROV footage notes a stark contrast with the relatively featureless surrounding seabed with no marine fauna or growth.

5.2 ACTIVITY TIMING

No on-the-water activities are proposed as part of this EP, and therefore the activity will be considered complete upon acceptance of the EP from NOPSEMA.

5.3 LOCATION

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

The well locations and water depths are provided in Table 5-1. These locations were verified by an ROV survey conducted on 13/03/2022 (Appendix C).

Table 5-1: Well Locations and Depth

Well Name	Latitude	Longitude	Water Depth (m)
Oliver-2	11° 38' 03.674" S	125° 01' 36.470" E	307
Tenacious West-1 ST1	11° 51' 46.748" S	124° 53' 44.131" E	150

5.4 OPERATIONAL AREA

As no planned operations are proposed, an Operational Area has not been defined. A boundary with a radius of 500 m from each wellhead, and 20 m above each wellhead, has been selected as a conservative buffer within which environmental and social impacts could occur over time, such as slow degradation of wellhead materials into the marine environment. Collectively, these two buffers around the wellheads are referred to as the 'environment that may be affected (EMBA)' in this EP. No safety zones around the wellheads are proposed as part of the activity, and as described in Section 5.2, the activity will be considered complete upon acceptance of the EP from NOPSEMA.

5.5 DETAILS OF THE WELLS

The Oliver-2 appraisal well was drilled in 2009 to total depth (TD) of 3233m BRT (2,901 m below the seabed). Tenacious West-1 ST1 was drilled in 1998 to a total depth (TD) of 3030m BRT (2,858 m below the seabed).

A summary of the wells, including permanent barrier status, is provided in Table 5-2.

Table 5-2: Well summary

Well Name	Permit Area	Total Measured Depth Below The Seabed (m)	Rig Release Date	Permanent Barrier Status
Oliver-2	AC/RL 12	2,901	08-Dec-09	Well permanently abandoned with two permanent barriers installed.
Tenacious West-1 ST1	AC/RL 4	2,856	11-Jul-98	Well permanently abandoned with two permanent barriers installed.

5.5.1 Oliver-2

5.5.1.1 Drilling Summary

The 36" top hole and 17 ½" hole of the Oliver-2 well were drilled with seawater & hi-vis pre-hydrated gel (PHG) sweeps, with cuttings returned to sea bed. For subsequent holes cuttings were returned to the drill rig and discharged overboard. At total depth the well was circulated to inhibited 1.1sg KCl Polymer mud to run and cement the 9 5/8" casing. The 8 ½" hole to total depth was drilled with a 1.12 to 1.16 sg KCl/PHPA/Aquacol water based mud (WBM) system, with cuttings discharged overboard after treatment through shakers to allow for re-circulation of the mud system.

The well fluids left in Oliver-2 following permanent abandonment are all WBM with a maximum weight of 11.1 pounds per gallon (ppg) inside the 9 5/8" casing. Some lower weight WBM's (either weighted or unweighted) are left in the 9 5/8" or 13 3/8" annuli.

5.5.1.2 Description of the Wellhead

The Oliver-2 wellhead has a low and high pressure housing, and a permanent guidebase with four guideposts extending above the pressure housing. A schematic of the wellhead is shown in Figure 5-1 and ROV images of the wellhead from March 2022 are shown in Figure 5-2. The wellhead is composed of steel, with small amounts of elastomeric materials used within seal components, and conforms to API 6A and API 17D material specifications.

A visual ROV inspection of the wellhead was conducted on 13/03/2022 (Appendix C). The ROV measured the height of the guide posts to be 3.1 – 3.2 m above the seabed and the corrosion cap to be 2 m above the seabed. The wellhead was observed to be intact with a corrosion cap in place that was secured. It was noted that there was no cathodic protection and the wellhead had evident corrosion in all main unpainted areas.

There were no signs of cement returns as the permanent guidebase was sitting flush onto the seabed, with no scour observed. There were also no signs of any cutting piles found in the survey in and around the wellhead and out to a 10 m radius.

Marine growth provided a 70% coverage of the hard calcareous variety, and it was noted that the marine growth density increased on the upper sections of the wellhead and the four guideposts

A visual leak test was carried out around the wellhead base up to the corrosion cap and there were no signs of any loss of containment, which is consistent with the status of the well having adequate barriers in place for permanent abandonment as approved in the WOMP.

A visual and sonar survey was conducted out to a 10 m radius around the wellhead to observe for any dropped objects or drilling-related debris left on the seabed. No items were observed. The seabed around the wellhead was observed to be flat and featureless with some small sand waves (up to 200 mm in height).

5.5.2 Tenacious West-1 ST1

5.5.2.1 Drilling Summary

The 36" top hole and 12 ¼" hole were drilled with seawater & hi-vis PHG sweeps, with cuttings returns to sea bed. For subsequent holes cuttings were returned to the rig and discharged overboard. The 8 ½" hole to total depth was drilled with an inhibited 1.12 to 1.16 sg KCl/PHPA/Aquacol WBM system, with cuttings discharged overboard after treatment through shakers to allow for re-circulation of the mud system.

The well fluids left in Tenacious West-1 ST1 following permanent abandonment are all WBM with a maximum weight of 10.0 ppg inside the 9 5/8" casing.

5.5.2.2 Description of the Wellhead

The Tenacious West-1 ST1 well has a 30" x 13 3/8" conductor pipe and permanent guide base (PGB) stabbed into a temporary guide base (TGB) and cemented in place in a similar design to what is seen in Oliver-2. A schematic of the wellhead is shown in Figure 5-1 and ROV images of the wellhead from March 2022 are shown in Figure 5-3. The wellhead is composed of steel, with small amounts of elastomeric materials used within seal components, and conforms to API 6A and API 17D material specifications.

A visual ROV inspection of the wellhead was conducted on 13/03/2022 (Appendix C). The ROV measured the height of the guide posts to be 3.7 m above the seabed and the corrosion cap to be 2.9 m above the seabed. The wellhead structure was observed to be intact without any structural damage, including the presence of a corrosion cap that was secured. It was noted that there was no cathodic protection and the wellhead had evident corrosion in all main areas, with the TGB appearing the most heavily corroded.

There was some localised scouring under the wellhead, approximately 0.3 m to 0.4 m under the TGB. This lowest point was measured at 1 m below mean seabed.

Concrete/ grout was observed around the wellhead on the seabed. A majority of this was broken up into smaller pieces around the wellhead. There were no signs of any cutting piles found in the survey in and around the wellhead and out to a 10 m radius.

Marine growth provided an 80% coverage of the hard calcareous variety, it was noted that the marine growth density increased on the upper sections of the wellhead and the four guideposts.

A visual leak test was carried out around the WH base up to the corrosion cap and there were no signs of any loss of containment, which is consistent with the status of the well having adequate barriers in place for permanent abandonment as approved in the WOMP.

A visual and sonar survey was conducted out to a 10 m radius around the wellhead to observe for any dropped objects or drilling-related debris left on the seabed. No items were observed. The seabed around the wellhead was observed to be flat and featureless with some small sand waves (up to 200 mm in height).

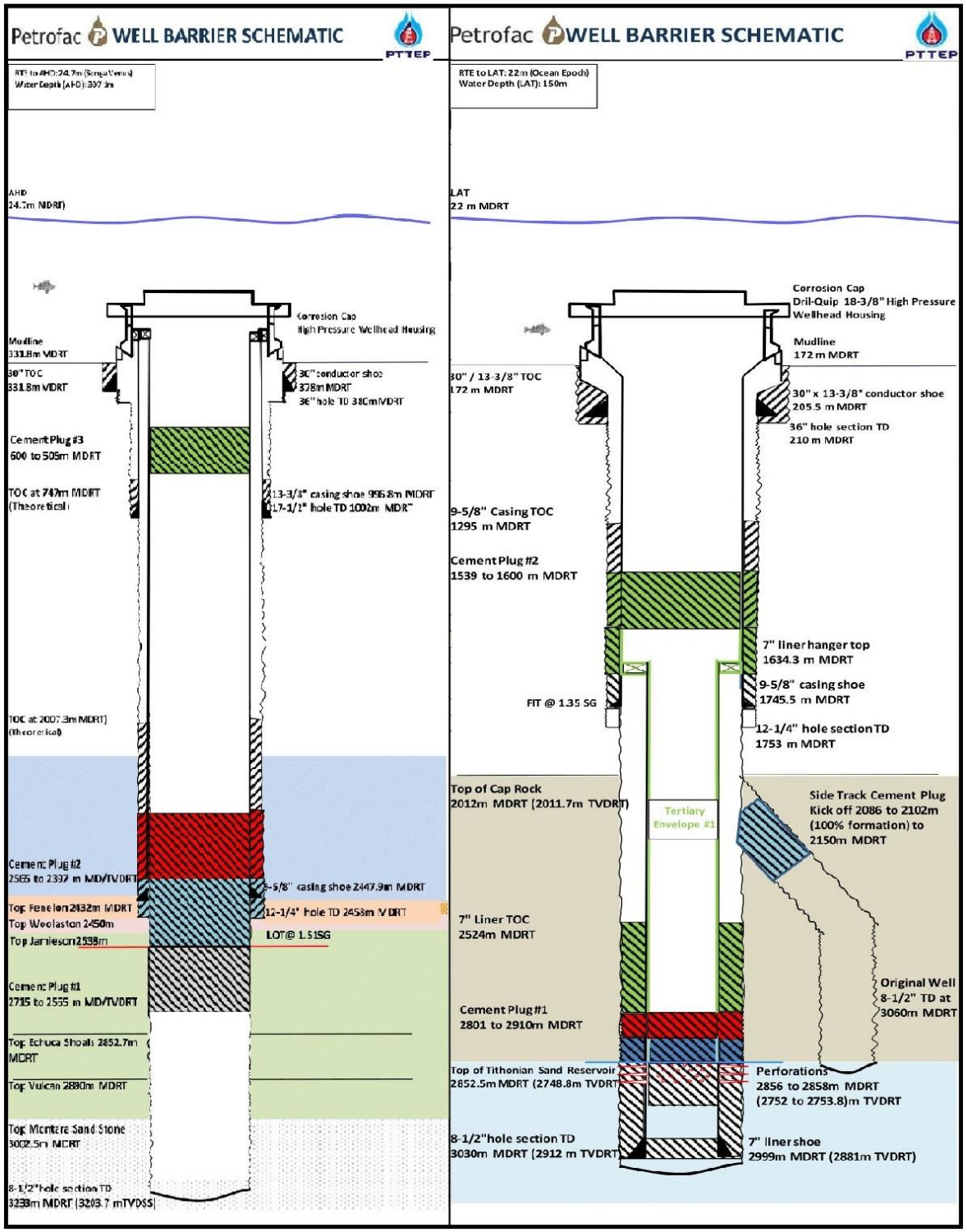


Figure 5-1: Oliver-2 (left) and Tenacious West-1 ST1 (right) well barrier schematics

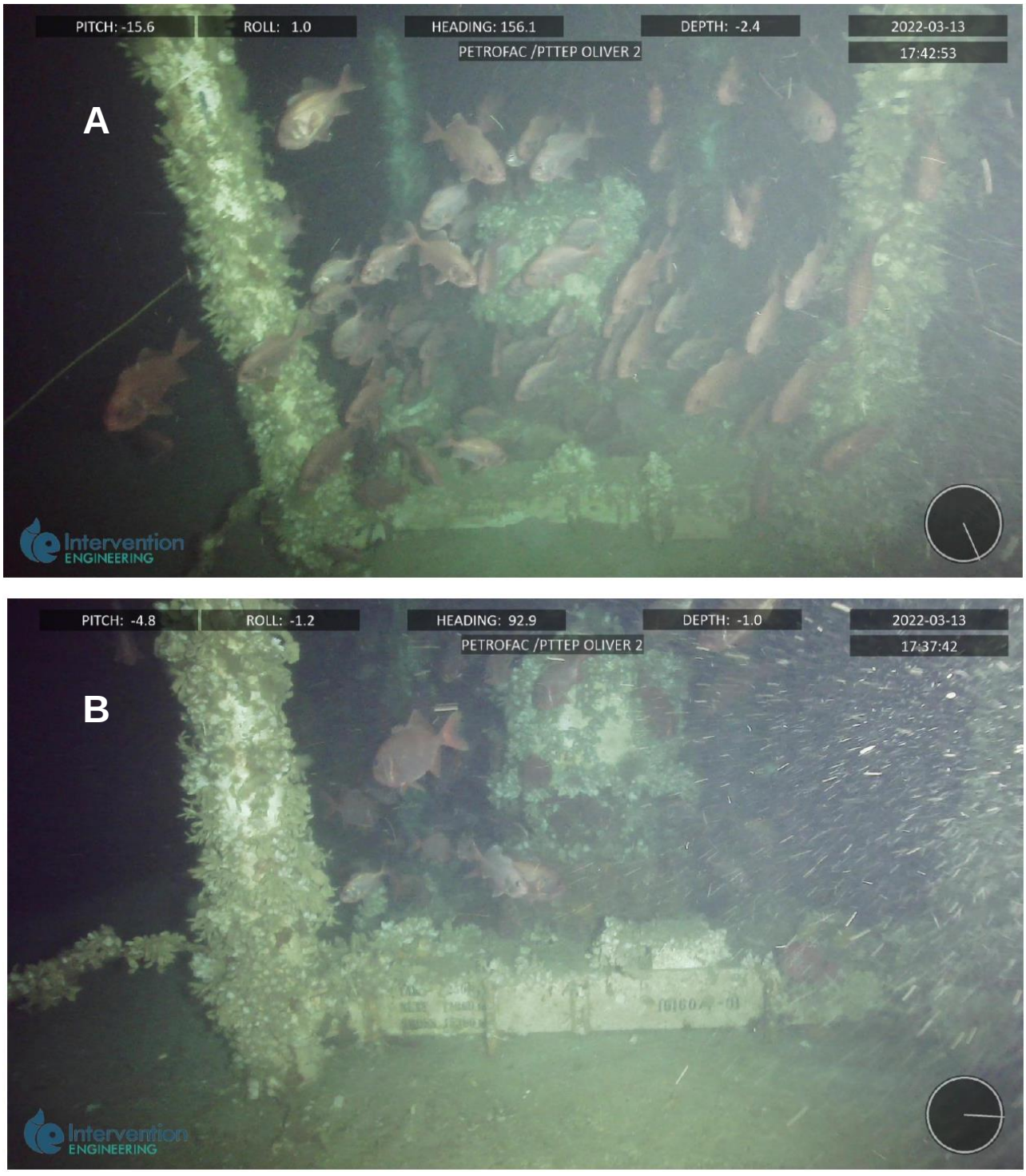


Figure 5-2: Oliver-2 wellhead: A – view of the top of the wellhead including guide posts and corrosion cap; B – permanent guide base at seabed level

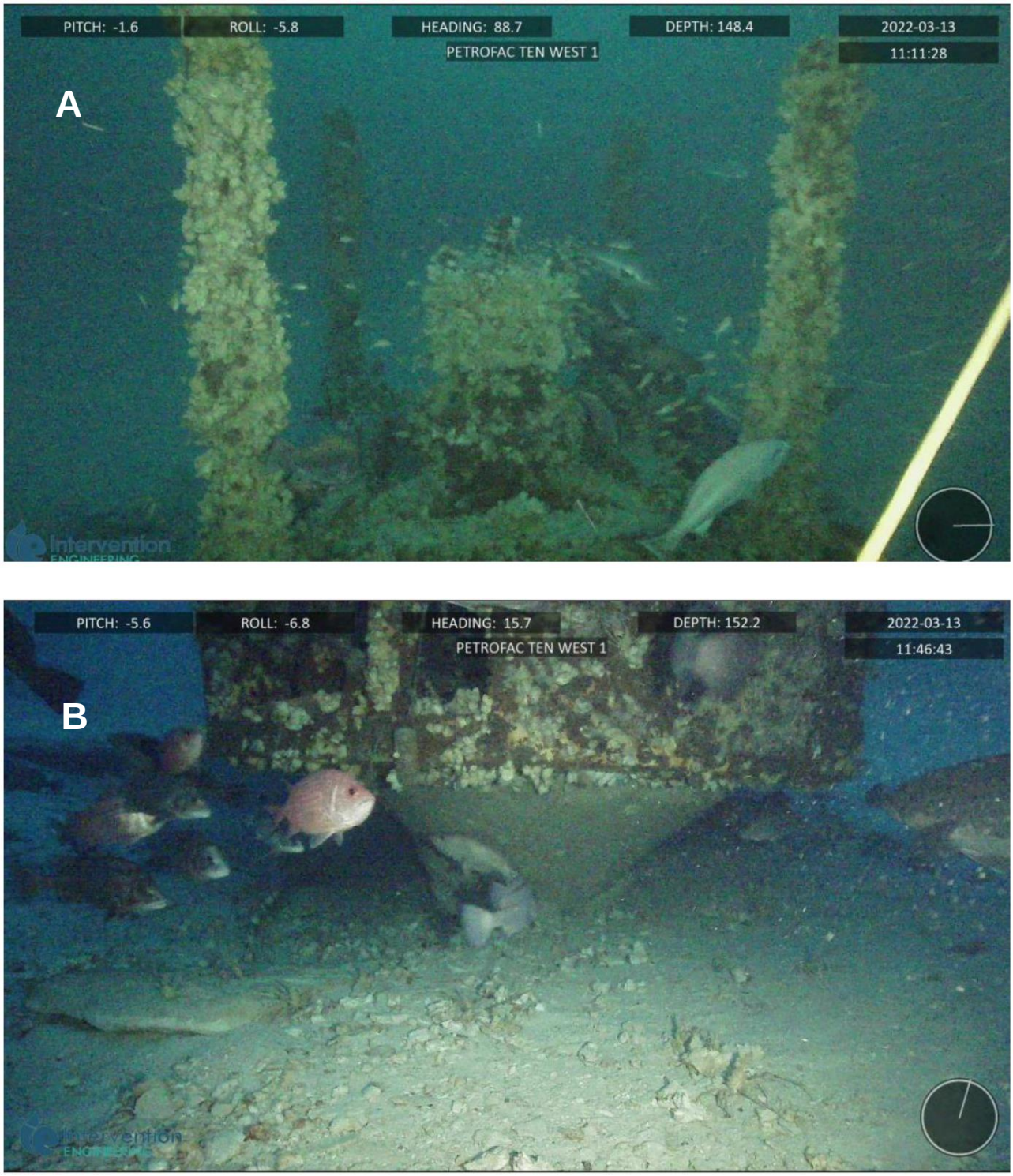


Figure 5-3: Tenacious West-1 ST1 wellhead: A - view of the top of the wellhead including guide posts and corrosion cap; B - view of scour under the temporary guide base and sign of cement returns

5.6 INVENTORY OF PROPERTY CURRENTLY IN SITU WITHIN TITLE AREAS

A review of the National Offshore Petroleum Information Management System (NOPIMS) database in conjunction with operational records has been completed to determine what property remains within the AC/RL12 and AC/RL4 title areas. The information reviewed includes daily drilling reports from operations at Tenacious West-1 ST1, and an ROV survey that was conducted upon completion of rig operations at Oliver-2 up to an 80 m radius from the well.

The records confirm that all subsea infrastructure has been removed from the AC/RL12 and AC/RL4 title areas, with the exception of:

- The Oliver-2 wellhead in AC/RL12.
- The Tenacious West-1 ST1 wellhead in AC/RL4.

A visual and sonar survey with a radius of 10 m around the wellheads was conducted on 13/03/2022 (Appendix C) to verify the historical records and observe for any undocumented dropped objects or debris that may have been left on the seabed during the drilling activity. Observations from the inspection were consistent with the historical records and no items other than the wellheads and associated cement returns were observed on the seabed. There were also no signs of any cuttings piles found in the survey in and around either wellhead. Any remaining cuttings are likely to be dispersed and would have retained WBM only.

5.7 INTEGRITY MONITORING

In accordance with the WOMP, both wells are classified as having adequate barriers in place for permanent abandonment. Consistent with this status, no gas bubbling or leaks from either wellhead were observed during a thorough ROV inspection on 13/03/2022 as described above. Therefore, no future integrity monitoring of Oliver-2 and Tenacious West-1 ST1 will be required.

5.8 CONTINGENT ACTIVITIES

No contingent activities are proposed as part of this EP given no on-the-water activities will take place.

5.9 SURRENDER OF TITLES

Subject to required internal approvals, it is PTTEP AA's intent following acceptance of this EP to surrender petroleum title area AC/RL4. In making a decision on a titleholder's application for consent to surrender a title, the Joint Authority must consider the criteria set out in section 270(3) of the OPGGS Act. When undertaking title surrender application assessments, NOPTA will consult with NOPSEMA with respect to titleholder compliance with section 270. This EP is intended to serve as a supporting permissioning document for the eventual surrender of AC/RL4 (and if required in the future, the eventual surrender of AC/RL12). The intent of this section is to provide information to demonstrate compliance with the following matters set out in the OPGGS Act:

- 270(3)(c) to (f) – to confirm that the titleholder has, to the satisfaction of NOPSEMA:
    - Removed, or caused to be removed, all property brought into the surrender area, or made arrangements that are satisfactory to NOPSEMA in relation to that property.
    - Plugged or closed off all wells made in the surrender area.
    - Provided for the conservation and protection of the natural resources in the surrender area.
    - Made good any damage to the seabed or subsoil in the surrender area.

Demonstration of compliance with these requirements is outlined in Table 5-3.

PTTEP AA understands that other legislative requirements that may also apply, such as the *Environment Protection (Sea Dumping) Act 1981*, which are outside the scope of this EP.

Table 5-3: Demonstration of Compliance with Criteria in Section 270 of the OPGGS Act

Criteria		Demonstration of Compliance
(3)(c)(i) & (ii)	The registered holder of the permit, lease or licence must, to the satisfaction of NOPSEMA, remove or caused to be removed from the surrender area all property brought into the surrender area by any person engaged or concerned in the operations authorised by the permit, lease or licence; or must make arrangements that are satisfactory to NOPSEMA in relation to that property	The property to be decommissioned in petroleum title areas AC/RL12 and AC/RL4 is well understood and the current status/condition was documented via an ROV visual survey inspection of the wellheads on 13/03/2022 (refer to Section 5.5 and 5.6). PTTEP AA has sought a deviation from the base case of removal to leave the Oliver-2 and Tenacious West-1 ST1 wellheads in situ. This EP demonstrates that environmental impacts and risks from the leave in situ option are ALARP and acceptable. Acceptance of this EP will meet PTTEP AA's obligations under s270(3)(c).
(3)(d)	The registered holder of the permit, lease or licence must, to the satisfaction of NOPSEMA, plug or close off all wells made in the surrender area by any person engaged or concerned in the operations authorised by the permit, lease or licence	The Oliver-2 and Tenacious West-1 ST1 wells are classified as having adequate barriers in place for permanent abandonment, as outlined in the accepted Well Operation Management Plan (WOMP; Revision 4, PTTEP Technical Document CORP-DR-D41-868269 (HQ202103848.1). Final abandonment reports have been accepted by NOPSEMA for both wells (refer to Section 5). A visual leak test was carried out around the wellheads via ROV inspection on 13/3/22 and there were no signs of any loss of containment, which is consistent with the permanent abandonment status of the wells.
(3)(e)	The registered holder of the permit, lease or licence must provide, to the satisfaction of NOPSEMA, for the conservation and protection of the natural resources[2] in the surrender area	Leaving the wellheads in situ is demonstrated in this EP to have a negligible and highly localised impact (within a maximum of tens of metres) on the seabed from gradual corrosion and accumulation of steel rust and a small amount of elastomeric material in surrounding sediments. These materials will mix with surrounding sediments, reducing the concentration, and may become permanently buried over time. The seabed at the location of the wells consists of flat, featureless soft-sediment habitats, as documented in the ROV visual inspection on 13/3/22 (Section 5.5). Soft substrates in the region are generally sparsely covered by sessile, filter-feeding organisms as described in Section 6.5.2). The wellhead structures offer hard substrate and subsequent attachment point for marine epibenthos, which in turn supports localised fish assemblages as observed from the ROV survey (Figure 5-2 and Figure 5-3).

[2] For the purposes of the OPGGS Act, natural resources has the meaning given by Article 77, paragraph 4 of the United Nations Convention on the Law of the Sea (UNCLOS), which states: "*The natural resources referred to in this Part consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil*."

Criteria		Demonstration of Compliance
		Given the negligible and localised nature of impacts from leaving the wellheads in situ, the proposed activity is therefore not inconsistent with the conservation and protection of natural resources in the context of the wider continental shelf location.
(3)(f)	The registered holder of the permit, lease or licence must, to the satisfaction of NOPSEMA, made good any damage to the seabed or subsoil in the surrender area caused by any person engaged or concerned in the operations authorised by the permit, lease or licence	PTTEP has documentation from the drilling campaign that no objects and/or drill cutting piles were located within an 80 m radius of the Oliver-2 wellhead, and no incidents of dropped objects were reported in daily drilling reports for the Tenacious West-1 ST1 wellhead. This is supported by a visual and sonar survey during an ROV inspection conducted on 13/03/2022, which did not identify any debris within a 10 m radius surrounding the wellheads. No visible cuttings were observed during the ROV survey. Any discharged cuttings at the time of drilling are likely to have been buried or dispersed within the water column. Furthermore, both wells were drilled with WBM and discharged cuttings would therefore not contain any residual hydrocarbons. On this basis there is no remediation of the seabed required at the wellhead locations in relation to cuttings or debris in order to make good any damage to the seabed or subsoil in the surrender area. While the wellheads remain in situ they support localised marine growth and associated fish assemblages in an area of otherwise flat, featureless soft sediment habitat. Over time leaving the wellheads in situ is demonstrated in this EP to have a negligible and highly localised impact (within a maximum of tens of metres) on the seabed from gradual corrosion and accumulation of steel rust and a small amount of elastomeric material in surrounding sediments. The ultimate fate of the wellheads is that they will collapse and likely become buried in sediment after an extended period (~120 years). On the basis of the negligible and localised nature of impacts from leaving the wellheads in situ, remediation to make good any damage to the seabed or subsoil in the surrender area in the future is not warranted.

6 DESCRIPTION OF THE ENVIRONMENT

6.1 OVERVIEW

A description of the existing environment is provided in this section to identify relevant values and sensitivities of the physical, ecological, and socio-economic environment, as required by Regulations 4(1), 11(1)(a) and 13(2)(a)(b) of the OPGGS (E) Regulations.

As described in Section 5.4 no planned operations are proposed, therefore an Operational Area has not been defined. A boundary with a radius of 500 m from each wellhead, and 20 m above each wellhead, has been selected as a conservative buffer within which environmental and social impacts could occur over time, such as slow degradation of wellhead materials into the marine environment. Collectively, these two buffers around the wellheads are referred to as the 'environment that may be affected (EMBA)' in this EP. It is noted there is no credible spill risk associated with the proposed wellhead abandonment activity, given both wells are permanently plugged and no vessel-based activities are proposed.

6.2 REGIONAL SETTING

6.2.1 Timor Sea

Both wellheads are located in a remote area of the Timor Sea (Figure 1-1), a shallow sea between Australia, Indonesia and East Timor. The Timor Sea is influenced by large scale oceanic processes, including the Indonesian Through Flow and the Timor Current. Major geomorphic features of this region include the Australian continental shelf and slope, and the Timor Trough. The Australian continental slope also features dozens of shallower banks and shoals which support diverse benthic assemblages.

6.2.2 North-west Marine Region

The management of Australia's offshore waters is facilitated by the creation of six marine regions under the EPBC Act. The EMBA is adjacent to the North-west Marine Region (NWMR) which terminates at the outer boundary of the Australian EEZ, however this boundary is jurisdictional in nature and the physical and ecological features of the NWMR are considered relevant to this EP.

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

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

6.3 PROTECTED AREAS

6.3.1 Australian Marine Parks

The Australian Marine Park (AMP) Network has been established around Australia as part of a National Representative System of Marine Protected Areas, the primary goal of which is to contribute to the long-term conservation of marine ecosystems and protect marine biodiversity. The EMBA is not located within or adjacent to any AMPs. The closest AMP is the Oceanic Shoals AMP, located approximately 113 km east of the Oliver-2 wellhead and outside the EMBA.

6.3.2 State Managed Reserves

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

6.3.3 Key Ecological Features

Key Ecological Features (KEFs) are components of the Commonwealth Marine Area recognised for their regional importance with respect to the region's biodiversity, ecosystem function and/or integrity (Commonwealth of Australia, 2013). The EPBC Protected Matters Search (PMST) was used to identify any KEFs within, and adjacent to the EMBA (Appendix B). No KEFs occur within or adjacent to the EMBA. The closest KEF is the carbonate banks and terraces of the Sahul Shelf KEF, located approximately 30 km south-east of the Tenacious West-1 ST1 wellhead.

6.3.4 Wetlands of Conservation Significance (declared Ramsar wetlands)

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

6.4 PHYSICAL ENVIRONMENT

6.4.1 Climate

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

Cyclonic activity occurs from November to April and can bring very large amounts of rain, with strong swell and rough seas. Tropical cyclones usually form in an active monsoon trough, producing heavy rains, strong winds, large swells and storm surges. On average, about five cyclones occur each year in the region, two of which make landfall and one of which is severe (Category 3 or higher, with wind gusts exceeding 170 km/h) (Bureau of Meteorology (BoM), 2014). The chance of a severe cyclone occurring is highest in March and April (BoM, 2014). Given the depth of the EMBA (>130 m depth), cyclonic activity is not expected to affect the oceanographic conditions around the wellheads.

6.4.2 Oceanography

Two oceanic currents dominate the offshore area between north-west WA and Indonesia: the Indonesian Throughflow and the Holloway Current (Figure 6-1). The Indonesian Throughflow influences the Timor Sea region and contributes to the South Equatorial Current, which flows westward and supplies the North West Shelf with warm, low saline water (Heyward et al., 1997). The Indonesian Throughflow is thought to be subject to the inter-annual variations of the El Niño-Southern Oscillation events (Heyward et al., 1997). The Holloway current is a surface current that flows parallel to the coastline along the North-West Shelf and provides a conduit to transport warmer, lower-salinity water from northern Australia into the Leeuwin current (Bahmanpour et al., 2016.).

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

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

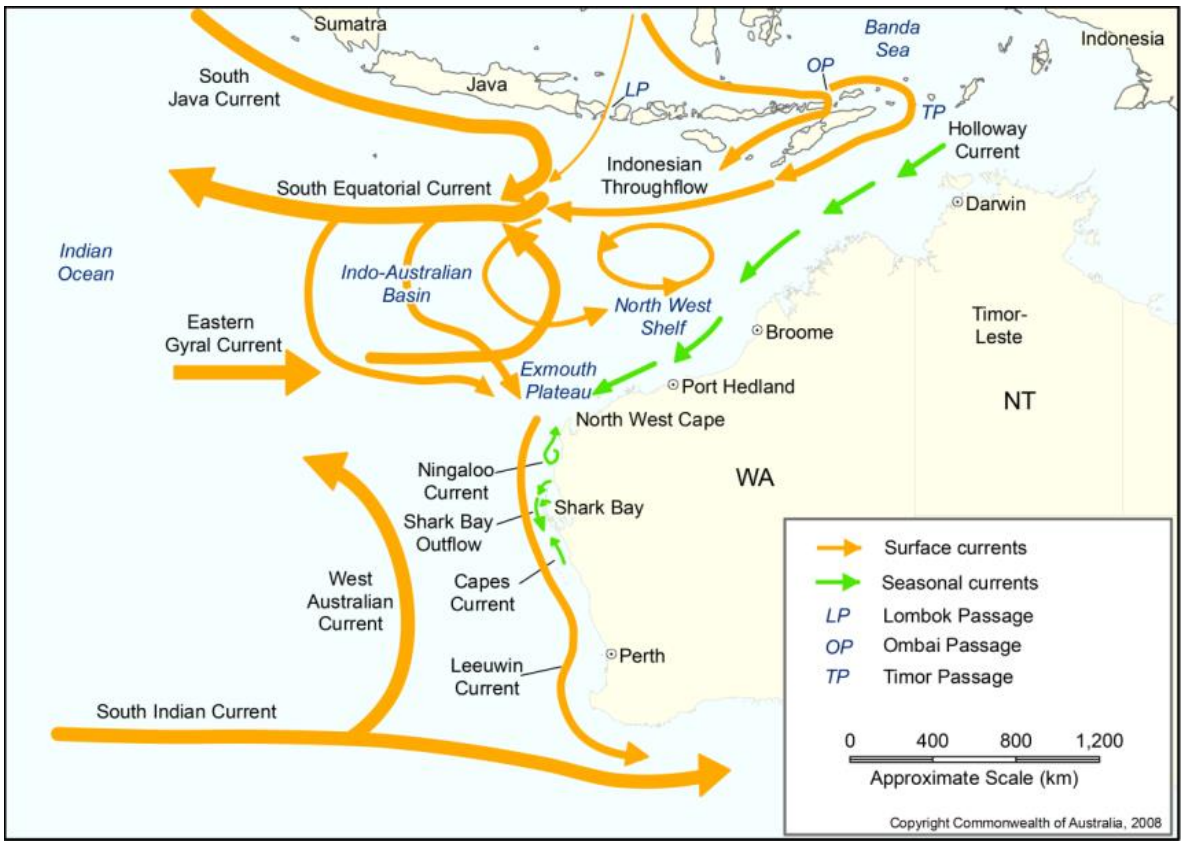


Figure 6-1: Key ocean currents influencing Western Australia (source: DEWHA, 2008a)

6.4.3 Bathymetry and Seabed Geomorphology

The two wellheads are located on the continental slope in a zone of transition between the Sahul Shelf and Timor Trough, where depths range between 0 m to 330 m, but predominantly 10 m to 100 m. The continental shelf edge occurs at approximately the 200 m isobath. Seabed morphology is complex, consisting of hard and soft bottomed substrates and features a broad range of shelf edge, terraces, banks and shoals. width from 300 to 500 km and is generally characterised by soft sediments (Heyward et al., 1997). Water depths on the Sahul Shelf range from 50 and 140 m, before dropping sharply along the continental slope to 3,000 m in the Timor Trough (approximately 75 km south-east of the coastline of Timor-Leste) (Heyward et al., 1997). The EMBA is located in water depths ranging from 130 m to 310 m. The Oliver-2 wellhead is located on the continental slope, at a depth of 310, which rises steeply from the Timor Trough. The Tenacious West-1 ST1 wellhead is located near the continental shelf edge, at approximately 150 m water depth, where the continental shelf is intersected by a number of canyons, banks and shoals, reflective of the wider region.

An ROV inspection of the wellheads and surrounds conducted on 13/03/2022 observed the seabed around the wellheads to be flat and featureless with some small sand waves, creating ridges and furrows, up to 200 mm in height.

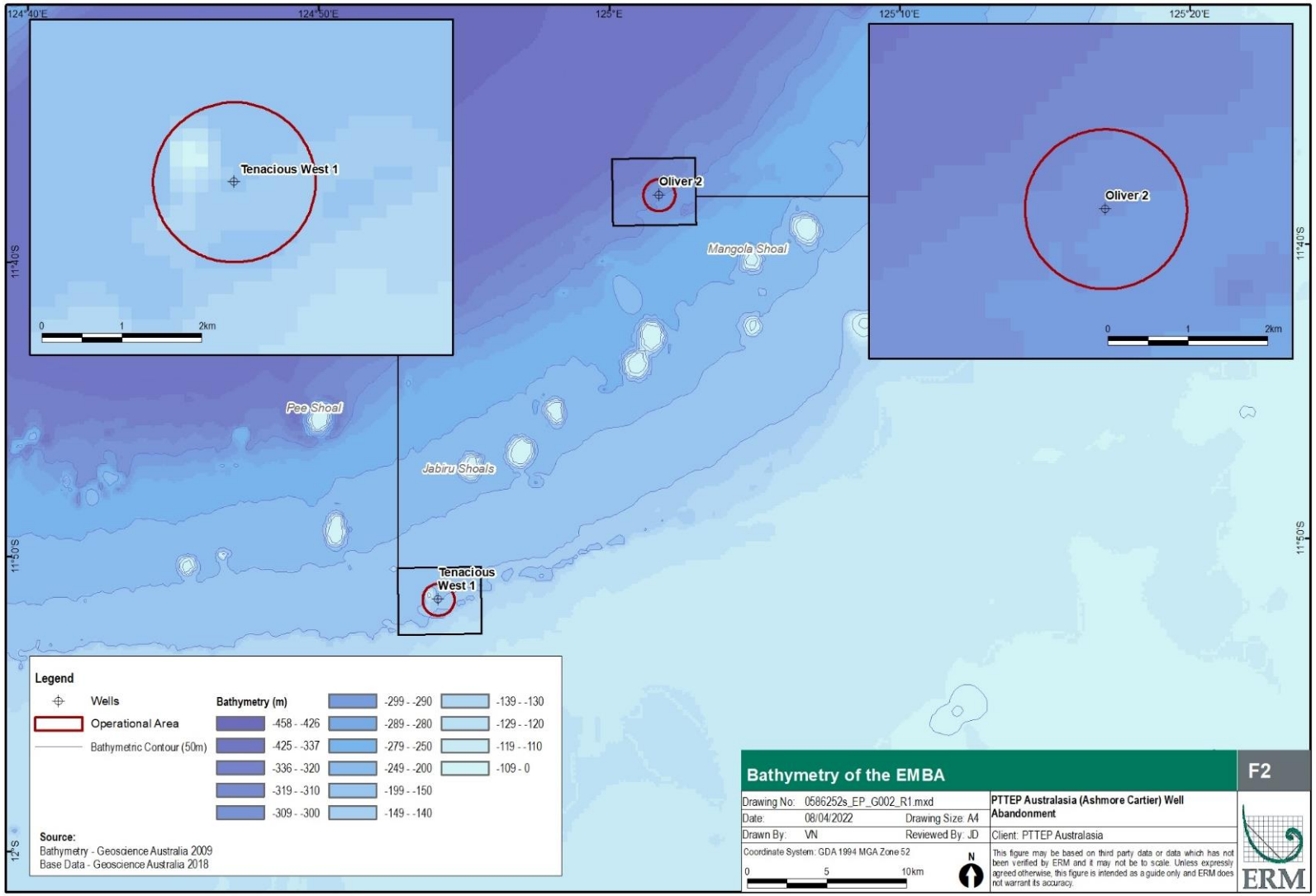


Figure 6-2: Bathymetry of the EMBA

6.4.4 Sediment Composition

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

The sediments of the Sahul Shelf are predominantly coarse grained, while the deposits of the Timor Trough are silty clays (Van Andel & Veevers, 1967). These two deposits are separated a band of sand-silt-clay the top of the continental slope, where the Tenacious West-1 ST1 EMBA is located. This characterisation is also reflected in the general distribution of seafloor sediment in the Australian region described in the Coastal and Marine Resources Information System (CAMRIS) Project, which describes the sediment within the EMBA as calcareous gravel, sand and silt (CSIRO, 2015). Benthic habitat mapping undertaken in 2010-11 and 2017 within permit area AC/RL7 (about 24 km west of the EMBA) showed that sediment in this nearby area primarily composed of soft-sediment habitats of unconsolidated substrate (ERM, 2012; O2 Marine, 2018). The sediment composition around both the Oliver-2 and Tenacious West-1 ST1 wellheads is expected to be similar.

6.5 BIOLOGICAL ENVIRONMENT

6.5.1 Productivity and Planktonic Communities

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

6.5.2 Benthic Habitats and Communities

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

6.5.2.1 Soft-sediment Habitats

Benthic habitat mapping and macrofauna sampling was undertaken in 2010-11 and 2017 within permit area AC/RL7, about 24 km west of the Tenacious West-1 ST1 wellhead (ERM, 2012; O2 Marine 2018). Within the AC/RL7 permit area, benthic habitats were comprised of white sandy substrate with shell grit, and sites were primarily homogenous, flat, featureless soft-sediment habitats. Epibenthic macrofauna were sparse, with sea stars and small bony fish the only fauna recorded. The absence of hard substrate is considered a limiting factor for recruitment of epibenthic organisms. In both surveys, Annelida (polychaete bristleworms) and Malacostracea (crabs, shrimp) were recorded as the two most abundant taxa. Also recorded, albeit to a lesser degree, were sea squirts, ostracods, sea spiders, echinoderms, molluscs, bryozoa, round worms, ribbon worms, peanut worms, flatworms, sea anemones, and sponges. Given the similar water depths and geomorphology, the EMBA is expected to support similar soft-sediment habitats and benthic communities.

6.5.2.2 Marine Growth on Infrastructure

Subsea infrastructure offers a hard substrate and subsequent attachment point for marine epibenthos growth in an environment typically characterised by soft sediments. An ROV inspection of the wellheads conducted on 13/03/2022 observed significant marine growth with a coverage of approximately 70% on Oliver-2 and 80% on Tenacious West-1 ST1 (Figure 5-2 and Figure 5-3). Density increased on the upper sections of the wellheads and the four guideposts. The wellheads were also observed to provide habitat for numerous fish. This is consistent with a study of 25 wellheads in water depths of 78 m to 825 m across the North West Shelf, which revealed commercially important fish species present around infrastructure and marine growth including ascidians, octocorals, sponges and basket stars (McLean et al., 2018). Fish abundance and percent cover decreased from 350 m depth. ROV surveys of the Woodside Energy Goodwyn Alpha Platform jacket on the North-West Shelf (0 – 130 m), reported up to 11 types of marine growth to occur on infrastructure, including hard corals, algae and other encrusting species, as well as an abundance of fish species important to the demersal scalefish fishery in the region (McLean et al., 2019). It is likely that both the Oliver-2 and Tenacious West-1 ST1 wellheads support similar assemblages of marine growth and fish species that are representative of the wider region.

6.5.3 Fish Assemblages

Coral reefs in the Timor Province and wider Indo-Pacific region support a high biomass of fish species, including coral trout, emperors, snappers, as well as larger pelagic species such as trevally, dolphinfish, marlin and sailfish (DEWHA, 2008a). The EMBA does not contain any shoals or reefs that may provide important fish spawning habitat. Demersal fish surveys undertaken in 2010-11 and 2017 within permit area AC/RL7 (about 24 km west of the Tenacious West-1 ST1 wellhead, in comparable water depths and seabed habitats) indicate that low numbers of fish are present within the permit area (ERM, 2012; O2 Marine, 2018). Wellhead infrastructure also supports fish assemblages associated with the increased marine growth and structural complexity, as observed from the ROV inspection conducted on 13/03/2022.

6.5.4 Listed Marine Fauna of Conservation Significance

DAWE's Protected Matters Search Tool (PMST) was used to identify threatened and/or migratory species listed under the EPBC Act that spatially overlap the EMBA (500 m radius around each wellhead). It should be noted that the PMST is a general database that conservatively identifies areas in which protected species have the potential to occur. In total, the PMST identified 19 threatened and 34 migratory species that may occur within the EMBA. These species are described below in Table 6-1. Two conservation dependent species have also been identified with a potential to occur within the EMBA; the scalloped hammerhead shark and the southern Bluefin tuna. The full list of marine species identified from the PMST report is provided in Appendix B. It is noted that while seabirds have been included in Table 6-1 from the PMST search, there is no credible pathway for impact to seabirds from abandonment of the wellheads in situ due to the depth of the wellheads.

No threatened ecological communities were identified within the EMBA.

Table 6-1: Description of EPBC Listed Threatened and/or Migratory species and their potential occurrence within the EMBA

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
Mammals						
Balaenoptera borealis	Sei whale	Vulnerable	Migratory	✓	✓	Sei whales are a cosmopolitan species, found in the waters off all Australian states. Sei whales show well-defined migratory movements between polar, temperate and tropical waters, which are essentially north-south with little longitudinal dispersion (Mackintosh, 1965). Breeding in this species is known to occur in tropical and subtropical waters; however, there are no known mating or calving areas in Australian waters. Sei whales may occasionally transit through the EMBA.
Balaenoptera edeni	Bryde's whale	N/A	Migratory	✓	✓	Bryde's whales are found year-round in tropical and warm temperate waters, both oceanic and inshore. No specific feeding or breeding grounds have been identified in Australian waters. The offshore form appears to undergo extensive migrations between subtropical and tropical waters during the winter months. Ambient noise monitoring conducted in the Oliver and Southern fields between December 2010 and December 2011 recorded Bryde's whales at all three sites with no seasonal cycle observed (McPherson et al., 2012). This species may be present in the EMBA.
Balaenoptera musculus	Blue whale	Endangered	Migratory	✓	✓	Two sub-species of blue whale occur within Australian waters: Antarctic blue whale (*B. m. intermedia*) and pygmy blue whale (*B. m. brevicauda*). Blue whales that may be present at the latitudes of the EMBA are likely to be pygmy blue whales, specifically the East Indian Ocean (EIO) pygmy blue whale (McCauley et al., 2018). Northward migrations pass Scott Reef between June and August, and southward migrations down the WA coast pass Scott Reef between October and December (Double et al., 2014).

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
						Breeding areas are unconfirmed, but likely include the Indonesian archipelago (Kahn, 2012). Given the proximity of the pygmy blue whale migration Biologically Important Area (BIA) (about 26 km north of the EMBA), these animals are likely to be encountered in low numbers in the EMBA particularly during migration periods (June to August and October to December).
Balaenoptera physalus	Fin whale	Vulnerable	Migratory	✓	✓	Fin whales are a cosmopolitan species that occur from polar to tropical waters, but rarely in inshore waters (DAWE, 2020). It is likely that fin whales migrate between Australian waters and Antarctic feeding areas, sub-Antarctic feeding, and tropical breeding areas (Indonesian, northern Indian Ocean, and south-west South Pacific Ocean waters). Southern Hemisphere breeding occurs between May and June, however there is insufficient data to prescribe migration times for fin whales (DAWE, 2020). Therefore, fin whales may occasionally transit through the EMBA.
Megaptera novaeangliae	Humpback whale	N/A	Migratory	✓	✓	Humpback whales are often sighted as far north as Ashmore Reef, although they typically occur in waters nearer the mainland coastline, and Camden Sound appears to be the northern-most limit for the majority of the West Australian population, utilised as breeding grounds from May to October. Humpback whales are likely to occur within the EMBA.
Orcinus orca	Killer whale	N/A	Migratory	✓	✓	Killer whales are a cosmopolitan species and may be seen in any marine region (DAWE, 2020). Off Australia, killer whales are most often seen along the continental slope and on the shelf, particularly near pinniped colonies. Killer whales are known to make seasonal movements, and probably follow regular migratory routes. However, no information regarding these movements is available for killer whales in Australian waters. Ambient noise monitoring conducted in the AC/RL7 permit area

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
						and the Oliver and Southern fields between December 2010 and December 2011 recorded a single killer whale at the AC/RL7 station in August 2011 (McPherson et al., 2012). Therefore, killer whales have the potential to occur in the EMBA.
Tursiops aduncus	Spotted bottlenose dolphin (Arafura/Timor Sea populations)	Vulnerable	Migratory	✓	✓	Bottlenose dolphins are found in tropical and sub-tropical coastal and shallow offshore waters of the Indian Ocean, Indo-Pacific Region and the western Pacific Ocean. In Australia, the Indo-Pacific bottlenose dolphin is restricted to inshore areas such as bays and estuaries, nearshore waters, open coast environments, and shallow offshore waters including coastal areas around oceanic islands. Due to the predominantly coastal distribution of this species, they are not expected to occur in the EMBA.
Physeter macrocephalus	Sperm whale	N/A	Migratory	✓	✓	Sperm whales have been recorded from all Australian states (Bannister et al., 1996). Females and young male sperm whales are restricted to warmer waters, generally north of approximately 45° S. Sperm whales tend to inhabit offshore areas with a water depth of 600 m or more, and are uncommon in waters less than 300 m deep (NOAA, 2010). This species may occur in the EMBA.
Fish, Sharks and Rays						
Carcharodon carcharias	White shark	Vulnerable	Migratory	✓	✓	The white shark is widely, but sparsely, distributed in all seas including cold temperate waters in both hemispheres. It is most frequently observed and captured in coastal temperate and subtropical regions, but has also been observed in tropical areas (e.g. the Coral Sea, Papua New Guinea). Accurate population assessments are not yet possible for any region (Bruce, 2008). Given its preference for temperate, coastal areas, this species is unlikely to be common in the EMBA.
Glyphis garricki	Northern river shark	Endangered	N/A	N/A	✓	Within Australia, northern river sharks are known to occur in rivers, tidal sections of large tropical estuarine systems, macrotidal embayments, inshore and offshore marine habitats in

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
						Western Australia and the Northern Territory (Department of the Environment (DoE), 2014a; Pillans et al., 2009). Species may occur within the Tenacious West-1 ST1 EMBA.
Anoxypristis cuspidate	Narrow sawfish	N/A	Migratory	✓	✓	Narrow sawfish are found across northern Australia, from Exmouth, Western Australia to central Queensland. Adults occur offshore, whereas juveniles and pupping females can be found inshore and in estuarine habitats (Peverell, 2005). Species or species habitat may occur within the EMBA.
Pristis pristis	Freshwater sawfish	Vulnerable	Migratory	N/A	✓	The Freshwater sawfish is mainly confined to the main channels of large rivers of northern Australia from the Fitzroy River, Western Australia, to the western side of Cape York Peninsula, Queensland (Allen, 2000, pers. comm. Cited in DAWE, 2020). Sub-adult freshwater sawfish predominantly occur in rivers and estuaries, while large mature animals tend to occur more often in coastal and offshore waters up to 25 m depth (Giles et al., 2006; Stevens et al., 2005). Given this species depth range it is unlikely to occur within the EMBA.
Pristis zijsron	Green sawfish	Vulnerable	Migratory	N/A	✓	Green sawfish are distributed in coastal waters from Queensland across northern Australia to Shark Bay in Western Australia, with some records identifying green sawfish hundreds of kilometres offshore in relatively deep water (Stevens et al., 2005). Adult Green sawfish inhabit both inshore and offshore waters, but appear to preference shallow inshore waters (Stevens et al., 2005). This species may occur within the EMBA.
Rhincodon typus	Whale shark	Vulnerable	Migratory	N/A	✓	The whale shark is an oceanic and coastal, tropical to warm-temperate pelagic species that is generally encountered close to or at the surface, but can make dives to around 1000 m in search of prey (DAWE, 2020; Compagno, 1984). In Australia, the Whale shark is most commonly seen in waters off northern Western Australia, Northern Territory and Queensland (Compagno, 1984; Last & Stevens, 1994).

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
						Whale shark foraging is noted to occur in the region, from Ningaloo Reef to waters in the Timor Sea, in spring (between July and November) (Sleeman et al. 2010; Wilson et al. 2006; Reynolds et al. 2017). A BIA is designated for whale shark foraging, which is located approximately 3 km south of the EMBA. This species therefore may occur within the EMBA.
Carcharhinus longimanus	Oceanic whitetip shark	N/A	Migratory	N/A	✓	Widely distributed in offshore tropical and warm temperate waters in depths to 150 m. Oceanic whitetip sharks are rarely seen close to land, and juveniles may be found well offshore (Bray, 2017). This species may occur in the EMBA.
Isurus paucus	Longfin mako	N/A	Migratory	N/A	✓	The longfin mako is a widely distributed, but rarely encountered, tropical ocean shark. This species appears to be cosmopolitan in tropical and warm temperate waters; however, at present, records are sporadic and the complete distribution remains unclear (International Union for Conservation of Nature (IUCN), 2017). This species may occur within the EMBA.
Isurus oxyrinchus	Shortfin mako	N/A	Migratory	N/A	✓	The shortfin mako has a circum-global distribution inhabiting tropical and temperate waters (Last & Stevens, 2009). To date, the Shortfin mako has not been recorded in the Arafura Sea (Threatened Species Scientific Committee (TSSC), 2014) and therefore is not expected to occur within the EMBA.
Manta birostris	Giant manta ray	N/A	Migratory	N/A	✓	The giant manta ray has a circum-tropical and semi-temperate distribution throughout the world's major oceans. Within this broad range, populations appear to be sparsely distributed and highly fragmented (Marshall et al., 2018). The giant manta ray appears to be a seasonal visitor to coastal or offshore sites, and are capable of large-scale movements (>1,000 km; Kashiwagi et al., 2011). Whilst largely solitary, giant mantas can aggregate in large numbers to feed, mate or clean. This species may occur within the EMBA.

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
Manta alfredi	Reef manta ray	N/A	Migratory	N/A	✓	The reef manta ray has a circum-tropical and subtropical distribution, existing in the Pacific, Atlantic and Indian Oceans. Populations appear to be sparsely distributed and highly fragmented (Marshall et al., 2019). The reef manta is often resident in or along productive near-shore environments, such as island groups, atolls or continental coastlines (Marshall et al., 2019). However, individuals have been reported to make seasonal migrations of several hundred kilometres (Couturier et al., 2011). Therefore, this species may occur within the EMBA.
Marine Reptiles						
Caretta caretta	Loggerhead turtle	Endangered	Migratory	✓	✓	In WA, loggerhead turtles inhabit coral and rocky reefs, seagrass beds and muddy bays (Limpus, 1995; Limpus et al., 1992; Prince, 1994). They predominantly feed on benthic invertebrates in depths ranging from nearshore to 55 m (DAWE, 2020; Plotkin et al., 1993). Adult green turtles feed on mainly seagrass, algae, egg fish cases, jellyfish and sponges (DAWE, 2020). Post-nesting migratory routes for green turtles recorded for Barrow Island and mainland NWMR generally travelled east or south of Barrow Island, where they forage in coastal waters less than 25 m deep (Chevron, 2015). Hawksbill turtles are omnivorous, feeding on a variety of plant and animal species, including sponges, octopus, squid, jellyfish, seagrass and algae in nearshore habitat (DAWE, 2020). Tracking data of hawksbill turtles in the NWMR indicate the turtles travel and forage in coastal waters less than 10 m deep (Chevron, 2015). Flatback turtles inhabit shallow, soft-bottomed seabed habitats and feed mostly on soft bodied prey such as sea cucumbers, soft corals and jellyfish (DAWE, 2020). Movements of flatback turtles
Chelonia mydas	Green turtle	Vulnerable	Migratory	✓	✓	
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory	✓	✓	
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory	✓	✓	
Natator depressus	Flatback turtle	Vulnerable	Migratory	✓	✓	

Species Name	Common Name	EPBC Threatened Status	Migratory Status	Oliver-2	Tenacious West-1 ST1	Description of Species and Potential to Occur Within the EMBA
Lepidochelys olivacea	Olive ridley turtle	Endangered	Migratory	✓	✓	within the NWS are confined to longshore movements in nearshore coastal waters or travel between island rookeries and the adjacent mainland (Chevron, 2015; Whittock et al., 2014).
Seabirds						
Anous tenuirostris melanops	Australian lesser noddy	Vulnerable	N/A	N/A	✓	The avifauna of the north-west Australia offshore area consists of tropical and sub-tropical breeding seabird species, and non-breeding migratory shorebirds. Several seabird BIAs extend out from Ashmore Reef; however, none overlap with the EMBA. The closest seabird BIA is a foraging area for the greater frigatebird, which extends to within about 90 km of the EMBA. The islands at Ashmore Reef are regarded as supporting some of the most important seabird rookeries in the north-west Australian offshore area. Breeding seabirds also make use of other offshore islands within the region, with breeding typically occurring from mid-April to mid-May (Clarke, 2010). Migratory shorebird species forage and rest in the region on their way between Northern Hemisphere breeding grounds and Northern Australian feeding grounds, known as the East Asian–Australasian Flyway. The annual cycle for shorebirds in the flyway has four approximate periods: breeding (outside Australia; May to August), southward migration (August to November); non-breeding (in Australia; December to February); and northward migration (March to May). There are no important sites for migratory shorebirds within the EMBA; however, given their migratory nature, it is expected that some individuals may pass through the EMBA.
Calidris canutus	Red knot	Endangered	Migratory	✓	✓	
Calidris ferruginea	Curlew sandpiper	Critically Endangered	Migratory	✓	✓	
Numenius madagascariensis	Eastern curlew	Critically Endangered	Migratory	✓	✓	
Anous stolidus	Common noddy	N/A	Migratory	✓	✓	
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	✓	✓	
Fregata ariel	Lesser frigatebird	N/A	Migratory	✓	✓	
Fregata minor	Great frigatebird	N/A	Migratory	✓	✓	
Actitis hypoleucos	Common sandpiper	N/A	Migratory	N/A	✓	
Calidris acuminata	Sharp-tailed sandpiper	N/A	Migratory	N/A	✓	
Calidris melanotos	Pectoral sandpiper	N/A	Migratory	N/A	✓	

6.5.4.1 Conservation Management Plans

A number of management policies, guidelines, plans and other materials exist for threatened species listed under the EPBC Act. The objectives of Recovery Plans and Conservation Advice seek to support the long-term recovery of threatened species. This is undertaken through defining the research and management measures to be undertaken to minimise the potential for the decline of, and support the recovery of a species, including the management of threatening processes. The management plans or conservation advices for the species identified by the PMST are summarised in Table 6-2.

Table 6-2: Conservation management plans relevant to the species identified in the PMST search

Species	Recovery Plan / Conservation Advice	Key Threats Identified in the Plans / Conservation Advice
All vertebrate fauna	Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (Commonwealth of Australia, 2018).	Marine debris/pollution is identified as threat in recovery plans and conservation advice. These threats are addressed in Section 9. No additional threats/actions identified that are relevant to the permanent abandonment of the wellheads in situ.
Sei whale	Conservation advice *Balaenoptera borealis* sei whale (TSSC, 2015a).	
Blue whale	Conservation management plan for the blue whale: A recovery plan under the Environment Protection and Biodiversity Conservation Act 1999 2015-2025 (Commonwealth of Australia, 2015).	
Fin whale	Conservation advice *Balaenoptera physalus* fin whale (TSSC, 2015b).	
Loggerhead turtle, hawksbill turtle, green turtle, and flatback turtle	Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia, 2017).	
White Shark	Recovery plan for the white shark (*Carcharodon carcharias*) (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2013).	
Northern River Shark	Sawfish and river shark multispecies recovery plan (DoE, 2015a). Approved Conservation Advice for *Glyphis garricki* (northern river shark) (DoE, 2014a).	
Freshwater Sawfish	Sawfish and river shark multispecies recovery plan (DoE, 2015a) Approved Conservation Advice for *Pristis pristis* (largetooth sawfish) (DoE, 2014b)	
Green Sawfish	Sawfish and river shark multispecies recovery plan (DoE, 2015a) Approved conservation advice for green sawfish (DEWHA, 2008b).	

Species	Recovery Plan / Conservation Advice	Key Threats Identified in the Plans / Conservation Advice
Whale Shark	Conservation advice *Rhincodon typus* whale shark (TSSC, 2015d)	
Australian Lesser Noddy	Conservation Advice *Anous tenuirostris melanops* Australian lesser noddy (TSSC, 2015e)	
Red Knot	Conservation advice *Calidris canutus* red knot (TSSC, 2016)	
Curlew Sandpiper	Conservation advice *Calidris ferruginea* curlew sandpiper (DoE, 2015b)	
Eastern Curlew	Conservation advice *Numenius madagascariensis* eastern curlew (DoE, 2015c)	

6.5.4.2 Habitat Critical to the Survival of a Species

The EPBC Act 1999 requires that habitat critical to the survival of a listed threatened species is identified in the Recovery Plan of that species. No habitat critical to the survival of a species was identified to overlap the EMBA. The closest Habitat Critical to the survival of a species to the EMBA is for green turtle nesting at Cartier Island (Commonwealth of Australia, 2017), located over 140 km south-west of the Tenacious West-1 ST1 wellhead.

6.5.4.3 Biologically Important Areas

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

A review of the Conservation Values Atlas confirmed no BIAs overlap the EMBA. The closest is a BIA designated for whale shark foraging, which is located approximately 3 km south of the EMBA.

6.6 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

6.6.1 Australian Commercial Fisheries

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

6.6.2 Indonesian Commercial Fisheries

Indonesian fishers have traditionally visited reefs in the NWMR to collect target species such as trepang (sea cucumber), shark fin and other marine species that are economically significant. Indonesian traditional fishing within the MoU Box (refer Table 3-1) is concentrated on reefs or in reef lagoons and target species include trochus, sea cucumbers, abalone, sponges, giant clams, reef fish/finfish and sharks; predominantly between August and October with fishers departing the region at the onset of the North-west monsoon season.

In 1980 Indonesia began systematically prohibiting trawling throughout Indonesian waters (Presidential Decree 39/1980), and a total ban of trawling in the waters of Indonesia came into effect 1 January 1983 (Presidential Instruction No. 11/1982) (Food and Agriculture Organization (FAO), 2015). The government reopened some areas for trawling, including the Arafura Sea and the Indian Ocean around west of Sumatra and Aceh Island (FAO, 2015); however, the Timor Sea remained closed to trawling. In 2021 the Government issued a new decree (18/2021), which once again enforced a full ban on the use of bottom trawl nets, considered to threaten the sustainability of the country's fish stocks. There is therefore no reasonable prospect for bottom trawling to occur in the vicinity of the wellheads now or into the foreseeable future. Furthermore, no concerns have been raised to date in consultation with the Indonesian Government (conducted by DFAT on behalf of PTTEP (Section 7.3).

Indonesian regulations require VMS on fishing vessels exceeding 30 GT (averaging about 16 meters or more) (Global Fishing Watch, 2021). In October 2019, the Indonesian government made vessel monitoring system (VMS) data publicly available for all fishing vessels equipped with the system. Analysis of these vessel tracks and ship identification data since 2013 suggests that vessels ≥30 GT operating in the Timor Sea mostly comprise of basic longline vessels and occasional handline vessels (Global Fishing Watch, 2021). These vessel types appear similar to various Indonesian vessels that have been sighted, rescued or apprehended by Australian border security from time to time within the region (AFMA, 2017; ABC, 2019; NT News, 2016). Vessels less than 30 GT that are not equipped with VMS may also operate in the Timor Sea, however due to water depths these are unlikely to be trawlers.

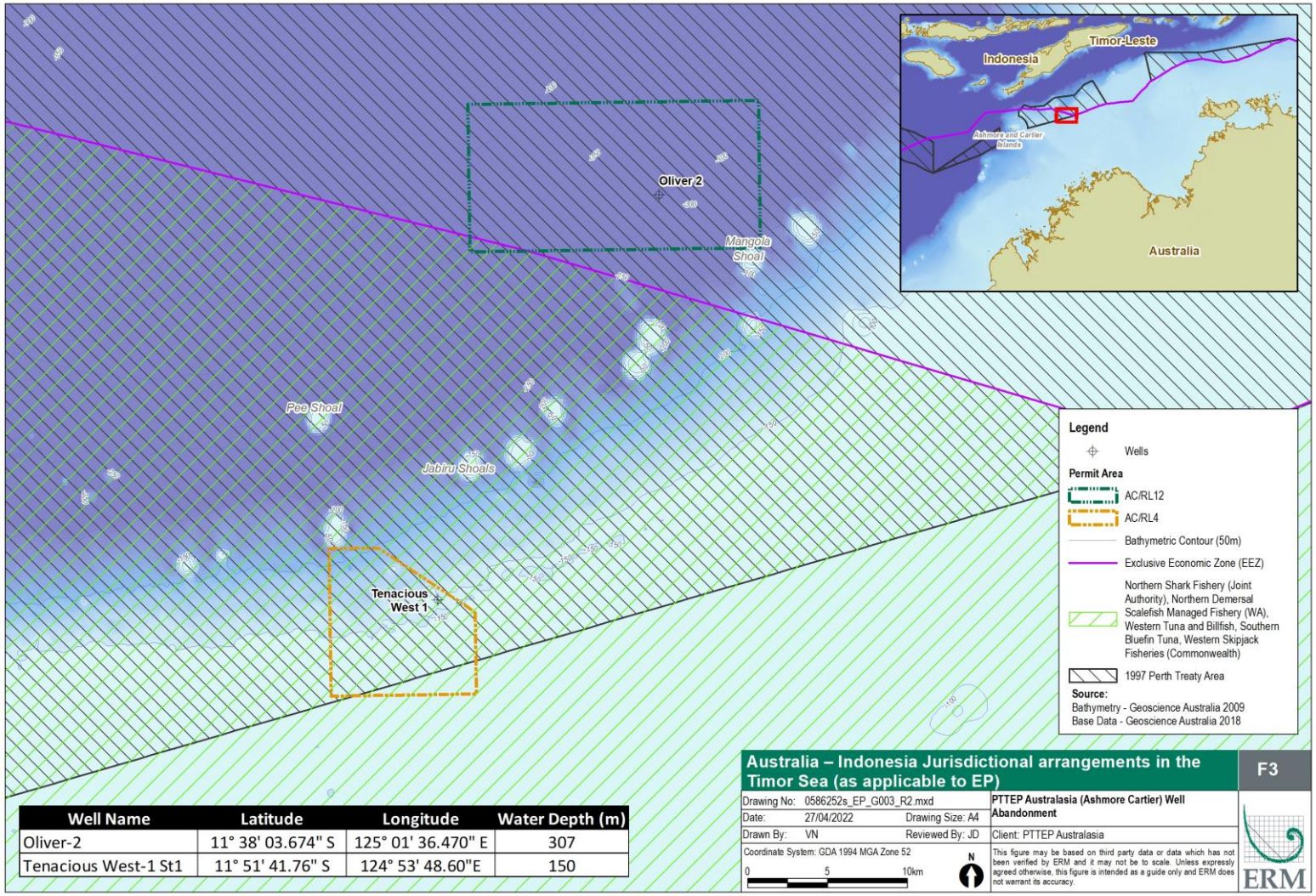
6.6.3 World Heritage and National Heritage Sites

6.6.3.1 World Heritage Sites

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

6.6.3.2 Commonwealth/National Heritage Sites

There are no Commonwealth or National heritage listed places within or adjacent to the EMBA. The closest Commonwealth Heritage Place is Ashmore Reef National Nature Reserve, about 180 km west of the EMBA.



Well Name	Latitude	Longitude	Water Depth (m)
Oliver-2	11° 38' 03.674" S	125° 01' 36.470" E	307
Tenacious West-1 St1	11° 51' 41.76" S	124° 53' 48.60"E	150

Figure 6-3: Australia–Indonesia jurisdictional arrangements in the Timor Sea (as applicable to the EP)

6.6.4 Indigenous Heritage

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

6.6.5 Maritime Heritage

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

6.6.6 Tourism and Recreational Activities

The EMBA are located in offshore waters, approximately 240 km north of the mainland coastline in an area not likely to be accessed for tourism activities. Tourism and recreation activities such as recreational fishing and cruises tend to be concentrated around nearshore waters, islands and coastal areas, and will therefore not occur within the EMBA.

6.6.7 Petroleum Exploration and Production

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

6.6.8 Shipping

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

6.6.9 Maritime Surveillance

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

6.6.10 Defence Activities

The closest defence training area to the EMBA is the North Australian Exercise Area, approximately 330 km to the east. Consultation with the Department of Defence did not raise any concerns (Section 7.3). Therefore, defence activities will not be considered further in this EP.

7 STAKEHOLDER CONSULTATION

7.1 OVERVIEW

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

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

This section outlines the consultation process undertaken to date for the AC/RL12 and AC/RL4 wellhead abandonment, as well as the processes for ongoing engagement.

7.2 CONSULTATION APPROACH

7.2.1 Stakeholder Identification

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

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

Using these criteria, relevant stakeholders were identified as:

- Australian Fisheries Management Authority (AFMA) – Petroleum;
- Australian Hydrographic Office (AHO);
- Australian Maritime Safety Authority (AMSA);
- Department of Agriculture – Fisheries;
- Department of Agriculture, Water and Environment (DAWE)
- Department of Defence;
- Department of Foreign Affairs and Trade (DFAT)
- Department of Industry, Science, Energy and Resources (DISER);
- Department of Mines, Industry Regulation and Safety (DMIRS);
- Department of Primary Industries and Regional Development (DPIRD) – Fisheries;
- Commonwealth Fisheries Association (CFA); and
- Western Australian Fishing Industry Council (WAFIC).

The EMBA is located outside the Australian Fishing Zone, contiguous with the Australian EEZ (as amended by the 1997 Perth Treaty, refer Section 3.2.1), therefore Australian fishing licence holders were not directly consulted during the development of this EP. The approach is consistent with advice previously received from WAFIC in relation to ongoing suspension of the wellheads in November 2019 (and again in March 2020), who were consulted as the peak body representative of state fisheries in WA: *We do not recognise any need for PTTEP to engage with commercial fishers with a licence overlapping the site of the wells because there is no active commercial fishing over this area*.

7.2.2 Sufficient and Timely Information

A key requirement of Regulation 16 of the OPGGS (E) Regulations is that 'relevant persons' are to be provided with sufficient information and time to make an informed decision on how their functions, activities, or interests may be impacted. Stakeholders were provided with an activity fact sheet and cover email on 9 September 2021. PTTEP AA is committed to providing stakeholders with sufficient information in an effort to be open and transparent with all stakeholders.

7.3 CONSULTATION TO DATE

PTTEP AA has a thorough history of engagement with stakeholders in relation to the status and proposed decommissioning of the Oliver-2 and Tenacious West-1 ST1 wellheads. Stakeholders were consulted about the ongoing suspension of the wells during development of Revision 0 of the Timor Sea Well Suspension EP (accepted 24 June, 2020). Stakeholders were first notified of the proposed continued well suspension on 18 November 2019. Ongoing consultation since acceptance of the EP has included advising and updating stakeholders on plans to conduct an ROV survey of the wellheads, which was conducted on 13/03/2022.

Stakeholders were first notified of the proposed wellhead abandonment that is the subject of this EP revision (Revision 1) on 9 September 2021. The notification included distribution of a fact sheet via email. The factsheet provided information on the project background, location of the wells and decommissioning planning for the wellheads, including options considered. A copy of the notification is contained in Appendix A.

7.3.1 Stakeholder Feedback and Assessment of Merit

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

PTTEP AA have undertaken an assessment of the merit of all feedback received from stakeholders and has incorporated the feedback into the development of the EP. Consultation activities conducted for the proposed activity with stakeholders who raised relevant matters are outlined in Table 7-1 below.

Table 7-1: Stakeholder Consultation Activities with Relevant Matters Raised

Stakeholder	Engagement History and Information provided	Stakeholder response	PTTEP response	PTTEP assessment and outcome
Australian Hydrographic Office (AHO)	On 9 September 2021, PTTEP emailed AHO advising on the proposed activity (Appendix A) and provided a Stakeholder Notification sheet.	On 10 September 2021, AHO responded advising that: • The data supplied will now be registered, assessed, prioritised and validated in preparation for updating AHO's navigational charting products. • These adhere to International and Australian Charting Specifications and standards. • These standards may result in some data generalisation or filtering due to the scale of existing charts, proximity to other features, and the level of risk a reported feature presents to mariners.	PTTEP notes that the data provided for the wellheads has been registered by AHO and navigation charting products have been updated to identify the position of the wellheads.	No relevant matters raised.
Department of Agriculture Water and Environment (DAWE) - Sea dumping	On 17 September 2021, PTTEP emailed DAWE – sea dumping advising on the proposed activity and requesting to confirm requirements under the *Sea Dumping Act 1981* (Appendix A)	On 24 September 2021, DAWE responded advising that: • Based on the current information provided regarding the location and nature of the proposed actions, a sea dumping permit is required if these abandonment in situ activities are to be undertaken.	PTTEP will apply for a Sea Dumping Permit as required under the *Sea Dumping Act 1981*.	PTTEP has addressed the relevant matter in Section 3 and Section 9 of this EP.
Department of Defence	On 9 September 2021, PTTEP emailed Department of Defence advising on the proposed activity (Appendix A) and provided a Stakeholder Notification sheet.	On 12 October 2021, Department of Defence responded advising that: • The proposed activity is located outside of any defence Training/ Practice areas • Recommended liaison with the Australian Hydrographic Services (AHS), ensuring AHS is notified three weeks prior to commencement of activity.	On 12 October 2021, PTTEP thanked Department of Defence for feedback and responded confirming that: • PTTEP has noted the EP location of activity outside Defence / Training Practice areas. • PTTEP has consulted with AHS in relation to the activity and will follow up	PTTEP has addressed the relevant matter raised in Section 9 and Section 10 of this EP.

Stakeholder	Engagement History and Information provided	Stakeholder response	PTTEP response	PTTEP assessment and outcome
			to confirm receipt of information and address any queries. • No on-the-water operations proposed as part of activity, therefore will discuss with AHS the need to mark wellhead on their electronic navigation charts in the event of permanent abandonment on the seabed.	
Department of Foreign Affairs and Trade (DFAT)	On 9 September 2021, PTTEP emailed DFAT advising on the proposed activity (Appendix A) and provided a Stakeholder Notification sheet. PTTEP advised the proposed activities are located within the 1997 Perth Treaty area. It was noted that the Treaty is not in force but Australia still acts consistently with the requirements. It was acknowledged that under the 1997 Perth Treaty there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights. It was confirmed that PTTEP AA has reviewed sources such as Global Fishing Watch which suggest that Indonesian commercial fishers may be present within the 1997 Perth Treaty Area. The risks and impacts associated with potential interactions with Indonesian fishers will be fully assessed in the EP prior to submission to NOPSEMA. PTTEP requested DFAT pass on this notification to the Indonesian Minister of Fisheries and Marine Affairs.	On 3 November 2021 DFAT responded advising that they are in the process of tracking down information and will be in touch in due course. On 9 December 2021 DFAT advised the issue is with the legal division and the legal division is in the process of liaising with NOPSEMA and DISER and should be finished shortly. On 12 January 2022, DFAT apologised for delay in response and responded advising that: • DFAT notes wellheads are in areas of Australia shared jurisdiction with Indonesia • PTTEP's investigation into the options to decommission the wellheads should take the Perth treaty obligations that Australia has o Indonesia into account • Given the treaty obligations DFAT would appreciate PTTEP's advice on whether there is any further information PTTEP would like to provide in addition to this Information Sheet so that DFAT can be certain Australia will comply with its obligations to Indonesia. • To fully comply with Australia's obligations to Indonesia, DFAT will consult with the Indonesian Government	On 2 February 2022 PTTEP responded to DFAT's correspondence from 12 January 2022 confirming that: • PTTEP have considered Australia's Perth Treaty obligations to Indonesia as part of the evaluation of decommissioning options for the wellheads. • The leave in situ options eliminates the need to undertake vessel-based activities, which represents a reduction in emissions and marine pollution risk when compared to removal of the wellheads. The comparative assessment of decommissioning options conducted by PTTEP also demonstrated that environmental impacts from the leave in situ option would be comparable with impacts from removal of the wellheads in relation to local sediment and water quality and benthic habitats. The leave in situ option therefore represents a better overall environmental outcome compared to removal.	Extensive efforts have been undertaken to engage with the Indonesian Government via DFAT. To date no objections or concerns have been raised.

Stakeholder	Engagement History and Information provided	Stakeholder response	PTTEP response	PTTEP assessment and outcome
	PTTEP followed up this email with phone calls to DFAT on the 17 September 2021, 20 September 2021 and 22 September 2021 and were advised to re-submit the consultation to the DFAT Treaties department. On the 22 September 2021 PTTEP re-sent the initial activity notification email to DFAT Treaties directly. PTTEP followed up with phone calls on the 24 September 2021 and 1 October 2021 in an attempt to engage with DFAT. Follow up emails were sent on the 11 October 2021 requesting confirmation of receipt and highlighting importance of consultation with DFAT.	on PTTEP's proposal. DFAT will provide them with PTTEP's information sheet and any further information provided by PTTEP. DFAT will advise PTTEP of their response once received. On 21 March 2022 DFAT responded to PTTEP's correspondence of 16 March 2022 and provided the following update: • DFAT have passed relevant information that they were provided with to the Indonesian Embassy in Canberra. The Embassy is liaising about it with the Government of Indonesia. • DFAT has followed up with the Embassy and the Embassy advised that the process is not complete. DFAT stated they will stay in touch with the Embassy and will get in touch with PTTEP again in due course.	• The leave in situ option for the wellheads proposed by PTTEP does not unduly inhibit the exercise of the rights and jurisdiction of any Party for the reasons outlined above. PTTEP requested for DFAT to let them know if they require any further information On 16 March 2022 PTTEP sent an email to follow up on progress of DFAT's consultation with the Indonesian Government on PTTEP's proposal. PTTEP requested to organise a time to discuss with DFAT.	
Western Australian Fishing Industry Council (WAFIC)	On 9 September 2021, PTTEP emailed WAFIC advising on the proposed activity (Appendix A) and provided a Stakeholder Notification sheet.	On 28 October 2021, WAFIC responded advising that: • WAFIC's preferred position is for removal of the wellheads to mitigate against expected degradation of the wellhead which will result in trace elements in the marine environment. • Based on the cumulative impacts from multiple titleholders requesting the same option, and the expected leaching of trace elements in the marine environment, leaving it in situ does not meet the requirements as described by NOPSEMA in "delivering equal or better environmental outcomes"	On 6 December 2021, PTTEP thanked WAFIC for feedback and responded confirming that: • PTTEP has noted WAFIC's for removal of wellheads to mitigate against expected degradation of the wellhead, particularly in relation to the potential for trace elements to be released into the marine environment.	PTTEP has addressed relevant matter raised in Section 4 and Section 9 of this EP.

Stakeholder	Engagement History and Information provided	Stakeholder response	PTTEP response	PTTEP assessment and outcome
		On the 9 December 2021 WAFIC responded to PTTEP's correspondence from 6 December 2021 asking PTTEP to confirm whether the cumulative impacts of the wellheads remaining in situ been considered in the EP.	• PTTEP acknowledges WAFIC's comment that multiple titleholders have contacted WAFIC requesting the same option (i.e. leaving wellheads or other infrastructure in situ). • For this particular activity, negligible to minor impacts and risks to the environment have been determined on the basis that the Oliver-2 and Tenacious West-1 ST1 wellheads would remain in situ permanently and would eventually corrode over a time scale of hundreds of years. The mainly steel construction of the wellheads is designed with very stable, non-biodegradable materials that are expected to have a service life of many decades within the marine environment. However, the wellheads will slowly corrode into the water column and small amounts of steel rust may accumulate in the sediment immediately surrounding the wellheads. Given the expected rate of steel corrosion and the very minor quantities of elastomeric materials, impacts to marine sediments, organisms and water quality would be negligible and highly localised (within tens of metres of the wellheads). It is also noted that both wellheads are located in the Perth Treaty Area –	

Stakeholder	Engagement History and Information provided	Stakeholder response	PTTEP response	PTTEP assessment and outcome
			an area that is not fished by State or Commonwealth fishers. • Subsection 270(3) of the Act allows for alternative arrangements, including leaving the wellheads in situ, as long as the option delivers equal or better environment, health and safety, social and well integrity outcomes when compared to complete removal. PTTEP AA and ERM have conducted a detailed options assessment to establish the option that provides the most benefits or the least risk of impacts to the environment as a whole and provides the greatest level of safety, in the long term as well as in the short term. Following this process, the option to leave the wellheads in situ has been demonstrated to have negligible environmental, socio-economic and health and safety impacts and risks and is considered equal or slightly better than the base case of complete removal across all the assessment criteria. Therefore, leaving the Oliver-2 and Tenacious West-1 ST1 wellheads in situ is considered able to meet PTTEP AA's decommissioning obligations under the OPGGS Act.	

Stakeholder	Engagement History and Information provided	Stakeholder response	PTTEP response	PTTEP assessment and outcome
			On 20 of December 2021 PTTEP responded to WAFIC's further query on 9 December 2021 confirming that: • Cumulative impacts of the wellheads remaining in situ have been considered as part of the options assessment for the wellheads (refer to Section 4.4.2). The cumulative assessment has been included in this Environment Plan as part of the overall impact assessment and demonstration that the selected decommissioning option delivers "equal or better environmental outcomes" as required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.	

7.4 ONGOING CONSULTATION

Outcomes of all consultation are documented in the Correspondence Log. At all times, PTTEP AA will maintain dedicated channels for enquiries, whether related to the EP, another project or activity, or of a general nature. Key ongoing stakeholder consultation commitments for the EP are outlined in Table 7-2.

Table 7-2: Ongoing Consultation Requirements

Stakeholders	Timing	Method and Information
Activity Cessation Notification		
Cessation of the activity will occur upon receipt of the EP acceptance notification from NOPSEMA. All identified relevant stakeholders will be notified.	Within 2 weeks of EP acceptance.	Email or letter notification informing stakeholders of the acceptance of the EP.

8 ENVIRONMENTAL IMPACT AND RISK ASSESSMENT METHODOLOGY

8.1 INTRODUCTION

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

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

The outcomes of the impact and risk assessment are presented in Section 9.

8.2 RISK ASSESSMENT PROCESS

The environmental risk assessment is a systematic process comprised of the following steps (detailed further in the following sections and within Figure 8-1):

- Description of the proposed activity – Section 3.2.1.
- Understanding the existing environment (physical, biological, and socioeconomic receptors) and identification of receptors, values and sensitivities – Section 8.2.1.
- Identification of potential environmental impacts and risks associated with planned activities and credible unplanned events (Section 8.2.2).
- Evaluation of the potential consequence and likelihood of these impacts and risks to the identified receptors with legal requirements and inherent design in place but without other controls, and determination of the 'inherent' risk (Section 8.2.3).
- Identification of appropriate alternative, additional or improved controls (i.e. those in addition to legal requirements and inherent design) to reduce impacts and risks to levels that are demonstrably ALARP.
- Evaluation of the residual impacts and risks with the adoption of alternate and/or additional control measures from the ALARP evaluation;
- Demonstration that the environmental impacts and risks will be of an acceptable level; and
- Development of environmental performance outcomes, performance standards, and measurement criteria.

Each stage of the risk assessment is undertaken with consideration of stakeholder functions, interests and activities, with any specific feedback from stakeholder consultation being taken into account (refer to Section 8.2.5).

8.2.1 Identification of Receptors, Values and Sensitivities

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

Receptors, values and sensitivities were identified for the EMBA and its surroundings, taking into account areas that may be affected directly or indirectly by the activity.

8.2.2 Impact and Risk Identification

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

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

8.2.3 Risk Assessment

The risk assessment stage involves the assessment of impacts and risks in context of the particular values and sensitivities (environmental and social) that may be impacted. Based on this assessment and using the PTTEP AA Risk Matrix (Table 8-1), a rating is given to:

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

To determine the consequence rating, PTTEP AA determines the credible worst case consequence which could occur if controls fail. The applicable consequence rating is then chosen from the PTTEP AA Environmental Risk Assessment Matrix (Table 8-1).

The likelihood (probability or frequency) of an impact occurring takes into account the effective implementation of control measures. The likelihood rating of the credible worst-case impact is based upon knowledge/historical data of similar events/incidents occurring within PTTEP AA or in the industry as-a-whole. Definitions of likelihood ratings are detailed in the PTTEP AA Environmental Risk Assessment Matrix (Table 8-1).

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

Table 8-1: PTTEP AA Environmental Risk Assessment Matrix

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

8.2.4 Demonstration of ALARP

In alignment with NOPSEMA's ALARP Guidance Note (N-04300-GN0166, June 2015), PTTEP AA has adapted the approach developed by Oil and Gas UK Guidance on Risk Related Decision Making (Oil & Gas UK, 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 8-1). Specifically, the framework considers impact severity based upon contextual information in relation to the following factors:

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

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

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

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

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

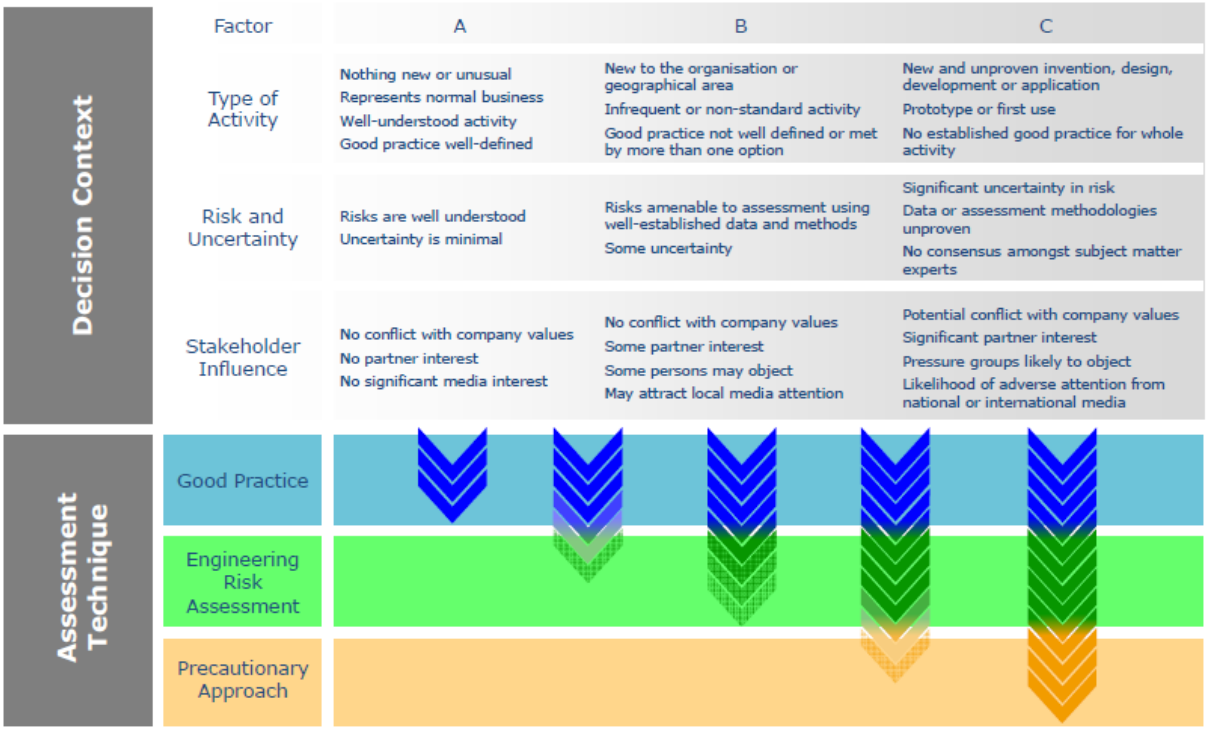


Figure 8-1: Decision support framework used to demonstrate ALARP (Oil & Gas UK, 2014)

8.2.4.1 Type A Risk

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

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

8.2.4.2 Type B Risk

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

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

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

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

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

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

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

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

8.2.4.3 Type C Risk

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

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

8.2.4.4 ALARP Justification

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

The following criteria were used to determine where impacts and risks were ALARP;

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

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

8.2.5 Acceptable Level

PTTEP AA considers a range of factors when evaluating the acceptability of environmental impacts or risks associated with its activities. This evaluation is outlined in Table 8-2 and is aligned with the NOPSEMA Environment Plan Decision Making Guideline (GL1721 Rev 5 June 2018), the Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009 (Sub-regulation 10AI and Part 1, Section 3 – Objects of the Regulations), and Part 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Impacts and risks classified as ‘Decision Type A’ are considered acceptable if the level of residual risk is determined to be low or medium and the criteria outlined in Table 8-2 are met.

Impacts and risks classified as ‘Decision Type B’ are ‘Acceptable’ if the criteria outlined in Table 8-2 are met and it can be demonstrated that the predicted levels of impact and/or residual risk, are at or below pre-defined acceptable level(s) for that impact or risk. Acceptable levels are defined for relevant values and sensitivities and are informed by relevant external context including the principles of ecologically sustainable development (ESD), input from relevant persons, relevant statutory instruments (such as published recovery plans, conservation advice and management plans), good practice guidance and applicable scientific information. Predicted levels of impact or risk to relevant values and sensitivities are evaluated to demonstrate how the activity will be managed to ensure acceptable levels are met. EPOs are then established that are linked to the pre-defined acceptable levels of impact/risk.

PTTEP AA considers an impact or risk to be unacceptable when despite the application of a 'Precautionary Approach' to risk management, and the application of all reasonably practicable control measures, there remains a ''Possible (C)' chance of a 'Major (5)' environmental effect occurring or a "Likely (B)' chance of a 'Serious (4)' environmental effect occurring as per the PTTEP AA Environmental Risk Matrix (**Table 8-1**).

Table 8-2 Acceptability Criteria

Criteria	Validation
1. Risk Level	The environmental risk is deemed to have a low or medium ranking, the environmental consequence from routine operations does not exceed a ranking of 2 and the environmental consequence from an unplanned risk does not exceed a ranking of 4. If ranked medium risk additional control measures have been applied to manage potential environmental impacts and risks to ALARP.
2. Principles of Ecologically Sustainable Development	The aspect of the activity does not compromise relevant principles of Ecologically Sustainable Development (ESD) or breach relevant requirements for environmental approvals (EPBC Act Part 3, Division 1), namely: • does not pose a threat of serious or irreversible environmental damage to matters of national environmental significance: a. the world heritage values of a declared World Heritage property; b. the national heritage values of a National Heritage place c. the ecological character of a declared Ramsar wetland; d. any values and sensitivities that exist in, or in relation to, part or all of a Commonwealth marine area or Commonwealth land. • does not pose a [significant] threat to biodiversity and ecological integrity of: e. a listed threatened species or listed threatened ecological community; or f. a listed migratory species; • does not pose a threat to the quality of the environment available to future generations
3. AMP Values, Management Prescriptions and IUCN Reserve Management Principles	The management of the activity is consistent with any relevant plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species that include specific management and conservation requirements.
4. Legislative Requirements	All relevant legislative and other requirements have been met or considered in context.
5. Internal Requirements	All relevant internal PTTEP AA requirements have been met
6. Stakeholder Objections, Claims, Concerns or Advice	All relevant person(s) have been provided with sufficient information with respect to potential impacts on their functions, interests or activities and all valid objections or claims made by relevant (potentially affected) person(s) have been sufficiently addressed

8.2.6 Environmental Performance Outcomes, Standards and Measurement Criteria

To meet the requirements of Regulation 13 (7) of the OPGGS (E) Regulations, environmental performance outcomes, performance standards, and measurement criteria have been identified in Section 10. These terms are defined as follows:

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

9 ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

This section presents the evaluation of the environmental impacts and risks completed for planned/ routine and unplanned aspects of the proposed activity using the methodology described in Section 8.

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

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

A risk assessment workshop was undertaken to identify and assess the risks associated with the abandonment of the wellheads.

The following planned impacts were identified:

- Physical Presence: Benthic Disturbance (Section 9.2.1);
- Non-routine Discharges to the Marine Environment (Section 9.2.2);

The following unplanned risks were identified:

- Physical Presence: Disturbance to Other Marine Users (Section 9.3.1);

9.1 ENVIRONMENTAL IMPACTS/RISKS DEEMED NOT CREDIBLE

The risk assessment workshop identified environmental impacts/risks that were assessed as not credible within the scope of the activity, and are therefore not considered in this EP. These are outlined in the following sections for information only.

9.1.1 Displacement of Current Commercial Fishing Operations

The Oliver-2 and Tenacious West-1 ST1 wellheads are located outside of Australia's Exclusive Economic Zone (EEZ) within an area of shared jurisdiction with Indonesia (the Perth Treaty Area), and outside of the current Australian Fishing Zone (AFZ). Therefore, Australian State and Commonwealth commercial fisheries are not permitted to fish within the area of the wellheads. Additionally, Indonesian commercial fisheries are not permitted to trawl within the Timor Sea.

Given there is no fishing activity permitted in the vicinity of the wellheads, impacts and risks to current commercial fishing operations were assessed as not credible. Potential future risks are discussed in Section 9.3.1.

9.1.2 Displacement of Other Marine Users

The wellheads are located approximately 240 km north of the Australian mainland coastline and no specific tourism of recreational use (including recreational fishing) occurs in the vicinity of the wellheads (Section 6.6.6). As the wellheads are located in water depths of 150-310 m, they will not impact charter boats or private vessels passing through the area.

No current or planned oil and gas operations or facilities occur within the vicinity of the wellheads (Section 6.6.7). The locations of wellheads have been provided to AHO for marking on navigational charts (Section 7.3). Therefore, impacts to other oil and gas operators now or in the future was assessed as not credible.

The wellheads are located outside of any major shipping routes (Section 6.6.8), and given the water depths (150-310 m) they are beyond the operating depth of commercial ships. The physical presence of the wellheads will not pose a threat to shipping navigation now or in the future.

No known defence areas overlap with the location of the wellheads (Section 6.6.10). Given the wellheads are located in water depths of 150-310 m, they will not impact defence activities now or in the future.

9.1.3 Impacts to EPBC Act-listed Protected Species

EPBC Act-listed threatened and/or migratory species that may potentially occur in the vicinity of the wellheads are identified in Section 6.5.4. A search of the PMST database identified 19 threatened and 34 migratory species potentially occurring within the EMBA. However, given the water depths at the location of the wellheads; approximately 310 m at Oliver-2 and approximately 150 m at Tenacious West-1 ST1, not all species would occur. The potential impacts to species that may occur at these depths from the physical presence of the wellheads and very minor amounts of metals and other materials released into the marine environment during corrosion over time were assessed as not credible. This is due to the relatively small size of the wellheads and negligible risk of contact with metals given the slow release rate and localised assimilation into surrounding sediments.

9.1.4 Benthic Disturbance from Dropped Objects and/or Drill Cuttings

PTTEP has documentation from the drilling campaign that no objects and/or drill cutting piles were located within an 80 m radius of the Oliver-2 wellhead, and no incidents of dropped objects were reported in daily drilling reports for the Tenacious West-1 ST1 wellhead. This is supported by a visual and sonar survey during an ROV inspection conducted on 13/03/2022, which did not identify any debris within a 10 m radius surrounding the wellheads.

Top hole sections and lower sections of each well were drilled with WBM, and therefore would not contain residual hydrocarbons. Any discharged cuttings are likely to have been buried in the sediment or dispersed within the water column. No visible cuttings were observed around the wellheads during the ROV inspection on 13/03/2022.

On this basis, benthic disturbance from dropped objects and drill cuttings was assessed as not credible.

9.1.5 Planned or Unplanned Discharge of Well Fluid

Fluids remaining in the wells above the top of the cement plug consist of WBMs only (Section 5.5). The remaining fluids could be exposed to the marine environment through the long-term degradation of the wellheads. The residual amounts of WBM are non-toxic, and there is no credible risk of impact from planned or unplanned discharge of residual amounts of non-toxic well fluid components to the environment (including marine sediment, benthic habitats, water quality or protected species) from the two wellheads. It is noted that the well fluids would also be exposed if the wellheads were removed.

9.1.6 Loss of Well Integrity

The Oliver-2 and Tenacious West-1 ST1 wells are classified as having adequate barriers in place for permanent abandonment, as outlined in the accepted Well Operation Management Plan (WOMP; Revision 4, PTTEP Technical Document CORP-DR-D41-868269 (HQ202103848.1) (refer to Section 5). Final abandonment reports have been accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for both wells. It is noted that the wellheads were thoroughly inspected by ROV on 13/03/2022 and no gas bubbles or leaks were observed, consistent with the permanent abandonment status. The release of hydrocarbons from the wells was therefore assessed as not credible.

9.2 PLANNED ACTIVITIES

9.2.1 Physical Presence: Alteration of Benthic Habitat

Physical Presence: Seabed Disturbance				
Decision Type	Type A (refer to Section 8.2.4.1)			
Aspects / Events	The presence of the Oliver-2 and Tenacious-1 ST1 left in situ impacts the benthic environment by: • creating a hard substrate protrusion from the seabed; and • potential scouring and accretion around the wellheads.			
Receptors	• Benthic habitat			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	**Environmental Impact**	**Consequence**	**Likelihood**	**Inherent Risk**
Alteration of benthic habitat from the Oliver-2 and Tenacious-1 ST1 wellheads remaining in situ on the seabed	Addition of hard substrate in an environment generally consisting of soft sediments, and potential scouring and accretion around the wellheads.	Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
Scouring and Accretion Around Wellhead The presence of the wellheads on the seafloor may interact with the surrounding hydrodynamic conditions, potentially resulting in localised scouring and accretion that may impact on associated benthic habitats. Studies on the effects of sediment movements associated with anthropogenic structures on the seabed, such as shipwrecks and artificial reefs, indicate impacts to be limited to within 10 m of the structure (Smiley, 2006; Lewis and Pagano, 2015). ***Creation of Hard Substrate Habitat*** The abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads retains a hard substrate protrusion from the seabed (up to 3.7 m above the mudline), altering the local benthic habitat, which generally consists of soft sediments (Section 6.5.2).				
Impact / Risk Assessment				
Scouring and Accretion Around Wellhead An ROV inspection of the wellheads on 13/03/2022 observed no scour around the Oliver-2 wellhead and the permanent guidebase was sitting flush onto the seabed. Some localised scouring was observed under the Tenacious-1 ST1 wellhead, approximately 0.3 m to 0.4 m under the TGB. This lowest point was measured at 1 m below mean seabed. This is consistent with studies on the effects of sediment movements associated with anthropogenic structures on the seabed, such as shipwrecks and artificial reefs, indicate impacts to be limited to within 10 m of the structure (Smiley, 2006; Lewis and Pagano, 2015). Impacts to benthic communities from localised scouring are negligible given the flat, featureless soft sediment habitat observed around the wellheads. ***Creation of Hard Substrate Habitat*** The wellheads have remained on the seabed since the rig release date for each well (Oliver-2 since 2009; Tenacious West-1 ST1 since 1998). Given the length of time each wellhead has remained in situ, considerable marine growth has developed, as documented in an ROV inspection conducted on 13/03/2022				

Physical Presence: Seabed Disturbance		
(Section 5.5). The seabed in the vicinity of the wellheads is generally characterised by soft sediments (Heyward et al., 1997) and any marine growth on the wellheads is likely comprised of species that are representative of the wider Timor Province marine region (Section 6.5.2.2), such as gorgonians, sponges, ascidians and bryozoans. The settlement of these organisms on the wellheads has the potential for a positive impact while the wellheads maintain structural integrity due to a localised increase in marine productivity and attraction of fish to the area. Numerous fish were observed utilising the wellhead habitat during the ROV inspection (Figure 5-2 and Figure 5-3). The benefit provided by the provision of hard substrate habitat is minor given the limited surface area of the wellheads.		
Identification of Control Measures and Demonstration of ALARP		
Control Measure	**Adopted**	**Justification**
Inherent Design and Legislative Requirements		
Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) Subsection 572(3)	Yes	Control based on legislative requirements – must be adopted. The requirements of Subsection 572(3) are met through this EP.
Sea Dumping Permit under the *Environmental Protection (Sea Dumping) Act 1981*	Yes	Through consultation with DAWE, PTTEP has established that the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads will require a Sea Dumping Permit Control based on legislative requirements – must be adopted.
Alternatives/Substitutes Considered		
Wellhead removal.	No	A comparative assessment of options is presented in Section 4 which evaluates wellhead removal against the leave in situ option. The assessment demonstrates that the leave in situ option provides equal or better environmental outcome compared to the base case of complete removal across all assessment criteria. In relation to environmental impacts and risks, the leave in situ option and removal option were assessed to result in a similar negligible potential for physical benthic habitat alteration. Removal of the wellheads would result in localised impacts to the seabed and associated benthic habitat from cutting and removal of the wellheads. Removal of the wellheads would also remove existing marine growth and result in permanent removal of hard substrate for benthic habitat growth that has been shown to support local fish assemblages (Figure 5-2 and Figure 5-3). However, this would be a very minor impact given the limited surface area of the wellheads and water depths (~150 to 310 m). In comparison, leaving the wellheads in situ may result in localised scouring/accretion of sediments with negligible effect. The outcome of the options assessment therefore does not warrant the cost and slight increase in risks of conducting a field-based operation to remove the wellheads. This option has therefore not been adopted.
Additional Controls Considered		
Monitoring of wellheads using an ROV to assess any	No	Impacts to the seabed from the in situ wellheads are likely to be limited to within 10 m of the wellheads. There is limited environmental benefit (information) to be gained monitoring sediment and settlement of marine organisms around the wellhead. Monitoring also introduces

Physical Presence: Seabed Disturbance				
changes to the seabed and sediment.		potential environmental and socio-economic impacts and risks associated with typical ROV and vessel-based activities, and the cost of conducting ROV monitoring significantly outweighs the benefit. Therefore, monitoring has not been adopted.		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	**Environmental Impact**	**Consequence**	**Likelihood**	**Residual Risk**
Alteration of benthic habitat from the Oliver-2 and Tenacious-1 ST1 wellheads remaining in situ on the seabed	Addition of hard substrate in an environment generally consisting of soft sediments, and potential scouring and accretion around the wellheads.	Minor (1)	Unlikely	Low
ALARP Statement				
Given the decision context is 'Type A', and: • All relevant control measures have been evaluated by PTTEP AA to manage the potential impacts and risks associated with the physical presence of the two wellheads on the seabed; and • No objections, claims or concerns were raised by relevant stakeholders, PTTEP AA considers that all potential environmental impacts associated with benthic disturbance from the abandonment of wellheads are appropriately managed. As no additional reasonable controls were identified that would further reduce the impacts and risks, the impacts and risks are considered to be ALARP.				
Demonstration of Acceptability				
Acceptable Level Criteria	**Statement of how the acceptable level criteria has been met**			
1. Residual risk from routine operations low or medium & ALARP and consequence ≤2	The residual risks associated with benthic disturbance are low and ALARP and the greatest consequence is Minor (1).			
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC	There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with benthic disturbance. There is no significant threat to biodiversity and ecological integrity associated with benthic disturbance.			

Physical Presence: Seabed Disturbance	
Act Part 3, Division 1) met	There is no serious threat to the quality of the environment available to future generations associated with benthic disturbance.
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from benthic disturbance. No specific recovery/conservation management plans, advice or guidelines have been identified that are relevant to benthic communities.
4. Legislation & Other Requirements	No legislative or other requirements were identified.
5. Internal Context – PTTEP AA Requirements	There are no relevant internal requirements.
6. External Context – Stakeholder objects and claims addressed	There has been no objections or claims raised by relevant stakeholders in relation to benthic disturbance.
Acceptability Statement	
Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level. The impact assessment has determined that, given the adopted controls, benthic disturbance represents a low current risk rating that is unlikely to result in a potential impact greater than localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of benthic disturbance to an acceptable level.	

9.2.2 Non-routine Discharges to the Marine Environment

Non-routine Discharges to the Marine Environment				
Decision Type	Type A (refer to Section 8.2.4.1)			
Aspects / Events	Non-routine discharges to the marine environment from corrosion of the wellheads.			
Receptors	• Water quality; • Benthic habitats; and • Species.			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	**Environmental Impact**	**Consequence**	**Likelihood**	**Inherent Risk**
Corrosion of the wellheads resulting in non-routine discharge of very minor amounts of steel and elastomeric materials to the marine environment.	Local decline in water quality. Secondary impacts including: • toxicity to benthic habitats and marine species	Minor (1)	Unlikely (B)	Low
Source of Impact / Risk				
As the abandoned Oliver-2 and Tenacious West-1 ST1 wellheads remain in situ, the wellheads will corrode over a time at a rate of about 0.2 mm/year (Melchers, 2005). This could result in the introduction of contaminants (steel rust and very minor quantities of elastomeric materials) to marine sediments, impacting water quality, and benthic habitats and marine species. At the slow rate of corrosion identified, most steel material may have disintegrated after about 120 years. The high proportion of marine growth on the wellheads may have the effect of encapsulating the steel and thus reducing the corrosion rate.				
Impact / Risk Assessment				
The wellheads are composed of steel, with small amounts of elastomeric material used within the seal components. Corrosion of the wellheads over time could result in the release of very minor amounts of metals (predominantly iron) and other materials into the water column and surrounding sediments. Studies of erosion/accretion around subsea structures (e.g. shipwrecks and artificial reefs) found that impacts are likely limited to within 20 m of the structure (Smiley et al., 2006; Lewis and Pagano, 2016). Steel is primarily comprised of iron with minor concentrations of alloying elements. For example, AISI 4130 alloy steel is comprised of the following: • iron (98%) • carbon (trace) 0.28-0.33% • chromium 0.80-1.10% • manganese 0.40-0.60% • silicon (trace) 0.15 – 0.35% • sulphur (trace) 0.040% • molybdenum (trace) 0.15 – 0.25% and • phosphorus (trace) 0.035%.				

Non-routine Discharges to the Marine Environment		
Iron, as the main component of the wellheads is an abundant element in marine sedimentary systems (Taylor et al., 2011). It is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997), and iron oxides are included on the (OSPAR PLONOR list). The very minor quantities chromium and zinc may result in localised elevations of these heavy metals (within tens of metres of the wellheads) but will mix with surrounding sediments, reducing the concentration and may become permanently covered in sediments if the corroded wellhead material becomes buried over time. Plastics generally known to breakdown in seawater over long periods of time (hundreds to thousands of years) and therefore the small amounts of elastomeric material used in the seal components also expected to slowly breakdown into various particle sizes. The low rate of degradation, combined with the very small volumes remaining in situ, are expected to have negligible localised impacts. Given the composition of the steel wellhead, the expected rate of corrosion and the very minor quantities of elastomeric materials present, impacts to marine sediments, organisms and water quality would be negligible and highly localised (within tens of metres of the wellheads). During stakeholder consultation on the decommissioning options, the Western Australian Fishing Industry Council (WAFIC) requested PTTEP AA to consider the potential for cumulative impacts from multiple titleholders looking to abandon wellheads in situ. There are no other wellheads or other property present within title areas AC/RL12 and AC/RL4 as outlined in Section 5.6. Based on the assessment above that corroded steel and minor quantities of elastomeric materials will be confined to sediments immediately surrounding the wellheads, potential impacts will be highly localised and will not result in cumulative impacts. As identified in Table 6-2, marine debris is identified as a key threat to marine turtles in the Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia, 2017). While the term ‘marine debris’ in the recovery plan relates to floating non-degradable debris, such as lost or discarded fishing gear, land-sourced garbage and ship-sourced materials disposed of at sea, the term can be applied to the elastomeric material releases from the wellheads as it degrades over time. Given the quantity of material released (iron and negligible quantities of plastic), the contribution of material from the wellhead as a threat to marine turtles is considered to be insignificant, particularly given the water depths of the wellheads. Furthermore, plastics are expected to enter the marine environment over a very long period of time as they degrade and are likely to settle on the seabed and become buried in the sediments over time. Leaving the wellhead *in situ* is not inconsistent with the recovery plan. The Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia’s Coasts and Oceans (Commonwealth of Australia, 2018) includes an objective to understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations. The discharge of negligible quantities of elastomeric materials is therefore an applicable discharge under this plan. Given the quantity of material released, the contribution of material from the wellheads as a threat to the marine environment is considered to be insignificant. Steel rust will settle in the vicinity of the wellhead and the small amount of elastomeric material will be released and degrade over a long period of time, contributing a negligible amount to the overall microplastics in the ocean. Leaving the wellhead in situ is not inconsistent with the threat abatement plan. Potential release of well fluids as a result of corrosion of the wellheads is not expected, as described in Section 9.1.5.		
Identification of Control Measures and Demonstration of ALARP		
Control Measure	**Adopted**	**Justification**
Inherent Design and Legislative Requirements		
Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) Subsection 572(3)	Yes	Control based on legislative requirements – must be adopted. The requirements of Subsection 572(3) are met through this EP.

Non-routine Discharges to the Marine Environment		
Sea Dumping Permit under the *Environmental Protection (Sea Dumping) Act 1981*	Yes	Through consultation with DAWE, PTTEP has established that the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads will require a Sea Dumping Permit Control based on legislative requirements – must be adopted.
Alternatives/Substitutes Considered		
Wellhead removal.	No	A comparative assessment of options is presented in Section 4 which evaluates wellhead removal against the leave in situ option. The assessment demonstrates that the leave in situ option provides equal or better environmental outcomes compared to the base case of complete removal across all assessment criteria. In relation to environmental impacts and risks, the leave in situ option and removal option were assessed to have a similar negligible impact from discharges to the marine environment. The removal option would result in minor, localised impacts to the environment typical of a vessel based activity, including generation of atmospheric emissions and routine discharges (e.g. sewage and grey water, deck and bilge water, cooling water and brine). The activity would also introduce the moderate risk of a hydrocarbon spill in the highly unlikely event of a vessel collision with a third party vessel. In comparison, the leave in situ option would result in small amounts of steel rust accumulating in the sediment surrounding the wellheads as they slowly corrode, which are assessed above to result in negligible and highly localised impacts to the surrounding benthos. The outcome of the options assessment therefore does not warrant the cost and slight increase in risks of conducting a field-based operation to remove the wellheads. This option has therefore not been adopted.
Additional Controls Considered		
Monitoring of wellheads using an ROV to assess any changes to the seabed and sediment.	No	Impacts to the seabed from the in situ wellheads are likely to be limited to within 10 m of the wellheads. There is limited environmental benefit (information) to be gained monitoring sediment and settlement of marine organisms around the wellhead. Monitoring also introduces potential environmental and socio-economic impacts and risks associated with typical ROV and vessel-based activities, and the cost of conducting ROV monitoring significantly outweighs the benefit. Therefore, monitoring has not been adopted.
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)		
No further practicable improvements to the above controls have been identified.	N/A	N/A

Non-routine Discharges to the Marine Environment				
Residual Risk Analysis and Ranking				
Aspect / Event	**Environmental Impact**	**Consequence**	**Likelihood**	**Residual Risk**
Corrosion of the wellheads resulting in non-routine discharge of very minor amounts of steel and elastomeric materials to the marine environment.	Local decline in water quality. Secondary impacts including: • toxicity to benthic habitats and marine species	Minor (1)	Unlikely (B)	Low
ALARP Statement				
Given the decision context is 'Type A', and: • All relevant 'Good Practice' control measures have been evaluated by PTTEP AA to manage the potential impacts and risks associated with the planned discharges; and • No objections, claims or concerns were raised by relevant stakeholders. PTTEP AA considers that all potential environmental impacts and risks associated with routine discharges from the project vessel are appropriately managed. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks the impacts and risks are considered to be ALARP.				
Demonstration of Acceptability				
Acceptable Level Criteria	Statement of how the acceptable level criteria has been met			
1. Residual risk from routine operations low or medium & ALARP and consequence ≤2	The residual risks associated with non-routine discharges are low and ALARP and the greatest consequence associated with potential impacts on water and sediment quality and marine species is Minor (1).			
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with non-routine discharges. There is no significant threat to biodiversity and ecological integrity associated with non-routine discharges. There is no serious threat to the quality of the environment available to future generations associated with non-routine discharges.			

Non-routine Discharges to the Marine Environment	
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from non-routine discharges to the marine environment. No specific plans, advice or guidelines have been identified.
4. Legislation & Other Requirements	No legislative or other requirements were identified.
5. Internal Context – PTTEP AA Requirements	There are no relevant internal requirements.
6. External Context – Stakeholder objects and claims addressed	During stakeholder consultation on the decommissioning options, the Western Australian Fishing Industry Council (WAFIC) requested PTTEP AA to consider the potential for cumulative impacts from multiple titleholders looking to abandon wellheads in situ. This has been addressed in the assessment above, which concluded there is no potential for cumulative impacts. There are no other wellheads or other property present within title areas AC/RL12 and AC/RL4 and potential impacts from corroded steel and minor quantities of elastomeric materials will be confined to sediments immediately surrounding the wellheads, potential impacts will be highly localised (within tens of metres of the wellheads) and will not result in cumulative impacts. It is also noted that the wellheads are located outside the Australian Fishing Zone and there is no potential for impact to Australian fisheries from the wellheads remaining in situ.
Acceptability Statement	
Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level. The impact assessment has determined that non-routine discharges to the marine environment from the corrosion of wellheads represent a low current risk rating that is unlikely to result in a potential impact greater than localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks from non-routine discharges from the corrosion of wellheads to an acceptable level.	

9.3 UNPLANNED RISKS

9.3.1 Physical Presence: Disturbance to Other Marine Users

Physical Presence: Disturbance to other users				
Decision Type	Type A (refer to Section 8.2.4.1)			
Aspects / Events	Disturbance to other marine users as a result of the continued presence of the wellheads			
Receptors	Socio-economic			
Inherent Impact/Risk Assessment Ranking				
Aspect / Event	**Environmental Impact**	**Consequence**	**Likelihood**	**Inherent Risk**
Disturbance to other marine users as a result of the continued presence of the wellheads	The wellheads could present a snag risk to fishing gear, in particular trawl nets.	Moderate (2)	Unlikely (B)	Low
Source of Impact / Risk				
The ongoing physical presence of the wellheads on the seabed could present a snag risk to fishing gear, namely trawl nets during future commercial fishing operations.				
Impact / Risk Assessment				

The EMBA is located within the Australian territorial seas, however is outside the Australian EEZ as amended by the 1997 Perth Treaty (Section 3.2.1). The Treaty has not been signed by the Indonesian Government, however Australian fisheries act consistently with the Treaty (AFMA, 2014). Whilst this could change in the medium to long term, the impact to Australian Commonwealth or State fisheries is expected to be negligible due to no trawling methods currently utilised by nearby operations. The Northern Demersal Scalefish Fishery is the closest active fishery to the EMBA and primarily uses fish traps (Newman et al., 2019). Furthermore, the location of the wellheads have been communicated to the AHO and have been included in navigation charts (Section 7.3).

As described in Section 6.6.2, in 1980, trawling was systematically prohibited in Indonesia waters (Presidential Decree 39/1980), and a total ban came into effect 1 January 1983 (Presidential Instruction No. 11/1982) (FAO), 2015). The Indonesian government reopened some areas for trawling, however the Timor Sea remained closed. In 2021 the Government issued a new decree (18/2021), which once again enforced a full ban on the use of bottom trawl nets, considered to threaten the sustainability of the country's fish stocks. There is therefore no reasonable prospect for bottom trawling to occur in the vicinity of the wellheads now or into the foreseeable future. Furthermore, no concerns have been raised to date in consultation with the Indonesian Government (conducted by DFAT on behalf of PTTEP (Section 7.3).The impact to commercial fishing operations if active in the area of the wellheads in the future is expected to be negligible. VMS data indicates vessels ≥30 GT operating in the Timor Sea mostly comprise of basic longline vessels and occasional handline vessels (Global Fishing Watch, 2021). Vessels less than 30 gross tonnes that are not equipped with VMS may also operate in the Timor Sea, however due to water depths these are unlikely to be trawlers and thus unlikely to be interfered with by wellhead infrastructure.

Given the small surface area of the wellheads they pose a small risk of interference should future unforeseen trawling take place within the EMBA. The ultimate fate of the wellheads is that they will collapse and become buried in sediment, which means after an extended period (~120 years) there will be no further hazard to trawling. Given current information indicates trawling will not take place and the limited risk of interference, the overall risk is assessed to be low.

Physical Presence: Disturbance to other users		
Identification of Control Measures and Demonstration of ALARP		
Control Measure	**Adopted**	**Justification**
Inherent Design and Legislative Requirements		
Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) Subsection 572(3)	Yes	Control based on legislative requirements – must be adopted. The requirements of Subsection 572(3) are met through this EP.
Sea Dumping Permit under the *Environmental Protection (Sea Dumping) Act 1981*	Yes	Through consultation with DAWE, PTTEP has established that the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads will require a Sea Dumping Permit Control based on legislative requirements – must be adopted.
AHO has been notified of wellhead locations and they are marked on navigational charts	Yes	Communication of the wellhead locations to AHO provides an opportunity for the exact location of the wellheads to be marked on navigational charts giving fisheries and other marine users sufficient information to plan activities around the infrastructure. The locations of the wellheads have been communicated to AHO through stakeholder consultation and the wellhead locations have been included on navigation charts (Section 7.3).
Alternatives/Substitutes Considered		
Wellhead removal.	No	A comparative assessment of options is presented in Section 4 which evaluates wellhead removal against the leave in situ option. The assessment demonstrates that the leave in situ option provides equal or better environmental outcomes compared to the base case of complete removal across all assessment criteria. In relation to socio-economic impacts and risks, the leave in situ option and removal option were assessed to have a similar negligible risk of disturbance to other users. The primary impact to socio-economic activities from the wellhead removal option is the potential for temporary (up to 3 days) and localised disturbance of other marine users due to the physical presence of the project vessel during wellhead cutting and removal. However, due to the remote location and duration of the activity, the potential for interaction with other vessels is minimal. The leave in situ option also results in negligible socio-economic risk, as described above, on the basis that the wellheads are located in water depths that would not interfere with vessel navigation and are not expected to present a snag risk to fishing gear such as bottom-trawl nets. No bottom trawling occurs in the area by either Australian or Indonesian fisheries. The wellheads are located outside the Australian Fishing Zone, and bottom trawling by Indonesian fishing vessels is not expected as the wellheads are located within a relatively deep area of the Timor Sea which is closed to trawling by Indonesian vessels. The outcome of the options assessment therefore does not warrant the cost and slight increase in risks of conducting a field-based operation to remove the wellheads. This option has therefore not been adopted.

Physical Presence: Disturbance to other users				
Additional Controls Considered				
Install trawl protection structures on the wellheads.	No	Additional benefits are low as there is a low risk of snagging for commercial fisheries. Installing an over-trawlable structure or rock dumping over the wellhead adds additional risks to the activity, associated with vessel use and seabed disturbance from installation. Cost/sacrifice outweigh potential benefits.		
Improvements Considered to Effectiveness of Controls (functionality, availability, reliability, survivability, independence and compatibility)				
No further practicable improvements to the above controls have been identified.	N/A	N/A		
Residual Risk Analysis and Ranking				
Aspect / Event	**Environmental Impact**	**Consequence**	**Likelihood**	**Residual Risk**
Physical presence of the wellheads	The wellheads could present a snag risk to fishing gear, in particular trawl nets.	Moderate (2)	Unlikely (B)	Low
ALARP Statement				
Given the decision context is 'Type A', and: • All relevant 'Good Practice' control measures have been evaluated by PTTEP AA to manage the potential impacts and risks associated with the physical presence of the project vessel; and • No objections, claims or concerns raised by relevant person(s), PTTEP AA consider all potential environmental impacts and risks associated with the physical presence of the wellheads and project vessel to be managed appropriately. As no reasonable additional or alternative controls were identified that would further reduce the impacts and risks, without jeopardising the objectives of the activity, the impacts and risks are considered to be ALARP.				
Demonstration of Acceptability				
Acceptable Level Criteria	**Statement of how the acceptable level criteria has been met**			
1. Residual risk from routine operations low or medium & ALARP and consequence ≤2	The residual risks associated with the physical presence of the wellheads are low and ALARP and the greatest consequence is moderate (2).			

Physical Presence: Disturbance to other users	
2. Principles of ESD not compromised and relevant requirements for environmental approvals (EPBC Act Part 3, Division 1) met	There is no threat of serious or irreversible environmental damage to any matters of national environmental significance associated with physical presence of the wellheads. There is no significant threat to biodiversity and ecological integrity associated with physical presence of the wellheads. There is no serious threat to the quality of the environment available to future generations associated with physical presence of the wellheads.
3. The management of the activity is consistent with a plan of management for a Australian Marine Park (AMP) and/or a recovery plan for a threatened species	The activity remains consistent with AMP management prescriptions. There are no risks to AMPs from the physical presence of wellheads. No specific plans, advice or guidelines have been identified.
4. Legislation & Other Requirements	No direct legislative controls have been identified relating to managing the disturbance to other marine users. Non-regulatory requirements that have been adopted include notification to AHO of wellhead locations so they can be marked on navigational charts.
5. Internal Context – PTTEP AA Requirements	There are no internal PTTEP AA requirements.
6. External Context – Stakeholder objects and claims addressed	There have been no objections or claims raised by relevant person(s) in relation to disturbance to other marine users.
Acceptability Statement	
Criteria (1-6) have been met and the impacts and risks are determined to be of an acceptable level. The impact assessment has determined that, given the adopted controls, disturbance to other marine users represents a low current risk rating that is unlikely to result in a potential impact greater localised temporary disturbance. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. Therefore, PTTEP AA considers the adopted controls appropriate to manage the impacts and risks of disturbance to other marine users to an acceptable level.	

10 ENVIRONMENTAL PERFORMANCE OBJECTIVES, STANDARDS AND MEASUREMENT CRITERIA

This section outlines the environmental performance outcomes (EPOs), environmental performance standards (EPSs) and measurement criteria (MC) in place to manage the potential environmental risks and impacts to ALARP and acceptable levels. EPOs, EPSs and MC are defined in Section 8.2.6.

The EPOs, EPSs and MC relating to the abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads in situ are presented in Table 10-1. The measurement criteria for an EPS also acts as a measurement criteria for the relevant EPOs. In the event of a non-compliance with an EPO, incident reporting will be performed as described in Section 11.7 and the incident records will provide further evidence that the EPO has been implemented.

Table 10-1: Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria

EPO #	EPO	EPS #	EPS	MC	Responsibility
Planned Impacts					
Physical Presence: Disturbance to Other Marine Users					
1	No significant disruption or interference with other marine users in the EMBA.	1.1	The location of the wellheads and permanent abandonment status have been communicated to AHO and they are included on navigation charts.	Consultation records demonstrate that AHO has been notified of the wellhead locations and permanent abandonment status and they are included on navigation charts.	PTTEP AA CEO
2	Abandonment of the Oliver-2 and Tenacious West-1 ST1 wellheads complies with all legislative and regulatory requirements	2.1	A Sea Dumping Permit under the *Environment Protection (Sea Dumping) Act 1981* will be applied for and in place prior to relinquishment of the AC/RL12 and AC/RL4 permit titles in consultation with DAWE.	Records demonstrate an approved Sea Dumping Permit is in place for the wellheads as required by DAWE.	PTTEP AA CEO

11 IMPLEMENTATION STRATEGY

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

11.1 SSHE MANAGEMENT SYSTEM OVERVIEW

The PTTEP corporate SSHE MS is the foundation for operational and risk control of activities conducted by PTTEP AA and is aligned with ISO 14001 (Environmental Management Systems), ISO 45001 (Occupational Health and Safety Management Systems), and the International Association for Oil and Gas Producers (IOGP) international standards.

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

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

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

11.2 LEADERSHIP, COMMITMENT, POLICY AND STRATEGIC OBJECTIVES

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

11.3 ORGANISATION, RESOURCES AND DOCUMENTATION

11.3.1 Roles and Responsibilities

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

The key roles and responsibilities within PTTEP AA, as they relate to the implementation of this EP are summarised in Table 11-1.

Table 11-1: Roles and Responsibilities

Role	Responsibility
Chief Executive Officer (CEO) (PTTEP AA)	• Overarching responsibility for the implementation of this EP. • Ensure the roles and responsibilities under this EP are communicated to the relevant personnel, and that personnel are competent to undertake their roles and responsibilities. • Ensure incident reporting and investigation is completed as required. • Ensure that reportable and recordable incidents are reported to NOPSEMA. • Ensure environmental performance reporting is completed and submitted to NOPSEMA.
Environmental Advisor (Consultant)	• Provide support to the PTTEP AA CEO to ensure implementation and compliance with this EP. • Track compliance with performance outcomes and performance standards as per the requirements of this EP • Assist with the review, investigation and reporting of environmental incidents. • Liaise with relevant regulatory authorities as required. • Assist in preparation of external regulatory reports required, in line with environmental approval requirements and PTTEP AA incident reporting procedures.
Corporate Affairs Advisor	• Prepare and implement the Stakeholder Consultation Plan. • Report on stakeholder consultation. • Perform liaison as required by Section 9.3.1 and EPS 1.1.

11.3.2 Training and Competency

As there are no field activities associated with the Petroleum Activities Program no training requirements specific to the Petroleum Activities Program are required.

11.3.2.1 Environmental Awareness Induction

No field-based personnel will be involved in the Petroleum Activities Program and therefore no inductions specific to the Petroleum Activities Program are required.

11.3.3 Contractor Management

As there are no field activities associated with the Petroleum Activities Program no contractor management requirements have been identified.

11.3.4 Document Management

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

(a) This EP;

(b) Revisions to this EP;

(c) Records and copies of reports under regulations 26 and 26A of the OPGGS (E) Regulations, relating to reportable incidents; and regulation 26B of the OPGGS (E) Regulations, relating to recordable incidents.

Records will also be kept, consistent with measurement criteria described in Section 10, to demonstrate compliance with environmental performance objectives and environmental performance standards.

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

11.4 MONITORING, AUDITING, MANAGEMENT OF NON-CONFORMANCE AND REVIEW

11.4.1 Monitoring

The activity will end upon acceptance of the EP by NOPSEMA (Section 5.2). As such, monitoring is not considered relevant for this Petroleum Activities Program. Demonstration of compliance with requirements under Section 270 of the OPGGS Act in relation to surrender of title is provided in Section 5.9.

11.4.2 Auditing

The activity will end upon acceptance of the EP by NOPSEMA (Section 5.2). As such, auditing is not considered relevant for this Petroleum Activities Program.

11.4.3 Management of Non-Conformance

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

However, as there are no activities associated with this EP, and the activity will end upon acceptance of the EP by NOPSEMA (Section 5.2), management of non-conformance is not considered relevant for this Petroleum Activities Program.

11.5 ENVIRONMENT PLAN MANAGEMENT OF CHANGE AND REVISION

The activity will end upon acceptance of the EP by NOPSEMA (**Section 5.2**). As such, no management of change or revision will be required for this Petroleum Activities Program.

11.6 RECORD KEEPING

Compliance records (outlined in Measurement Criteria in Section 10) will be maintained.

11.7 REPORTING

To meet the EPOs and EPSs outlined in this EP, PTTEP AA reports at a number of levels, as outlined in the next sections.

11.7.1 Routine Reporting

11.7.1.1 Environmental Performance Review and Reporting

In accordance with Regulation 14(2) of the OPGGS (E) Regulations, an environmental performance report will be submitted to NOPSEMA within one month of acceptance of the EP. One report will be submitted to close the EP, in accordance with Regulation 25A.

In accordance with the Environment Regulations the report will address compliance with environmental performance objectives, environmental performance standards and controls outlined in this EP.

A Monthly Recordable Incident Report will be submitted to NOPSEMA monthly, before the 15 of each month. Details of recordable incidents that have occurred during the Petroleum Activities Program for previous month. If no recordable incidents have occurred, a 'nil incident' report should be submitted to NOPSEMA.

11.7.2 Incident Reporting (Internal)

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

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

11.7.3 Incident Reporting (External) - Recordable and Reportable

11.7.3.1 Recordable Incidents

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

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

PTTEP AA will:

- document all recordable incidents that occurred during the calendar month
- all material facts and circumstances concerning the recordable incidents that the operator knows or is able, by reasonable search or enquiry, to find out
- any action taken to avoid or mitigate any adverse environment impacts of the recordable incidents
- the corrective action that has been taken, or is proposed to be taken, to prevent similar recordable incidents
- the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

It is noted that the activity will end upon acceptance of this EP by NOPSEMA (Section 5.2). As such, there is no scope for recordable incidents to occur.

11.7.3.2 Reportable Incidents

Reportable incidents are defined under the OPGGS (E) Regulations as "*an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage".*

A reportable incident for the Petroleum Activities Program is:

- an incident that has caused environmental damage with a Consequence Level of Moderate (2) or above (as defined under PTTEP AA's Risk Table (refer to Table 8-1).

- an incident that has the potential to cause environmental damage with a Consequence Level of Moderate (2) or above (as defined under PTTEP AA's Risk Table (refer to Table 8-1).

The environmental risk assessment (Section 9) for the Petroleum Activities Program does not identify any risks with a potential consequence level of 2+ for environment. Additionally, there is no credible hydrocarbon spill for this activity. Should an unexpected event occur during the life of the EP that is classified as a reportable incident it would be reported as above.

Any such incidents represent potential events which would be reportable incidents. Incident reporting is undertaken with consideration of NOPSEMA (2014) guidance stating, 'if in doubt, notify NOPSEMA', and assessed on a case-by-case basis to determine if they trigger a reportable incident as defined in this EP and by the Regulations.

11.8 END OF THE ENVIRONMENT PLAN

The EP will end when PTTEP AA notify NOPSEMA that the obligations identified in this EP have been completed, and NOPSEMA has accepted the notification, in accordance with Regulation 25A of the Environment Regulations.

11.9 OIL POLLUTION EMERGENCY PLAN

Under Regulations 14(8) the Implementation Strategy must contain an oil pollution emergency plan (OPEP) and provide for the updating of the OPEP. Regulation 14(8AA) outlines the requirements for the OPEP which must include adequate arrangements for responding to and monitoring of oil pollution.

As there is no credible hydrocarbon risk for this Petroleum Activities Program (Section 9.1), no OPEP has been developed for inclusion in the Implementation Strategy.

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13 ABBREVIATIONS

Abbreviation	Description
ABF	Australian Border Force
AC	Ashmore Cartier
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHIS	Aboriginal Heritage Enquiry System
AHO	Australian Hydrographic Office
ALARP	As Low As Reasonably Practicable
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BIA	Biologically Important Areas
BOM	Bureau of Meteorology
CAMRIS	Coastal and Marine Resources Information System
CEO	Chief Executive Officer
CFA	Commonwealth Fisheries Association
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity and Conservation Attraction
DEH	Department of Environment and Heritage
DEWHA	Department of the Environment, Water, Heritage and the Arts
DFAT	Department of Foreign Affairs and Trade
DISER	Department of Industry, Science, Energy and Resources
DMIRS	Department of Mines, Industry Regulation and Safety
DoE	Department of the Environment
DPIRD	Department of Primary Industries and Regional Development
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EEZ	Exclusive Economic Zone
EIO	East Indian Ocean
EMBA	Environment that may be affected

Abbreviation	Description
EP	Environment Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPO	Environmental Performance Outcome
EPS	Environment Performance Standard
ERM	Environmental Resources Management Australia Pty Ltd
ESD	Ecologically Sustainable Development
FAO	Food and Agriculture Organisation
GT	Gross tonnes
ID	Identification
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMO	International Maritime Organisation
IOGP	International Association of Oil & Gas Producers
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
KEF	Key Ecological Feature
km	Kilometre
KPI	Key performance indicator
m	metre
MC	Measurement Criteria
MNES	Matters of National Environmental Significance
MoU	Memorandum of Understanding
MS	Management Standard
MSS	Marine seismic survey
nm	Nautical miles
NOAA	National Oceanic and Atmospheric Administration
NOPIMS	National Offshore Petroleum Information Management System
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NT	Northern Territory
NWMR	North-west Marine Region
OGUK	Oil & Gas UK
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006

Abbreviation	Description
OPGGS (E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations
OSPAR	Oil Spill Prevention, Administration and Response
PFSEL	Provisional Fisheries Surveillance and Enforcement Line
PGB	Permanent guide base
PHG	Pre-hydrated gel
PLONOR	List of Substance / Preparations Used ad Discharges Offshore Which Are Considered to Pose Little or No Risk to the Environment
PMST	Protected Matters Search Tool
ppg	Pounds per gallon
PTTEP AA	PTTEP Australasia (Ashmore Cartier) Pty Ltd and/or PTTEP Australia Timor Sea Pty Ltd
RAN	Royal Australian Navy
RL	Retention Lease
ROV	Remote operated vehicle
SMART	Specific, Measurable, Achievable, Realistic, Timely
SSHE	Safety, security, health and environment
TD	Total depth
TGB	Temporary guide base
TSSC	Threatened Species Scientific Committee
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WBM	Water Based Muds
WOMP	Well Operations Management Plan

Appendix A: Stakeholder Consultation Records

Stakeholder Consultation Correspondence:

To whom it may concern,

PTTEP AA would like to provide you with information and request feedback on the decommissioning of two wellheads as part of the development of an Environment Plan (EP) under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations. The wellheads are located on the seabed in petroleum title areas AC/RL12 and AC/RL4 in the Timor Sea, in water depths of 150 m and 307 m respectively.

The attached 'Wellhead Decommissioning Stakeholder Information' fact sheet provides a summary of the decommissioning options being considered for the two wellheads.

The wellheads are within an area of shared jurisdiction between Australia and Indonesia, as demarcated by the "Treaty between the Government of Australia and the Government of the Republic of Indonesia establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries" (Perth Treaty). Within this area Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights. PTTEP AA understands that although not yet countersigned by the Indonesian government, Australia acts consistently with the arrangements of this treaty.

The Oliver-2 wellhead is located outside the Australian Fishing Zone (AFZ) (figure included in the attached factsheet). While the Tenacious West-1 ST1 wellhead is within the AFZ, PTTEP AA understands its location within the Perth Treaty Area prevents commercial fishing occurring over the wellhead. Furthermore, no Commonwealth or Western Australian state trawl fisheries operate nearby the wellhead.

A preliminary assessment of options has indicated that leaving the wellheads in situ is the preferred decommissioning option for the wellheads. This option would require no further field activities

PTTEP AA would like to invite feedback on the information contained in this email and attached factsheet, particularly in relation to the option to permanently leave the wellheads in situ. Any comments, queries or concerns can be provided by responding to this email or using the contact details in the fact sheet, and we will provide you with a response as soon as possible. We would appreciate your feedback by Friday 8th October.

Please note that PTTEP AA will take all feedback into consideration in the options assessment process for the wellheads. Should the outcome result in a change to the preferred decommissioning option, PTTEP AA will provide additional stakeholder information on revised activities.

AC/RL12 AC/RL4 Wellhead Decommissioning
Stakeholder Consultation Information Sheet
August 2021

Background

PTTEP Australasia (Ashmore Cartier) Pty Ltd (PTTEP AA) is investigating options to decommission two subsea wellheads located in petroleum title areas AC/RL12 and AC/RL4 in the Timor Sea (Figure 1). The AC/RL12 title area (formerly AC/P33) contains the Oliver-2 appraisal well and the AC/RL4 title area contains the Tenacious West-1 ST1 appraisal well. The wells are permanently plugged with independent verified barriers in place, and the wellheads for both wells remain on the seabed. The wellheads are currently covered under an ongoing well suspension Environment Plan (EP), which is publicly available on NOPSEMA's website (EP document: A729247).

PTTEP AA is now preparing an EP to decommission the wellheads and is proposing to leave the wellheads in situ following a preliminary assessment of options (described below). Stakeholder views on the leave in situ decommissioning option are being sought to inform PTTEP AA's decision making and development of the EP.

Location

The Oliver-2 and Tenacious West-1 ST1 wellheads are located in the Timor Sea on the continental slope (Figure 1; Table 1). The wellheads are approximately 2.5 m in height and additional guideposts rise approximately 5 m to 7 m above the sea floor. The wells are situated outside the Australia Exclusive Economic Zone in an area of shared jurisdiction with Indonesia (1997 Perth Treaty), where Australia exercises seabed jurisdiction and Indonesia exercises water column jurisdiction, including fishing rights.

Table 1: Location of the Oliver-2 and Tenacious West-1 ST1 wellheads

Well Name	Latitude	Longitude	Water Depth (m)
Oliver-2	11° 37' 48.34" S	125° 01' 31.36" E	307
Tenacious West-1 ST1	11° 51' 41.76" S	124° 53' 48.60" E	150

Approvals Process

Oil and gas decommissioning in Commonwealth waters is regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) and associated regulations. An Environment Plan (EP) is the key permissioning document assessed by NOPSEMA through which titleholders can demonstrate compliance with the majority of decommissioning obligations under subsection 270(3) of the OPGGS Act (relating to surrender of title).

The "base case" for decommissioning under the OPGGS Act is the complete removal of infrastructure; however, other options may be considered provided PTTEP AA can demonstrate in an Environment Plan that the alternative decommissioning approach delivers equal or better environmental, safety and well integrity outcomes compared to complete removal, and that the approach complies with all other legislative and regulatory requirements. The preliminary assessment of decommissioning options for the Oliver-2 and Tenacious West-1 ST1 wellheads is described below.

Wellhead Decommissioning Planning

PTTEP AA has undertaken a preliminary assessment of decommissioning options in accordance with the relevant regulatory requirements. The purpose of the assessment is to identify the option that provides the greatest benefit or least risk of impacts to the environment and the interests of stakeholders, and provides the greatest level of safety over both the long and short term. The preferred option for decommissioning is the one with the best balance of factors and complies with all legislative and regulatory requirements.

Two decommissioning options were considered:

- Complete removal of the wellheads (base case); and
- Leave the wellheads in situ.

Outcomes of the preliminary options assessment indicate that leaving the wellheads in situ is the preferred decommissioning option for the Oliver-2 and Tenacious West-1 ST1 wellheads. This option would require no further field activities and provides equal or better environment, health and safety and social outcomes compared to the base case of complete removal. The following factors informed the preliminary identification of leaving the wellheads in situ as the preferred option:

- No emissions would be released, or waste generated due to no on-the-water activity.
- No risk of hydrocarbon spill due to no on-the-water activity.
- The wellheads are in water depths not frequented by recreational marine users (150 m and 307 m) and do not pose a hazard to commercial shipping, therefore no impacts are anticipated.
- No risk to existing fisheries as the wellheads are located outside the Australian EEZ and therefore there is no overlap with commercial fisheries.
- No commercial bottom trawl fishing currently operates in the area, nor is future trawling expected to occur in the area. PTTEP AA has reviewed publicly available resources and understands the wellheads are located in depths that are not accessed by Indonesian fishers, and within management boundaries that prohibit access by Australian fishers. If future trawling were to occur, the wellheads may exclude fishing in this area to avoid risk of snagging. The Australian Hydrographic Organisation will be advised of the location of the wellheads for marking on navigational charts.
- No health and safety risks presented to crew during wellhead cut and lift operations.
- Over the long-term the wellheads will degrade in situ resulting in discharge of trace amounts of metals (steel) to the surrounding sediments with highly localised, negligible effects on benthic habitat.

It is noted that there is no credible risk of a hydrocarbon spill from loss of well integrity from either the leave in situ or removal option as the wells are permanently plugged with multiple cement barriers in place, to a standard accepted by NOPSEMA.

Seeking Stakeholder Feedback

PTTEP AA is consulting with relevant stakeholders whose interests, functions and activities may be affected by the decommissioning of the Oliver-2 and Tenacious West-1 ST1 wellheads. Stakeholder views are particularly being sought on the leave in situ option and any long term implications of this option.

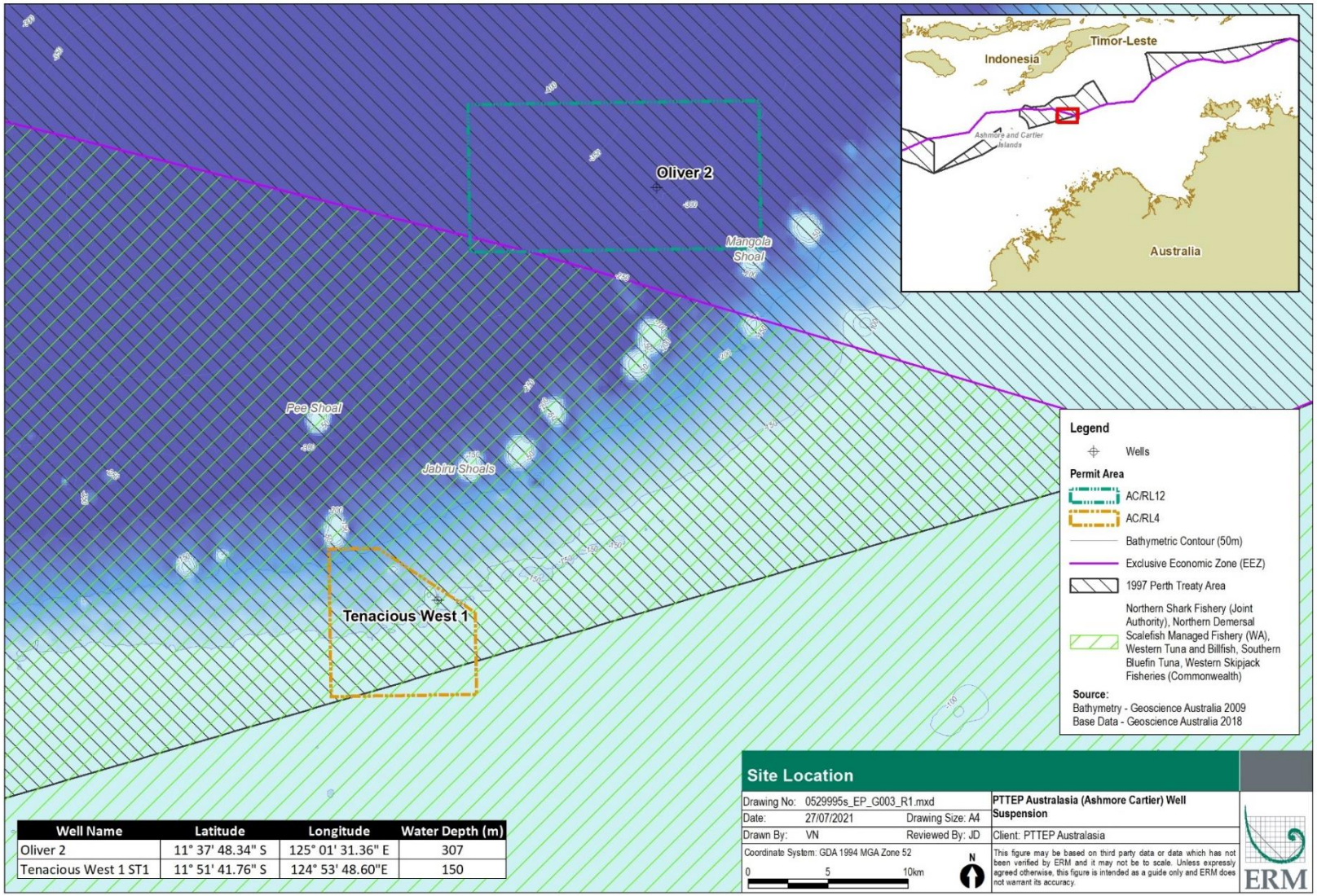
Contact Details

If you have any comments or feedback on the activity, please reach out using the contact details below.

Contact name: Ryan Hartfield

Address: Level 5, 225 St Georges Terrace, Perth, Western Australia 6000

Email: PTTEP.Well.Suspension@erm.com



Well Name	Latitude	Longitude	Water Depth (m)
Oliver 2	11° 37' 48.34" S	125° 01' 31.36" E	307
Tenacious West 1 ST1	11° 51' 41.76" S	124° 53' 48.60"E	150

Figure 1: Location of Oliver-2 and Tenacious West-1 ST1 wellheads and overlap with relevant WA State and Commonwealth Fisheries

PTTEP AA Timor Sea Wellhead Abandonment Environment Plan - Stakeholder Consultation Log

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
Commonwealth Government				
Australian Fisheries Management Authority (AFMA) - Petroleum	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	13/09/2021	Received	Confirmation of receipt Noted Due to limited resources AFMA is unable to comment on individual proposals, however, it is important to consult with all fishers who have entitlements to fish within the proposed area. This can be done through the relevant fishing industry associations or directly with fishers who hold entitlements in the area. Provided link to AFMA website with details of associations Provided link to list of Commonwealth Concession holders in each fishery on AFMA website Provided contact (email address) to request individual contact details of identified relevant operators. Noted that there is a cost associated with this service and the total price will depend on the complexity of the request.	No relevant matter raised (noting that the wellheads are outside the Australian Fishing Zone) - general correspondence only

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
Australian Hydrographic Office (AHO)	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	10/09/2021	Received	Confirmation of receipt Noted that data supplied will now be registered, assessed, prioritised and validated in preparation for updating our Navigational Charting products. These adhere to International and Australian Charting Specifications and standards. These standards may result in some data generalisation or filtering due to the scale of existing charts, proximity to other features, and the level of risk a reported feature presents to mariners.	No relevant matter raised - general correspondence only
	31/03/2022	Phone Call from PTTEP	Phone call to AHS from PTTEP. No answer. Voice message left noting that PTTEP is inquiring whether the wellheads had been marked on the navigational charts.	N/A - Correspondence sent by PTTEP
	1/04/2022	Sent	Email sent to stakeholder, following up on phone call. PTTEP forwarded initial consultation with the stakeholder information fact sheet, providing the location of the two wellheads. PTTEP inquired if the wellheads have been marked on the navigational charts.	N/A - Correspondence sent by PTTEP
	1/04/2022	Received	AHO responded confirming that both wells are on the AHO products in the positions as provided in initial stakeholder notification.	Relevant matter raised - addressed in Section 5 of the EP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			AHO advised that the location marked on the ENC was different to the location a contractor was given for ROV work at the wellheads. AHO stated they are trying to resolve this issue.	
	12/04/2022	Sent	Email sent to PTTEP confirming that there was an error in the in the coordinates provided to AHO for the Oliver-2 wellhead in consultation from September 2021. This resulted in the incorrect position being marked on the ENC. PTTEP provided the correct coordinates for the Oliver-2 wellhead: 11° 38’ 03.674” S , 125° 01’ 36.470” E. PTTEP requested AHO update the ENC to reflect the correct position of the wellhead.	N/A - Correspondence sent by PTTEP
	13/04/2022	Received	AHO confirmed the ENC will be updated ASAP	No relevant matter raised
	27/04/2022	Received	AHO confirmed the position was updated in the products and the ENC will be released 28th April 2022	No relevant matter raised
Australian Maritime Safety Authority (AMSA)	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	10/09/2021	Received	Confirmation of receipt	N/A - General correspondence only
Department of Agriculture - Fisheries	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	
Department of Agriculture Water and Environment (DAWE) - Sea dumping	17/09/2022	Sent	Email sent to stakeholder to confirm the requirements under the Sea Dumping Act 1985 for the decommissioning of two wellheads. PTTEP outlined the location of the wellheads and water depths. PTTEP explained that the Oliver-2 wellhead is located outside the Australian Fishing Zone (AFZ)and whilst the Tenacious West-1 ST1 wellhead is within the AFZ, its location within the Perth Treaty Area prevents commercial fishing occurring over the wellhead. Furthermore, PTTEP explained no Commonwealth or Western Australian state trawl fisheries operate nearby the wellhead. The wells are permanently plugged with independent verified barriers in place, and the wellheads for both wells remain on the seabed. The wellheads are currently covered under an ongoing well suspension Environment Plan (EP). A preliminary assessment of options has indicated that leaving the wellheads in situ is the preferred decommissioning option for the wellheads. This option would require no further field activities. PTTEP enquired: 1. Confirmation that as the wells were drilled in 1998, they are subject to a Sea Dumping Permit. 2. Are there any further considerations required under the permit as the wellheads are to be permanently abandoned within the Perth Treaty Area?	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
	24/09/2021	Received	Stakeholder thanked PTTEP for enquiry. Stakeholder outlined the Sea dumping Act fulfils Australia's international obligations under the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Protocol). The Act regulates activities in Australian waters to prevent marine pollution caused by the dumping of wastes and other matter. Permits for sea dumping activities are issued under the Act, in accordance with the London Protocol. In addition to the requirements of Annex 1 (Wastes or other matter that may be considered for dumping) and Annex 2 (Assessment of Wastes or other matter that may be considered for dumping) of the London Protocol, the legal framework is supplemented by guidelines published by the International Maritime Organization (IMO). The guidelines are intended for use by national authorities responsible for regulating dumping of wastes to guide the evaluation of applications for dumping of wastes in a manner consistent with the provisions of the London Protocol. Stakeholder outlined that in October 2019, the Revised specific guidelines for assessment of platforms or other man-made structures at sea were approved at the meeting of the contracting parties to the protocol and subsequently issued by the IMO. The revised guidelines may have implications for the department's approach to permitting of abandoned infrastructure at sea. The department is reviewing its regulatory arrangements for abandonment of offshore oil and gas infrastructure, including consideration of the amendments to these guidelines, and will consult with industry in due course regarding potential changes to our approach. Until our position is resolved, the department will continue to consider proposals	Relevant matter raised - addressed in Section 3 (Legislation and Regulatory Framework) and Section 9 (Environmental Impact and Risk Assessment) of the EP.

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			to abandon infrastructure at sea on a case-by-case basis. The department is currently working to finalise this review as quickly as possible, however, this is a highly complex matter. Stakeholder gave the following response in regard to PTTEP's proposal: Based on the current information provided regarding the location and nature of the proposed actions, a sea dumping permit is required if these abandonment in-situ activities are to be undertaken. Stakeholder provided links to website with instructions for submitting a sea dumping permit application and links to application forms.	
Department of Defence (Defence)	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	12/10/2021	Received	Confirmation of receipt. Noted located outside of any Defence Training/ Practice areas Recommended liaison with the Australian Hydrographic Services, in particular ensure that AHS be notified three weeks prior to the commencement of activities. Provided contact details of the Nautical Assessment officer (phone) as a direct contact of the AHS.	Relevant matter raised - addressed in Section 9 (Environmental Impact and Risk Assessment) and Section 10 (Environmental Performance Objectives, Standards and Measurement Criteria) of the EP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
	12/10/2021	Sent	Noted confirmation of location outside Defence Training/ Practice areas, and is consistent with the environmental plan. Confirmed consultation with AHS in relation to activity, and will follow up to confirm receipt of information and address any queries. Noted no on-the-water operations proposed as part of activity, therefore will discuss with AHS the need to mark wellhead on their electronic navigation charts in the event of permanent abandonment on the seabed.	N/A - Correspondence sent by PTTEP
Department of Foreign Affairs and Trade	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Advised the Department is being contacted as the activities proposed in the EP are located within the 1997 Perth Treaty area. It was noted that the Treaty is not in force but Australia still acts consistently with the requirements. Acknowledged that under the 1997 Perth Treaty there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights. Confirmed PTTEP AA has reviewed sources such as Global Fishing Watch which suggest that Indonesian commercial fishers may be present within the 1997 Perth Treaty Area. Advised the risks and impacts associated with potential interactions with Indonesian fishers will be fully assessed in the EP prior to submission to NOPSEMA. Requested DFAT pass on this notification to the Indonesian Minister of Fisheries and Marine Affairs, if necessary.	N/A - Correspondence sent by PTTEP
	9/09/2021	Received	Confirmation of receipt	N/A - General correspondence only

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
	17/09/2021	Phone Call from PTTEP	Follow up call to DFAT switchboard, told they need a name to transfer a call internally.	N/A - Correspondence sent by PTTEP
	20/09/2021	Phone Call from PTTEP	Follow up call to DFAT switchboard, different person answered and was put through to treaties, but no answer	N/A - Correspondence sent by PTTEP
	22/09/2021	Phone Call from PTTEP	Follow up call to DFAT with request to talk to treaties team, answered by employee who is usually in the treaties team but seconded into a different team. Advised to email DFAT treaties directly ad provided email address.	N/A - Correspondence sent by PTTEP
	22/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Advised the Department is being contacted as the activities proposed in the EP are located within the 1997 Perth Treaty area. It was noted that the Treaty is not in force but Australia still acts consistently with the requirements. Acknowledged that under the 1997 Perth Treaty there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including the exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights. Confirmed PTTEP AA has reviewed sources such as Global Fishing Watch which suggest that Indonesian commercial fishers may be present within the 1997 Perth Treaty Area. Advised the risks and impacts associated with potential interactions with Indonesian fishers will be fully assessed in the EP prior to submission to NOPSEMA. Requested DFAT pass on this notification to the Indonesian Minister of Fisheries and Marine Affairs, if necessary.	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
	24/09/2021	Phone Call from PTTEP	Follow up call. DFAT answered and advised to call treaties team.	N/A - Correspondence sent by PTTEP
	24/09/2021	Phone Call from PTTEP	Attempt to call contact from treaties team, no response	N/A - Correspondence sent by PTTEP
	1/10/2021	Phone Call from PTTEP	Attempt to call contact from treaties team, no response, message left	N/A - Correspondence sent by PTTEP
	11/10/2021	Sent	Follow up email sent, requesting confirmation of receipt of notification email. Requested to arrange a meeting time.	N/A - Correspondence sent by PTTEP
	11/10/2021	Sent	Email sent to treaties team, highlighting importance of consultation with the department and requesting to meet.	N/A - Correspondence sent by PTTEP
	1/11/2021	Sent	PTTEP reaches out to contact for guidance on how to progress with the treaties team at DFAT (relating to the abandonment of 2 oilfield wellheads in the Perth Treaty area).	N/A - Correspondence sent by PTTEP
	3/11/2021	Received	Response received stating DFAT is in the process of tracking down some information, and will get in touch again in due course.	No relevant matters raised
	9/12/2021	Received	Noted that issue has been with Legal Division Noted the Legal Division has been in the process of liaising with the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) and the Department of	No relevant matters raised

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			Industry, Science, Energy and Resources (DISER) and should be finished with that shortly.	
	12/01/2022	Received	DFAT thanked PTTEP for consultation and apologized for delay in response. Noted that the wellheads are in areas of Australia shared jurisdiction with Indonesia. Outlined that Australia and Indonesia act consistently with the Perth Treaty pending its entry into force. Article 7 of the Perth Treaty lists several rights and obligations that apply where Indonesia's water column overlaps Australia's seabed (areas of overlapping jurisdiction). Rights and obligations potentially relevant to the consideration of the removal of oil and gas infrastructure are contained in paragraphs (f), (j), (k), (m) and (n) of Article 7 and are extracted below: (f) (i) any installation or structure which is abandoned or disused shall be removed by the Party which authorised its construction in order to ensure the safety of navigation, taking into account any generally accepted international standards established in this regard by the competent international organisation (ii) such removal shall also have due regard to fishing and to the protection of the marine environment. Appropriate publicity shall be given to the depth, position and dimensions of any installations or structures not entirely removed; … (j) the Parties shall take effective measures as may be necessary to prevent, reduce and control pollution of the marine environment; (k) each Party shall be liable in accordance with international law for pollution of the marine environment caused by activities under its jurisdiction;	Relevant matter raised - included in Section 3 (Legislation and Regulatory Framework), Section 5 (Description of the Environment) and Section 9 (Environmental Impact and Risk Assessment) of EP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			… (m) neither Party shall exercise its rights and jurisdiction in a manner which unduly inhibits the exercise of the rights and jurisdiction of the other Party; and (n) the Parties shall cooperate with each other in relation to the exercise of their respective rights and jurisdiction. Section 572 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 requires a titleholder to remove from the title area, all structures, property and equipment that is, neither used nor to be used in connection with the operations, and that deviations from this requirement may be agreed to by NOPSEMA through an environment plan. DFAT asked that PTTEP's investigation into the options to decommission the wellheads take the Perth treaty obligations that Australia has to Indonesia into account. DFAT raised two points. First DFAT thanked PTTEP for the Stakeholder Consultation Information Sheet. Given the treaty obligations outlined above DFAT would appreciate PTTEP's advice on whether there is any further information PTTEP would like to provide in addition to this Information Sheet so that we can be certain Australia will comply with its obligations to Indonesia. Second, to fully comply with our obligations to Indonesia, DFAT will consult with the Indonesian Government on PTTEP's proposal. DFAT will provide them with PTTEP's information sheet and any further information PTTEP may choose provide to us. DFAT will advise PTTEP of their response once received. DFAT also noted they received from PTTEP an email notifying	

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			them that PTTEP AA plans to undertake a visual inspection of the wellheads, in the first or second quarter (Q1/Q2) of 2022, to inform development of the decommissioning Environment Plan (EP). DFAT Thanked PTTEP for this notification. In line with past practice, DFAT will inform Indonesia of these plans.	
	2/02/2022	Sent	PTTEP thanked DFAT for email and opportunity to provide additional supporting documentation for your consultation with the Indonesian Government on PTTEP's proposal. Confirmed PTTEP have considered Australia's Perth Treaty obligations to Indonesia as part of the evaluation of decommissioning options for the wellheads. Addressed the relevant paragraphs of Article 7 in relation to the wellheads as follows: (f) (i) any installation or structure which is abandoned or disused shall be removed by the Party which authorised its construction in order to ensure the safety of navigation, taking into account any generally accepted international standards established in this regard by the competent international organisation (ii) such removal shall also have due regard to fishing and to the protection of the marine environment. Appropriate publicity shall be given to the depth, position and dimensions of any installations or structures not entirely removed; PTTEP Evaluation: As described above, the leave in situ options eliminates the need to undertake vessel-based activities, which represents a reduction in emissions and marine pollution risk when compared to removal of the wellheads. The comparative assessment of decommissioning options conducted by PTTEP also demonstrated that environmental impacts from the leave in situ option would be comparable with impacts from removal of the wellheads in relation to local sediment and water quality and benthic habitats. The leave in situ option therefore	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			represents a better overall environmental outcome compared to removal. … (m) neither Party shall exercise its rights and jurisdiction in a manner which unduly inhibits the exercise of the rights and jurisdiction of the other Party; and (n) the Parties shall cooperate with each other in relation to the exercise of their respective rights and jurisdiction. PTTEP Evaluation: The leave in situ option for the wellheads proposed by PTTEP does not unduly inhibit the exercise of the rights and jurisdiction of any Party for the reasons outlined above. Finally PTTEP requested for DFAT to let them know if they require any further information.	
	16/03/2022	Sent	Email sent to stakeholder to follow up on progress with DFAT's consultation with the Indonesian Government on PTTEP's proposal to decommission in-situ the two subsea wellheads in petroleum title areas AC/RL 12 and AC/RL 4 in the Perth Treaty Area. PTTEP outlined they are planning to submit an Environment Plan for the proposed activity to NOPSEMA in early April, and the plan is required to document consultation completed and address stakeholder feedback received. PTTEP requested to organise a time to call to discuss	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
	21/03/2022	Received	Stakeholder apologised for delay in response and provided the following update: Stakeholder outlined the purpose of the requirement to consult with DFAT was to ensure consultation with relevant foreign entities (Government of Indonesia). Stakeholder outlined they have passed relevant information that they were provided with to the Indonesian Embassy in Canberra. The Embassy is liaising about it with the Government of Indonesia. DFAT has followed up with the Embassy and the Embassy advised that the process is not complete. DFAT stated they will stay in touch with the Embassy and will get in touch with PTTEP again in due course.	No relevant matters raised
Department of Industry, Science, Energy and Resources	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	10/09/2021	Received	Confirmation of receipt. Thanked PTTEP for notification and request for feedback Indicated that notification has been forwarded to relevant teams in the petroleum development and decommissioning areas of the department.	No relevant matters raised

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
WA State Government				
Department of Primary Industries and Regional Development (DPIRD) - Fisheries	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	10/09/2021	Received	Confirmation of receipt Thanked PTTEP for providing notification.	No relevant matters raised
Fisheries				
Commonwealth Fisheries Association (CFA)	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
Western Australian Fishing Industry Council (WAFIC)	9/09/2021	Sent	***Attachment: Stakeholder Notification PDF*** Email sent to stakeholder providing notification of the EP development and a brief overview of the activity. Requested any comments be provided by 8 October 2021, and provided a contact address (email) to do so. The attached stakeholder notification described the project background, activity description, location, overlap with fishery management areas, and location map.	N/A - Correspondence sent by PTTEP
	28/10/2021	Received	***Attachment: NOPSEMA Section 572 Maintenance and removal of property*** Confirmation of receipt Advised WAFIC's preferred position is for removal of the wellheads to mitigate against expected degradation of the wellhead which will result in trace elements in the marine environment. Based on the cumulative impacts from multiple titleholder requesting the same option, and the expected leaching of trace elements in the marine environment, leaving it in situ does not meet the requirements as described by NOPSEMA in "delivering equal or better environmental outcomes"	Relevant matter raised - addressed in Section 8 (Comparative Assessment of Decommissioning Options) and Section 9 (Environmental Impact and Risk Assessment) of the EP of the EP.
	6/12/2021	Sent	Acknowledgment of response Noted WAFIC's position for removal of wellheads to mitigate against expected degradation of the wellhead, particularly in relation to the potential for trace elements to be released into the marine environment. Acknowledged WAFIC's comment that multiple titleholders are contacted WAFIC requesting the same option (i.e. leaving wellheads or other infrastructure in situ), which may result in cumulative impacts.	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			Outlined that for this particular activity, negligible to minor impacts and risks to the environment have been determined on the basis that the Oliver-2 and Tenacious West-1 ST1 wellheads would remain in situ permanently and would eventually corrode over a time scale of hundreds of years. The mainly steel construction of the wellheads is designed with very stable, non-biodegradable materials that are expected to have a service life of many decades within the marine environment. However, the wellheads will slowly corrode into the water column and small amounts of steel rust may accumulate in the sediment immediately surrounding the wellheads. Given the expected rate of steel corrosion and the very minor quantities of elastomeric materials, impacts to marine sediments, organisms and water quality would be negligible and highly localised. It may also be worth noting that both wellheads are located in the Perth Treaty Area – an area that is not fished by State or Commonwealth fishers. Noted WAFIC's comment that leaving the wellheads in situ does not meet the requirements as described by NOPSEMA in "delivering equal or better environmental outcomes". The base case for the OPGGS Act is complete removal as per subsection 572(3) Noted that subsection 270(3) of the Act allows for alternative arrangements, including leaving the wellheads in situ, as long as the option delivers equal or better environment, health and safety, social and well integrity outcomes when compared to complete removal. PTTEP AA and ERM have conducted a detailed options assessment to establish the option that provides the most benefits or the least risk of impacts to the environment as a whole and provides the greatest level of safety, in the long term as well as in the short term. Following this process, the option to leave the wellheads in situ has been	

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			demonstrated to have negligible environmental, socio-economic and health and safety impacts and risks and is considered equal or slightly better than the base case of complete removal. Therefore, leaving the Oliver-2 and Tenacious West-1 ST1 wellheads in situ is considered able to meet PTTEP AA's decommissioning obligations under the OPGGS Act. The options assessment will be included as part of the Environment Plan (EP). Informed that WAFIC's feedback will be incorporated in the EP, and sensitive information will be removed from the public EP in accordance with usual practice.	
	9/12/2021	Received	Clarified that original email stated multiple titleholders are requesting the same option (i.e. leaving infrastructure in situ), which may result in cumulative impacts. Thanked PTTEP for providing additional information on the corrosion of the wellhead. Noted, as stated previously, the cumulative impacts of the wellheads remaining in situ, would pose a risk to the marine environment. Asked PTTEP to confirm whether the cumulative impacts of the wellheads remaining in situ been considered in the EP.	Relevant matter raised - addressed in Section 8 (Comparative Assessment of Decommissioning Options) and Section 9 (Environmental Impact and Risk Assessment) of the EP
	20/12/2021	Sent	Thanked WAFIC for clarifying original feedback. Confirmed that cumulative impacts of the wellheads remaining in situ have been considered as part of the options assessment for the wellheads. The cumulative assessment will be included in the Environment Plan as part of the overall impact assessment and demonstration that the selected decommissioning option delivers "equal or better environmental outcomes" as required under the Offshore	N/A - Correspondence sent by PTTEP

Stakeholder	Date	Sent/ Received	Summary of Correspondence	Assessment of Merit
			Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.	

Appendix B: Protected Matters Search Tool Reports

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. Please see the caveat for interpretation of information provided here.

Report created: 29-Mar-2022

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment 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 (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	21
Listed Migratory Species:	35

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

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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	62
Whales and Other Cetaceans:	22
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	20
Key Ecological Features (Marine):	None
Biologically Important Areas:	1
Bioregional Assessments:	None
Geological and Bioregional Assessments:	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 a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
EEZ and Territorial Sea
Extended Continental Shelf

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
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
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat likely to 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 likely to occur within area
REPTILE		
[Aipysurus foliosquama](#) Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
SHARK		

Scientific Name	Threatened Category	Presence Text
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 may 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	Species or species habitat may occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
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

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus		
White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat likely to 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 likely to occur within area
Carcharhinus longimanus		
Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may 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	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
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]
Scientific Name	Threatened Category	Presence Text
Bird		
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 overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine 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

Scientific Name	Threatened Category	Presence Text
[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
[Phaethon lepturus](#) White-tailed Tropicbird [1014]		Species or species habitat likely to 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

Scientific Name	Threatened Category	Presence Text
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
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 Ribboned Pipehorse, Ribboned 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

Scientific Name	Threatened Category	Presence Text
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
Reptile		

Scientific Name	Threatened Category	Presence Text
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 foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	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	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour 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

Scientific Name	Threatened Category	Presence Text
[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	Foraging, feeding or related behaviour likely to occur within area
[Hydrophis elegans](#) Elegant Seasnake [1104]		Species or species habitat may occur within area
[Lapemis curtus as Lapemis hardwickii](#) Spine-bellied Seasnake [83554]		Species or species habitat may occur within area
[Leioselasma coggeri as Hydrophis coggeri](#) Black-headed Sea Snake, Slender-necked Seasnake [87373]		Species or species habitat may occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
[Pelamis platurus](#) Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
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 likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		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
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		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
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Audacious Oil Field Standalone Development	2001/407	Controlled Action	Completed
PTTEP AA Floating LNG Facility	2011/6025	Controlled Action	Completed
Not controlled action			
Audacious-3 oil drilling well	2003/1042	Not Controlled Action	Completed
Drilling of exploration well Audacious-1 in AC/P17	2000/5	Not Controlled Action	Completed
Exploration Drilling in AC/P17, AC/P18 and AC/P24	2001/359	Not Controlled Action	Completed
Marine Survey for the Australia-ASEAN Power Link AAPL	2020/8714	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D Marine Seismic Survey	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval
2D or 3D Marine Seismic Survey in Petroleum Permit Area AC/P35	2009/4864	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic survey	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, petroleum exploration permit AC/P33	2006/2918	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey of AC/P4, AC/P17 and AC/P24	2006/2857	Not Controlled Action (Particular Manner)	Post-Approval
Auralandia 3D marine seismic survey	2011/5961	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Drilling of Audacious-5 appraisal well	2008/4327	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Sandalford 3D Seismic Survey	2012/6261	Not Controlled Action (Particular Manner)	Post-Approval
Songa Venus Drilling and Testing Operations	2009/5122	Not Controlled Action (Particular Manner)	Post-Approval
Ursa 3D Marine Seismic Survey	2008/4634	Not Controlled Action (Particular Manner)	Post-Approval
Vampire 2D Non Exclusive Seismic Survey, WA	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
2D Marine Seismic Survey	2008/4623	Referral Decision	Completed

Biologically Important Areas		
Scientific Name	Behaviour	Presence
Whales		
Balaenoptera musculus brevicauda		
Pygmy Blue Whale [81317]	Distribution	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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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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. Please see the caveat for interpretation of information provided here.

Report created: 29-Mar-2022

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment 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 (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	20
Listed Migratory Species:	35

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

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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	60
Whales and Other Cetaceans:	23
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	13
Key Ecological Features (Marine):	1
Biologically Important Areas:	1
Bioregional Assessments:	None
Geological and Bioregional Assessments:	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 a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
EEZ and Territorial Sea

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
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
FISH		
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
[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 likely to occur within area
REPTILE		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour 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 known to occur within area
SHARK		
[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 may occur within area

Scientific Name	Threatened Category	Presence Text
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
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
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
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
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 likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	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	Foraging, feeding or related behaviour 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
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		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 may 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

Scientific Name	Threatened Category	Presence Text
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]
Scientific Name	Threatened Category	Presence Text
Bird		
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

Scientific Name	Threatened Category	Presence Text
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 overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine 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
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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

Scientific Name	Threatened Category	Presence Text
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 Ribboned Pipehorse, Ribboned 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

Scientific Name	Threatened Category	Presence Text
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
Reptile		
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

Scientific Name	Threatened Category	Presence Text
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may 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
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 elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Lapemis curtus as Lapemis hardwickii Spine-bellied Seasnake [83554]		Species or species habitat may occur within area
Leioselasma coggeri as Hydrophis coggeri Black-headed Sea Snake, Slender-necked Seasnake [87373]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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 known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to 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 likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		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
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Steno bredanensis Rough-toothed Dolphin [30]		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
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Australia-ASEAN Power Link	2020/8818	Controlled Action	Proposed Decision
Decommissioning of Challis Oilfield	2003/942	Controlled Action	Post-Approval
Not controlled action			
Coot-1 hydrocarbon exploration well, Permit Area AC/L2 or AC/L3	2001/296	Not Controlled Action	Completed
Exploration Drilling in AC/P17, AC/P18 and AC/P24	2001/359	Not Controlled Action	Completed
Marine Survey for the Australia-ASEAN Power Link AAPL	2020/8714	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D Marine Seismic Survey	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
2D Seismic survey	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey of AC/P4, AC/P17 and AC/P24	2006/2857	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Sandalford 3D Seismic Survey	2012/6261	Not Controlled Action (Particular Manner)	Post-Approval
Vampire 2D Non Exclusive Seismic Survey, WA	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
2D Marine Seismic Survey	2008/4623	Referral Decision	Completed

Key Ecological Features [Resource Information]

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

Name	Region
Carbonate bank and terrace system of the Sahul Shelf	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Sharks		
Rhincodon typus		
Whale Shark [66680]	Foraging	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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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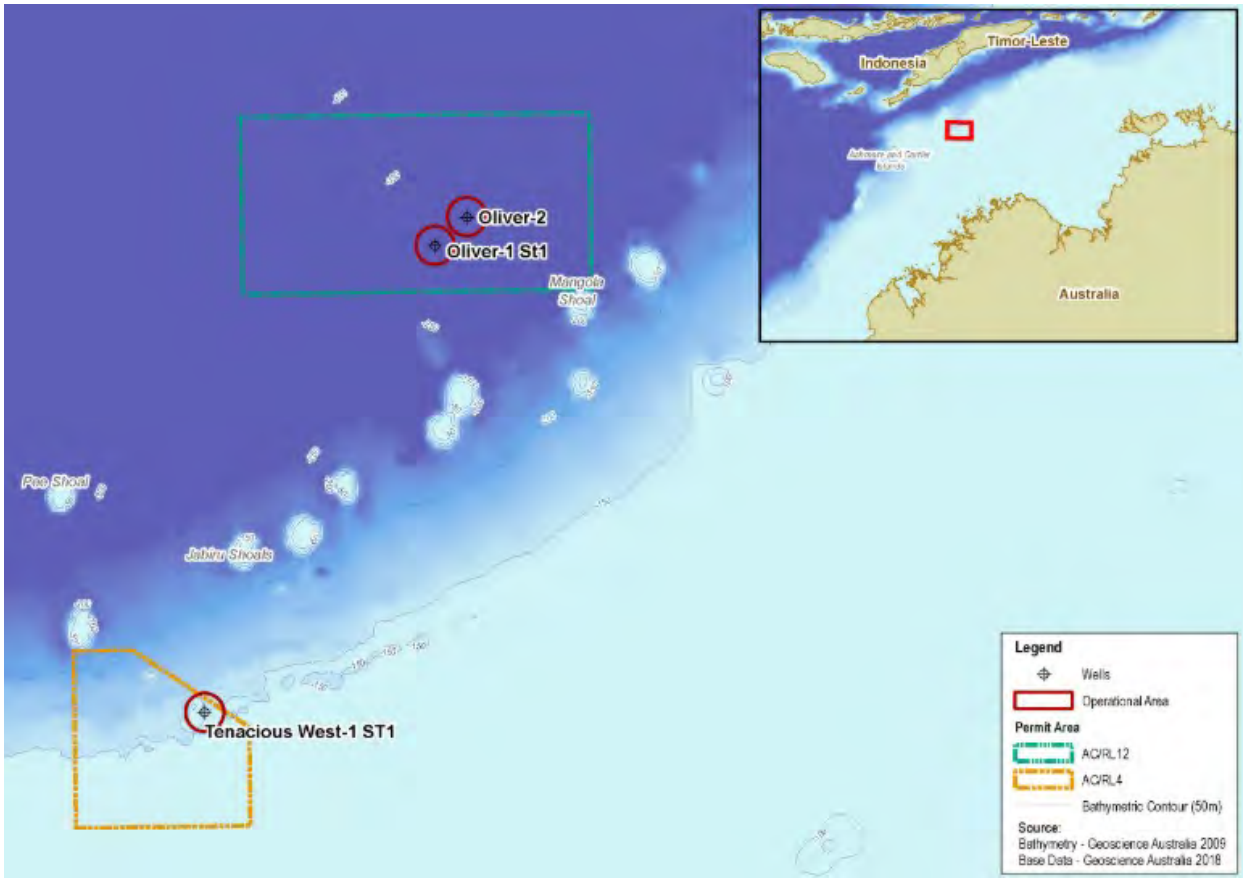
Appendix C: ROV Inspection Report for Oliver-2 and Tenacious West-1 ST1

Intervention Engineering

Inspection of Ten West 1 and Oliver 2 wells

PTTEP / Petrofac



Revision	Date	Comments	Author	Approver
3	23/03/2022		T. Overmars	
2	22/03/2022		T. Overmars	
1	22/03/2022		T. Overmars	
0	18/03/2022		T. Overmars	

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Terms and Abbreviations

Term / Abbreviation	Definition
Approx	Approximately
Demob	Demobilise
DGPS	Differential Global Positioning Satellite
HD	High Definition
IE	Intervention Engineering
Lat	Latitude
Long	Longitude
L&R	Launch and recovery
Mob	Mobilise
NE	North East
NW	North West
PGB	Permanent guide base
SE	South East
SOW	Scope of work
Stbd	Starboard
SW	South West
Ten West 1	Tenacious West-1 ST1 well
TGB	Temporary Guide base
USBL	Ultra Short Base Line

1 Introduction

Intervention Engineering was contracted by Petrofac to inspect the Tenacious West 1 and Oliver 2 wells owned by PTTEP.

The ROV was operated from the Go Spica vessel which was contracted by Petrofac for the operations. The vessel and equipment were mobilised and demobilised from the port of Dampier.

At the request of our clients Intervention Engineering (IE) mobilised a gas sampling tool in case any gas was noted at either of the inspection locations.

The vessel departed Dampier port on the 10-03-22 and began transiting to the first work location. The vessel reached the Ten West 1 well location at 08:30 on the 13-03-22 and began ROV operations directly after arrival.

Once the Ten West 1 well survey was complete, the vessel then transited to the Oliver 2 well location approximately 16 nautical miles away.

The second well inspection on Oliver 2 well was then conducted by the ROV and completed by 19:45 on the 13-03-22. The vessel began is transit back to Dampier port and arrived back in port on the 17-03-22.

2 Client stated objectives

PTTEP and Petrofac outlined the following objectives in their document '*PTTEP Australia*

Petrofac Project Execution Plan ROV Surveillance of Tenacious West-1 ST-1 and Oliver-2'

Under section 2.2 'Objectives' it is stated:

The objectives of the ROV surveillance scope are as follows:

• Survey the condition and integrity of the wellheads and immediate surroundings.

• In the event of escaping gas bubbles, capture samples for further testing onshore.

• Measure the approximate height of the subsea wellheads and the guideposts above the seabed using the ROV depth gauge.

• Conduct a visual inspection of the wellheads surroundings (+/- 10 m radius) e.g cement patio, cuttings mount, etc.

• All of the above is to be recorded using high-definition colour video complete with commentary and anomaly records.

• Conduct the above scope whilst being fully compliant with the PTTEP SSHE policy and fully meeting the PTTEP EP Commitment register.

3 Well locations

These are the locations for the wells given by PTTEP / Petrofac in their document '*PTTEP Australia*

Petrofac Project Execution Plan ROV Surveillance of Tenacious West-1 ST-1 and Oliver-2'

Please note that these locations are given with the location datum GDA94 CM129˚E.

Well name	Ten West 1 ST 1	Oliver 2
Geographical location	Timor Sea	Timor Sea
Location Datum	GDA94 CM129°E	GDA94 CM129°E
Latitude	11° 51' 46.748" S	11° 38' 03.674" S
Longitude	124° 53' 44.131" E	125° 01' 36.470" E
Easting	706 491.5 mE	720 970.84 mE
Northing	8 687 890.2 mN	8 713 089.86 mN

Figure 1 Client supplied location of well heads

4 Tenacious West 1 well

The Ten West 1 well was the first well to be inspected by the ROV.

The vessel arrived at the location at 08:30 on the 13-03-22 and the ROV began operations directly after arrival.

The well was located at the Navigation chart location.

4.1 Condition and integrity of the wellheads and immediate surroundings.

The Ten West 1 well head appeared to be in undamaged condition.

The wellhead had significant hard marine growth and appeared to be a haven for fish and other marine life in the area. (Figure 2)

There was some minor fishing gear entanglement on the wellhead consisting of mostly fishing line. There was no fishing net seen on the wellhead. (Figure 3)

The wellhead had evident corrosion in all main areas, with the TGB appearing the most heavily corroded (Figure 4). There were no anodes seen on the wellhead or guide bases during the survey.

The corrosion cap appeared intact, in place and appeared undamaged. (Figure 5)

There was some scouring occurring under the wellhead, approx 0.3m to 0.4m under the TGB. This lowest point was measured at 1m below mean seabed. (Figure 6)

There is concrete / grout seen around the wellhead on the seabed. A majority of this is broken up into smaller pieces around the wellhead, with one section still intact making a small bridged section. (Figure 7 and 8)

No cuttings from the hole appeared to be around the wellhead area.

Figure 2 Ten West 1 well marine life overview.

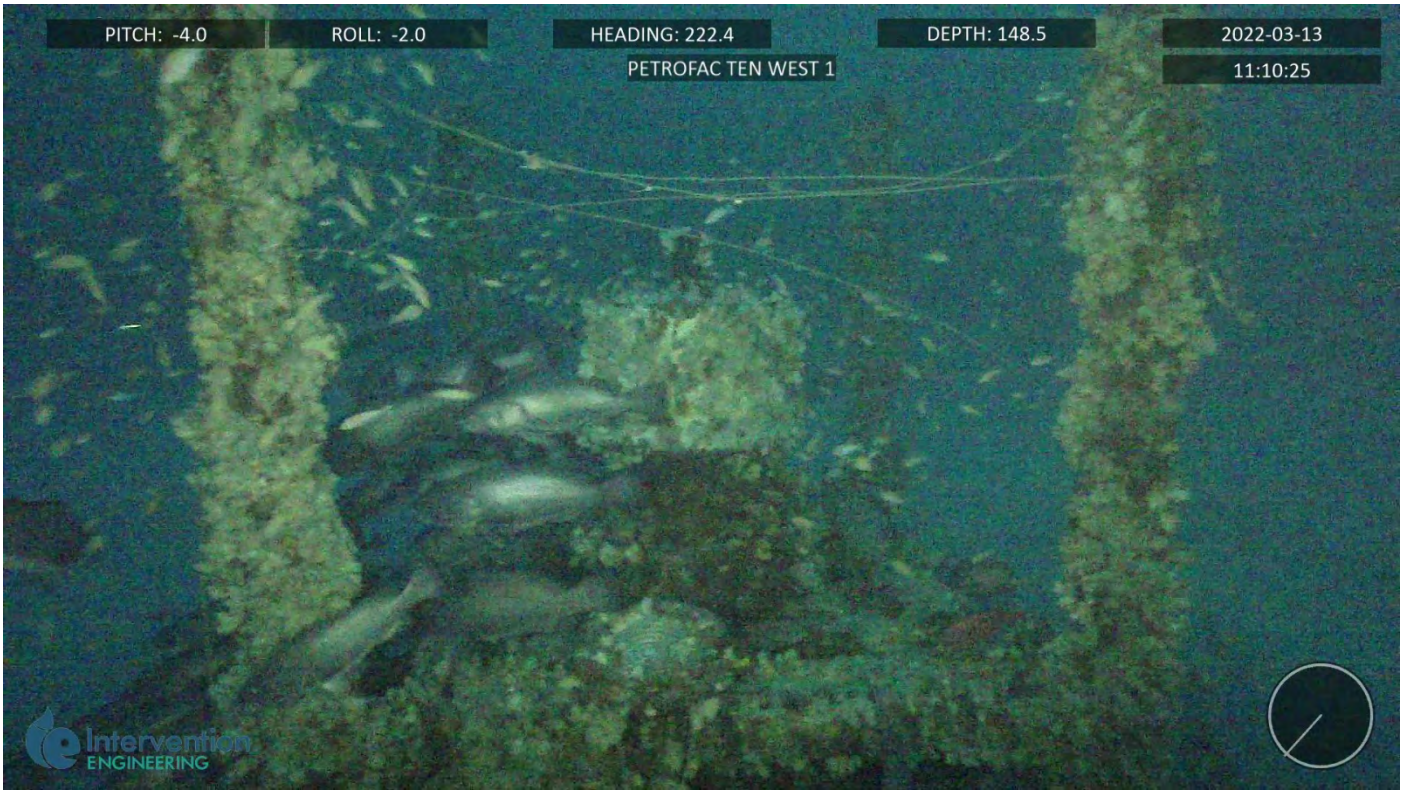

Figure 3 Ten West 1 fishing line entanglement.

Figure 4 Ten West 1 example of corrosion

Figure 5 Ten West 1 corrosion cap

Figure 6 Ten West 1 example scour under guide base.

Figure 7 Ten West 1 example grout on seabed

Figure 8 Ten West 1 example broken grout on seabed

4.2 Escaping gas / Bubble survey

The Ten West 1 wellhead was thoroughly inspected from all four sides, from above and at seabed level looking under the wellhead. The overall inspection of the wellhead and surrounding area took 50min.

At no time during the survey were there any indications of gas bubbles, leaks or hydrocarbon releases of any kind seen, nor any tell tail evidence of previous leaks evident.

As such the gas sampler tool was not required at this location.

4.3 Heights of Wellhead and guideposts above mean seabed

Mean seabed away from the well was measured with the ROV depth gauge to be 150.9m.

- The top of the corrosion cap on the wellhead was seen to be 148.0m – 2.9m above mean seabed.
- The top of the NW guide post was seen to be 147.2m – 3.7m above mean seabed.
- The top of the SW guide post was seen to be 147.2m – 3.7m above mean seabed.
- The top of the NE guide post was seen to be 147.2m – 3.7m above mean seabed.
- The top of the SE guide post was seen to be 147.2m – 3.7m above mean seabed.
- The lowest scour point around the wellhead was seen to be 151.9m – 1m below mean seabed.

4.4 Visual inspection of the wellheads surroundings (+/- 10 m radius)

The Ten west 1 well head is surrounded by flat featureless seabed. The seabed did have some small sand waves, creating ridges and furrows, but these were small in height, approx 0.2m from top to bottom.

No significant marine life was observed on the seabed in the areas surrounding the wellhead. The only significant marine life seen by the ROV during the survey was located in the vicinity directly on or around the wellhead.

The Ten West 1 wellhead had created a depression in the seabed around it which is shown in Figure 9.

Nothing of significance was seen on the seabed surrounding the wellhead 20m in all directions during the survey. The seabed was searched using both visual and sonar techniques.

An example of the seabed around the well is in Figure 10.

Figure 9 Ten West 1 well head and surrounding seabed

Figure 10 Ten West 1 example sorrounding seabed

5 Oliver 2 well

The Oliver 2 well was the second well to be inspected by the ROV.

The vessel arrived at the location at 14:20 on the 13-03-22 and the ROV began operations directly after arrival.

The well was located at the Client Supplied Position, Figure 1.

Unfortunately due to a glitch with the ROV depth gauge during the descent the gauge needed to be zeroed at mean seabed level, so all seabed depths are relative.

Mean seabed away from the well was measured with the vessel echo sounder at 301m

5.1 Condition and integrity of the wellheads and immediate surroundings.

The Oliver 2 well head was found to be in undamaged condition.

The wellhead has significant hard marine growth on all areas and was a haven for fish and other marine life in the area. (Figure 11)

There was no fishing gear entanglement seen on the wellhead.

The wellhead had evident corrosion in all main unpainted areas (Figure 12). There were no anodes seen on the wellhead or guide base.

The corrosion cap was intact, in place and appeared undamaged. (Figure 13)

There is no significant scour seen under the guide base as the PGB appears to be level with the seabed in most areas. Areas that are not in contact with the seabed are only approx 0.1m above seabed. (Figure 14)

Each of the 4 guide posts have a remnant of guide wire hanging out of each post. The small section of guide wire has fallen out of the slit in the guide post and is in contact with the seabed. (Figure 15)

No cuttings from the hole appear to be around the wellhead area.

Figure 11 Oliver 2 marine life overview

Figure 12 Oliver 2 Example of corrosion on wellhead

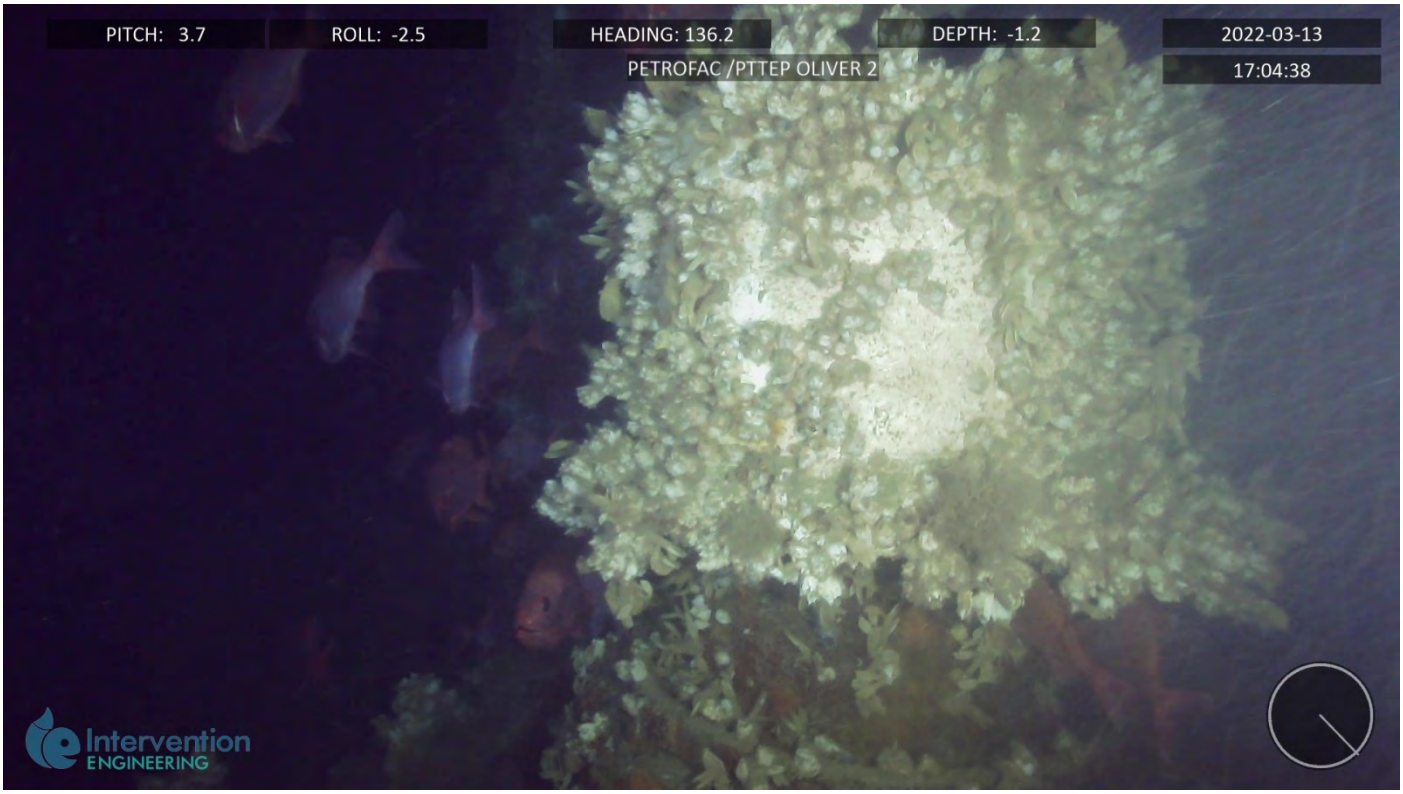

Figure 13 Oliver 2 Corrosion cap

Figure 14 Oliver 2 PGB at seabed level

Figure 15 Oliver 2 Guide wire remenant in contact with seabed

5.2 Escaping gas / Bubble survey

The Oliver 2 wellhead was thoroughly inspected from all four sides and from above the wellhead. The overall inspection of the wellhead and surrounding area took 35min.

At no time during the survey were there any indications of gas bubbles, leaks or hydrocarbon releases of any kind seen, nor any tell tail evidence of previous leaks evident.

As such the gas sampler tool was not required at this location.

5.3 Heights of Wellhead and guideposts above mean seabed

Mean seabed away from the well was measured with the vessel echo sounder at 301m. Unfortunately due to a glitch with the ROV depth gauge the gauge needed to be zeroed at mean seabed. The gauge is still accurate in its measurement, but as it was now zeroed on the seabed, all measurements will be in reference to the mean seabed depth instead of the surface.

- The top of the corrosion cap on the wellhead was seen to be 2.0m above mean seabed.
- The top of the NW guide post was seen to be 3.1m above mean seabed.
- The top of the SW guide post was seen to be 3.1m above mean seabed.
- The top of the NE guide post was seen to be 3.1m above mean seabed.
- The top of the SE guide post was seen to be 3.2m above mean seabed.
- The bottom of the PGB was seen to be at seabed level, so there is no scour.

5.4 Visual inspection of the wellheads surroundings (+/- 10 m radius)

The Oliver 2 well head is surrounded by flat featureless seabed. The seabed does have some small sand waves, creating ridges and furrows, but these are small in height, approx 0.2m from top to bottom.

No significant marine life was observed on the seabed in the areas surrounding the wellhead. The only significant marine life seen by the ROV during the survey was located in the vicinity directly on or around the wellhead.

The Oliver 2 PGB is at seabed level, which is shown in Figure 16. There is a small rise in the seabed around the wellhead, which then goes back to mean seabed. This difference is very small. It is estimated at less than 0.2m (Figure 17)

Nothing of significance was seen on the seabed surrounding the wellhead 20m in all directions. The seabed was searched using both visual and sonar techniques.

An example of the seabed around the well is in Figure 18.

Figure 16 Oliver 2 PGB at seabed level

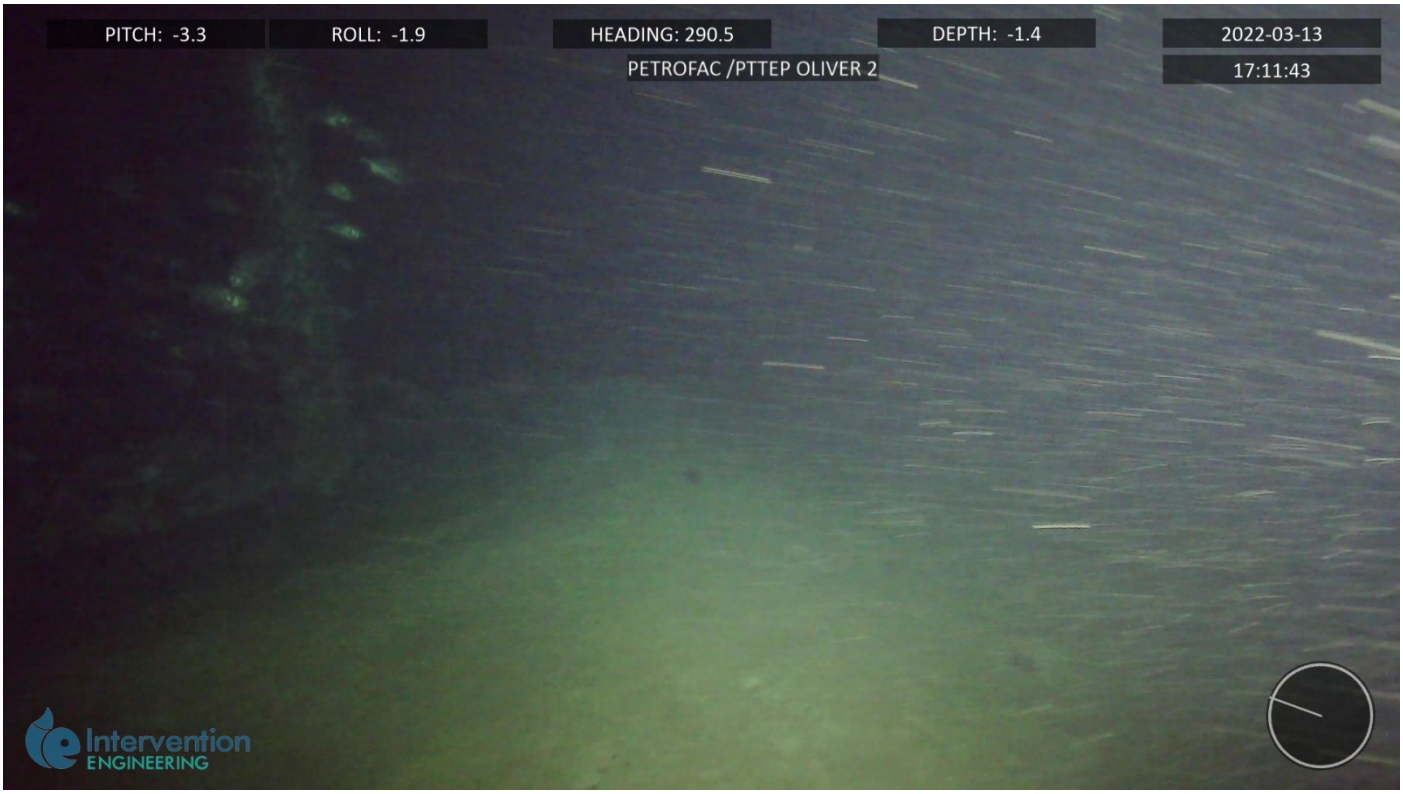

Figure 17 Oliver 2 Seabed around well

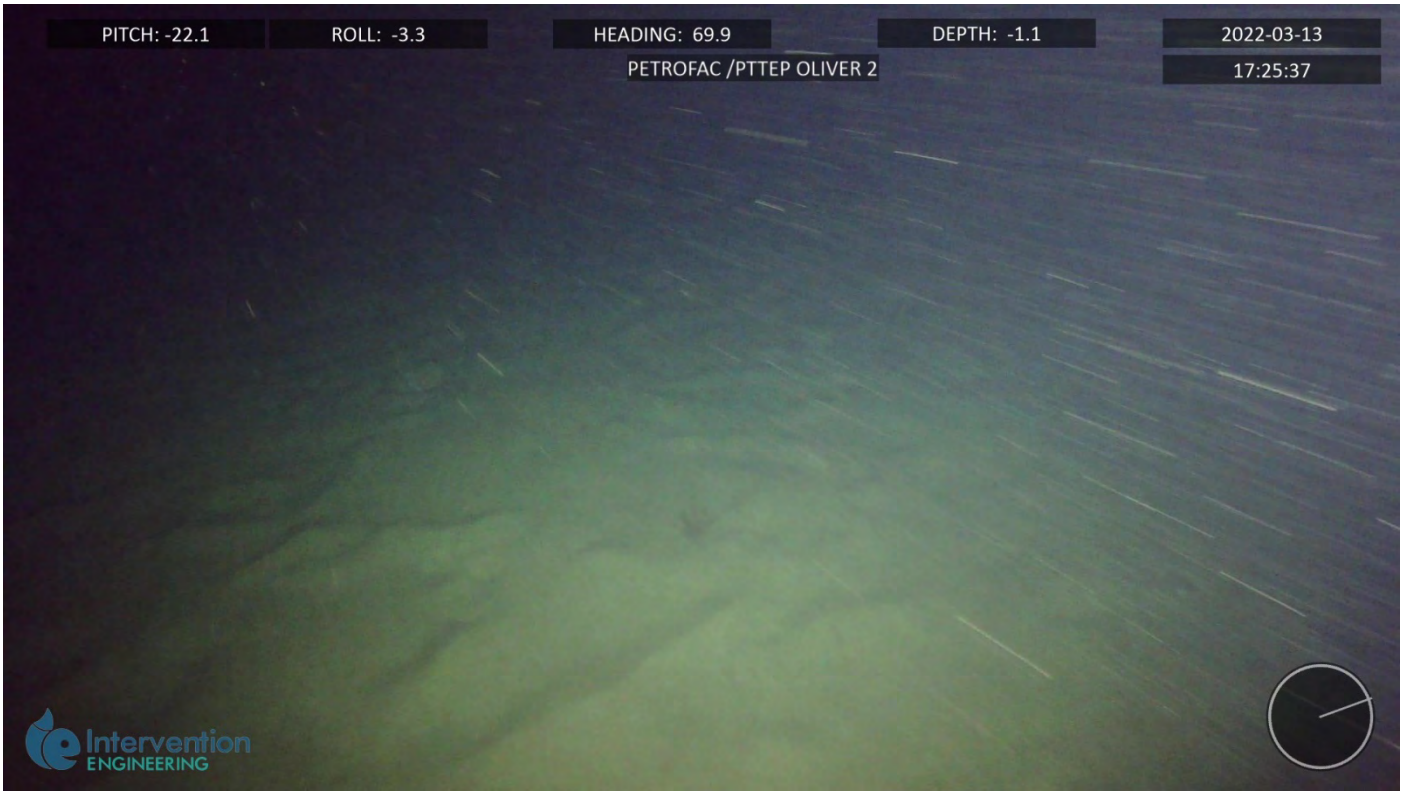

Figure 18 Oliver 2 wellhead example of sorrounding seabed.

6 Conclusions

All client objectives have been met with no injury to personnel or harm to the environment.

The wellheads were located and surveyed in a timely manner.

The wellheads appeared to be in good overall condition with no obvious disturbance.

The project has been conducted effectively even with strong time constraints.

All of the project crew worked well as a team and had good communication throughout. This has led to an effective and efficient survey of the wellheads.

Table 1 Anomaliy register

Anomaly	Location	Description	Picture
Fishing line	Ten West 1	Light fishing line	Ten west 1 - Pic00021
Guide wire NE	Oliver 2	Cut Guide wire	Oliver 2 - Pic00019
Guide wire SW	Oliver 2	Cut Guide wire	Oliver 2 - Pic00020
Guide wire NW	Oliver 2	Cut Guide wire	Oliver 2 - Pic00021
Guide wire SE	Oliver 2	Cut Guide wire	Oliver 2 - Pic00022

Appendix A. Supporting documents for the project

- Dive log 2 – Summary of the dive on Ten West 1 wellhead
- Dive log 3 – Summary of the dive on Oliver 2 wellhead
- Dive 02. Ten west 1 Part 2 13-03-22 video file – Video of the inspection on Ten West 1 wellhead
- Dive 03. Oliver 2 part 2 13-03-22 video file – Video of the inspection on Oliver 2 wellhead
- Dive 02. Ten west 1 sonar. 13-03-22 – Video of the sonar during the inspection of Ten west 1 wellhead
- Dive 03. Oliver 2 sonar. 13-03-22– Video of the sonar during the inspection of Oliver wellhead
- Daily progress reports issued to client from 08-03-22 to the 17-03-22. Summary of daily activities.

All documents and videos can be found on the portable hard drive handed to Petrofac client representative.

Additional copies will be held by IE for auditing and backup purposes.

Appendix D: Options Assessment Worksheet

Assessment Criteria	Sub-criteria	Base Case: Complete removal of Oliver-2 and Tenacious West-1 ST1 wellheads		Option 1: Leave Oliver-2 and Tenacious West-1 ST1 wellheads in situ	
		Ranking	Assessment	Ranking	Assessment
Environment	**Water quality and sediment impacts**	3	Negligible impacts may occur as a result of seabed disturbance and reduced water quality from a) cleaning off marine growth from the wellheads to remove the cap; b) small volumes of grit and flocculent potentially released to surface sediments during cutting; and b) lifting the wellheads off the seabed.	3	In the long-term the wellheads degrade resulting in the discharge of trace amounts of metals (steel) and elastomeric materials to surrounding sediments, with negligible, highly localised, impacts on sediment quality and water quality in the surrounding water column.
	Benthic habitat impacts	4	Removal of marine habitat growth on wellheads and permanent removal of the substrate for benthic habitat growth, which is expected to be very minor given the limited surface area of the wellheads and water depths (~150 to 310 m). Potentially significant but highly localised seabed disturbance surrounding the wellhead may occur during removal from high pressure water jetting and removal of excess cement around the conductor, which may be broken up during the removal process.	3	The wellheads will continue to act as a hard substrate, potentially supporting the growth of some limited benthic habitat for marine fauna. Over the long-term the wellheads will degrade resulting in discharge of trace amounts of metals (steel) to the surrounding sediments with negligible, highly localised, impacts on benthic habitat.
	Marine fauna impacts	3	Generation of noise from the project vessel (including dynamic positioning systems), ROV equipment and cutting tool may result in localised avoidance or behavioural changes in marine fauna. Given the duration of activities associated with complete removal of the wellheads, noise impacts to marine fauna are negligible. Similarly, the potential for vessel collision with marine fauna is negligible given the short duration of the activity.	1	Impacts to marine fauna from leaving the wellheads in situ are not expected. The wellheads will continue to support some limited marine growth which may attract fish in the local area until the wellheads slowly degrade and break down in the future.
	Emissions	3	Negligible emissions to air from vessel operating in field for a short duration (approximately 1.5 days per wellhead) and emissions during wellhead disposal. Potential impacts are expected to have no lasting effect, with no cumulative impacts when considered in the context of existing commercial shipping operations in the wider region.	1	No emissions released from the leave in situ option.
	Waste impacts	4	Negligible to minor impacts as a result of waste created through disposal of the wellheads.	1	No waste generated from the leave in situ option.
	Hydrocarbon spill risk	7	Vessel collision resulting in an oil spill is a highly unlikely but credible risk as a result of collision with a third party vessel.	1	No hydrocarbon spill risk from the leave in situ option.

Assessment Criteria	Sub-criteria	Base Case: Complete removal of Oliver-2 and Tenacious West-1 ST1 wellheads		Option 1: Leave Oliver-2 and Tenacious West-1 ST1 wellheads in situ	
		Ranking	Assessment	Ranking	Assessment
Socio-Economic	**Short-term impact on commercial fisheries**	1	No risk of displacement of existing fisheries during wellhead removal operations as the wellheads are located outside the Australian EEZ and therefore there is no overlap with commercial fisheries. Furthermore, the duration of the activity would be short (approximately 1.5 days per wellhead).	1	No commercial bottom trawl fishing currently operates in the area therefore there is no short-term commercial risk to fisheries.
	Short-term impact on other marine users	3	Negligible impacts on other marine users as the wellheads are located outside of any major shipping routes and given the distance offshore waters (approximately 240 km north of the mainland coastline) the area is not likely to be accessed for tourism activities.	1	There is no risk of impact to recreational marine users or shipping due to the water depths of the wellheads (~150 to 310 m).
	Long-term impact on commercial fisheries	1	No long-term impacts.	3	Future trawling is not expected in the area of the wellheads. Australia exercises seabed jurisdiction under the 1997 Perth Treaty, although the area of the wellheads is outside the Australian EEZ and there is no current overlap with Australian commercial fisheries. Trawling is not expected to extend into the Perth Treaty Area in the future as Indonesia exercises jurisdiction over the water column. The Timor Sea is closed to trawling by Indonesian vessels. No objections or concerns were raised through stakeholder consultation. AHO have been advised of the location of the wellheads for marking on navigational charts.
	Long-term impacts on other marine users	1	No long-term impacts.	1	There is no risk of impact to recreational marine users or shipping due to the water depths of the wellheads (~150 to 310 m). No objections or concerns were raised through stakeholder consultation. Furthermore, AHO have been advised of the location of the wellheads for marking on navigational charts.
Technical Feasibility	**Technical feasibility risk**	3	Cutting of wellheads via water jet cutting is a proven technology, with minor risk of project failure. There is a remote possibility that cutting will not be successful due to separation of individual parts of the wellhead during cutting,	1	No risk.

Assessment Criteria	Sub-criteria	Base Case: Complete removal of Oliver-2 and Tenacious West-1 ST1 wellheads		Option 1: Leave Oliver-2 and Tenacious West-1 ST1 wellheads in situ	
		Ranking	Assessment	Ranking	Assessment
			or the infrastructure being excessively cemented. Multiple attempts may be required to successfully cut and lift the wellhead if large volumes of excess cement are present around the conductor, which may also be covered by seabed sediment.		
	Industry experience risk	3	Technology requirements and track record of equipment is well understood. PTTEP has prior experience with this activity (outside Australia).	1	No risk.
Health and Safety	**Risk to project personnel offshore**	7	Moderate safety risks include: • Lifting • General risks of having a vessel operating offshore (includes adverse weather).Risk of vessel collision with third party vessel.	1	No in field activity, therefore no risk.
	Short-term safety risk to other marine users	3	Negligible safety risk to other marine users from a vessel operating in-field for a short duration (approximately 1.5 days per wellhead).	1	No in field activity, therefore no risk.
	Long-term safety risks to other marine users	1	No long-term safety risks.	3	Snagging of trawling equipment on a wellhead is a potential safety risk. However, future trawling is not expected in the area of the wellheads. Australia exercises seabed jurisdiction under the 1997 Perth Treaty, although the area of the wellheads is outside the Australian EEZ and there is no current overlap with Australian commercial fisheries. Trawling is not expected to extend into the Perth Treaty Area in the future as Indonesia exercises jurisdiction over the water column. The Timor Sea is closed to trawling by Indonesian vessels. No objections or concerns were raised through stakeholder consultation. AHO have been advised of the location of the wellheads for marking on navigational charts.