ConocoPhillips

Australia Business Unit - West

Barossa Project

CONTROLLED DOCUMENT

Title:

BAROSSA GAS EXPORT PIPELINE INSTALLATION ENVIRONMENT PLAN

Document ID:

BAA-100 0329

3	07-Feb-2020	Issued for Use	Phillips, Rob	Smith, Rochelle	Moroz, Matthew
REV	**REV DATE**	**DESCRIPTION**	**PREPARED BY**	**CHECKED BY**	**APPROVED BY**

Approval Details		
Prepared By:	**Team ID:**	**Date**
Phillips, Rob	rphilli5	07-Feb-2020

Verified By:	**Team ID:**	**Date**
Smith, Rochelle	rsmith39	07-Feb-2020 08:32 AM

Approved By:	**Team ID:**	**Date**
Moroz, Matthew	MOROZM	07-Feb-2020 08:59 AM

This document has been electronically verified and approved in accordance with the Project Information Management System (Pims) prior to issue. An audit trail of verification and approval is available within Pims, and as such signatures are not required. Only the latest approved revision of the digital version is considered valid for use.

Consultant:
Arundel, Seamus
Dinan, Pat T
Ewin, Kayleen J
Haslam, Ben
Moroz, Matthew
Ovenden, Steven P
Roach, Thomas M
Smith, Rochelle

ConocoPhillips

Australia Business Unit West

Barossa Project

CONTROLLED DOCUMENT

Barossa Gas Export Pipeline Installation Environment Plan

Document ID:

BAA-100 0329

REV	REV DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
3	06-February-2020	Re-issue for use	R Phillips	R Smith	M Moroz
2	30-October-2019	Re-issue for use	R Phillips	R Smith	M Moroz
1	6-August-2019	Re-issue for use	R Phillips	R Smith	M Moroz
0	29-July-2019	Issue for use	R Phillips	R Smith	M Moroz
C	3-July-2019	Issue for review	Jacobs	R Phillips	M Moroz
B	27-May-2019	Issue for review	Jacobs	Jacobs	
A	15-May-2019	Issue for review	Jacobs	Jacobs	

Authorisation of Document

Position Title	Name	Signature	Date
Vice President Barossa	Steve Ovenden		7/2/2020
Barossa Project Director	Pat Dinan	Pat Dinan	7/2/2020
Barossa HSEQ Manager	Mathew Moroz		6/02/2020
Pipelines and Subsea Facilities Manager	Seamus Arundel		7/2/2020
ConocoPhillips Senior Legal Council	~~Sandra Chivilo-Goode~~ DAVID BRIDGES	D.J. Bridges	7/2/2020

This page is intentionally left blank.

Environment Plan Summary

This Barossa Gas Export Pipeline Installation EP summary has been prepared from material provided in this EP. The summary consists of the following information as required by regulation 11(4) of the OPGGS (E) Regulations:

EP Summary material requirement	Relevant section of EP containing EP Summary material
The location of the activity	**Section 3.2**
A description of the receiving environment	**Section 4**
A description of the activity	**Section 3**
Details of the environmental impacts and risks	**Section 5**
The control measures for the activity	**Section 5.3.10, Table 6-1 and Table 7-7**
The arrangements for ongoing monitoring of the titleholders environmental performance	**Section 7.6**
Response arrangements in the oil pollution emergency plan	**Section 7.10**
Consultation already undertaken and plans for ongoing consultation	**Section 8**
Details of the titleholders nominated liaison person for the activity	**Section 1.5.2**

CONTENTS

1 INTRODUCTION

1.1 Overview

ConocoPhillips Australia Barossa Pty Ltd (ConocoPhillips) proposes to install the Barossa Gas Export Pipeline. The pipeline is located in Commonwealth waters and extends from the Barossa Gas Field, approximately 227 km north of the Northern Territory (NT) mainland, to the existing Bayu-Undan to Darwin pipeline, approximately 100 km north of the NT mainland. ConocoPhillips and its Joint Venture Partners have applied to National Offshore Petroleum Titles Administrator (NOPTA) for a pipeline licence and the pipeline will be installed within the licence area.

The activity covered in this Barossa Gas Export Pipeline Installation Environment Plan (EP) is part of the Barossa Project, a project to develop a gas and light condensate field using a Floating Production Storage and Offloading (FPSO) facility, subsea production system, supporting subsea infrastructure and the pipeline. The Barossa Project (including the pipeline) is described in the Barossa Area Development Offshore Project Proposal (OPP) which was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in March 2018.

This EP specifically addresses installation of the gas export pipeline. Other activities related to the Barossa Project are subject to separate EPs, where relevant.

1.2 Scope

The activity will consist of the installation of a 262 km long, 26-inch outer diameter carbon steel, concrete coated rigid pipeline. The pipeline installation activity includes pre-lay survey, installation of pre and post lay span rectification; installation of pipeline end terminations (PLETs) including foundations; flooding, cleaning, gauging and testing; dewatering and pre-conditioning activities. Operation of the gas export pipeline (once installed) is outside the scope of this EP.

This EP identifies and evaluates the potential environmental impacts and risks from routine/planned activities associated with the gas export pipeline installation within the Operational Area. The Operational Area comprises a 3000 m radius around the PLET locations and a 2000 m buffer along the gas export pipeline route; the buffer along the proposed pipeline route is reduced in some sections to the east and west of the pipeline centreline to remain within the pipeline installation corridor presented in the accepted OPP. The Operational Area is further defined in **Section 3.3.1**. The EP also includes assessment of any potential impacts and risks from non-routine/unplanned activities that originate from the gas export pipeline installation activities within the Operational Area.

Activities outside of the defined Operational Area, are outside the scope of this EP. These activities will be undertaken in accordance with relevant legislation – most notably, the *Navigation Act 2012* (Cth) – and therefore fall within the jurisdiction of the Australian Maritime Safety Authority (AMSA).

1.3 Purpose and Objective

This EP has been prepared as part of the requirements under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (OPGGS (E) Regulations), as administered by NOPSEMA. The purpose and objectives are to:

1. Meet the requirements of the OPGGS (E) Regulations; and
2. Provide a document for the workforce detailing how the activities are to be undertaken in an environmentally responsible manner.

1.4 Structure of the Environment Plan

The EP structure and the relevant sections of the OPGGS (E) Regulations are outlined in **Table 1-1.**

Table 1-1: EP structure, content and relevant sections of the OPGGS (E) Regulations

OPGGS (E) Regulation	Summary of Requirements	EP Section
	Regulation 13. Environmental assessment	
	Description of the activity	
13(1) (a, b, c, d)	Comprehensive description of the activity	3
	Description of the environment	
13(2) (a, b)	Description of the existing environment that may be affected by the activity and details of the particular relevant values and sensitivities (if any) of that environment	4
13(3) (a, b, c, d, e, f)	Description of the particular relevant values and sensitivities, including Matters of National Environmental Significance (MNES) as listed under Part 3 of the EPBC Act, e.g. National Heritage places, presence of listed threatened species and Commonwealth Marine Reserves	4.5.1
	Requirements	
13(4) (a, b)	Description of the requirements, including legislative requirements, which apply to the activity and are relevant to the environmental management of the activity and demonstration of how these requirements will be met	2
	Evaluation of environmental impacts and risks	
13(5) (a, b, c) 13(6) (a, b)	Details of the environmental impacts and risks for the activity, and an evaluation of all the impacts and risks appropriate to the nature and scale of each impact and risk, including all the environmental impacts and risks arising directly or indirectly from all operations of the activity and potential emergency conditions Details of the control measures that will be used to reduce the impacts and risks of the activity to ALARP and an acceptable level	5
13(7) (a, b, c)	Definition of EPSs for the control measures, EPOs against which performance in protecting the environment is to be measured, and MC which will be used to determine whether the EPOs and EPSs are being met	6
	Regulation 14. Implementation strategy for the environment plan	
14(1)	Description of implementation strategy for the activity	7
14(2)	Details of when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity, including that the interval between reports will not be more than one year	7.7
14(3) (a, b, c)	Description of the environmental management system, including specific measures that will be used to ensure that, for the duration of the activity, environmental impacts and risks of the activity continue to be identified and managed to ALARP and acceptable level through the control measures, and environmental outcomes and standards are being met.	5.3.10 and 7.6
14(4)	Definition of a clear chain of command, setting out of the roles and responsibilities of personnel in relation to the implementation, management and review of the EP, including during emergencies or potential emergencies	7.4
14(5)	Details of measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of their responsibilities in relation to the EP, including during emergencies or potential emergencies, and have the appropriate competencies and training	7.4 and 7.5

OPGGS (E) Regulation	Summary of Requirements	EP Section
14(6)	Provision of sufficient monitoring, recording, audit, management of nonconformance and review of environmental performance to ensure the environmental performance outcomes and standards in the EP are being met	7.6
14(7)	Provision of sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the EP are being met	7.6
14(8)	Oil Pollution Emergency Plan (OPEP) and provision for the maintenance of the plan	7.10 and Barossa Gas Export Pipeline Installation OPEP (BAA-100 0330); Appendix H
14(8AA) (a, b, c, d), 14(8[a]), 14(8B), 14(8C) (a, b, c, d, e), 14(8D), 14(8E)	Details of arrangements for responding to and monitoring oil pollution and testing these response arrangements, including demonstrating that the response arrangements are consistent with the national system for oil pollution preparedness and response	Barossa Gas Export Pipeline Installation OPEP (BAA-100 0330); Appendix H
14(9) (a, b)	Demonstration of consultation with relevant authorities of the Commonwealth, states, territories and other relevant interested persons or organisations	8 and Appendix E
14(10)	Description of the OPGGS Act, its associated regulations and any other environmental legislation applying to the activity	2
Regulation 15. Details of titleholder and liaison person		
15(1)	Details for the titleholder, including name, business address and telephone number	1.5.1
15(2)	Details for the titleholder’s nominated liaison person, including name, business address and telephone number	1.5.2
15(3)	Details of arrangements for notifying NOPSEMA of a change in the titleholder, a change in the titleholder’s nominated liaison person or a change in the contact details for either the titleholder or the liaison person	1.5.3
Regulation 16. Other information in the environment plan		
16(a)	Statement of the titleholder’s corporate environmental policy	7.1.2
16(b)	A report on all consultations between the titleholder and any relevant person	8 and Appendix F
16(c)	Details of all reportable incidents in relation to the proposed activity	7.8.1

1.5 Description of the Titleholder

ConocoPhillips Australia Barossa Pty Ltd (previously registered as ConocoPhillips Australia Exploration Pty Ltd until 17 May 2018) will be one of the future titleholders. ConocoPhillips Australia Exploration Pty Ltd was the proponent for the Barossa Area Development OPP.

ConocoPhillips Company (United States entity) is the world's largest independent exploration and production company. Through various Australian registered company subsidiaries, ConocoPhillips Company undertakes exploration activities, and holds and operates assets in the Timor Sea, Northern Territory (NT), Western Australia (WA) and Queensland (QLD). ConocoPhillips Company has been operating in Australia and the Greater Sunrise special regime area (formerly the Joint Petroleum Development Area) since the mid-1990s. Its activities in Australia are currently managed, operated and administered through its Australian Business Units (BUs).

Australia Business Unit-West (ABU-W) oversees the operation of the Bayu-Undan gas condensate field in the Timor Sea, the Darwin liquified natural gas (DLNG) facility in the NT and the 502 km pipeline linking the two facilities. ABU-W has also been safely and successfully undertaking exploration and appraisal activities in its offshore acreage in both the Bonaparte Basin (the Barossa appraisal drilling campaign, 2017; the Caldita-Barossa 3D marine seismic survey, 2016; the Bonaparte Basin Barossa appraisal drilling campaign, 2013-14) and the Browse Basin (the Browse exploration drilling campaign, 2012-14).

Australia Business Unit-East (ABU-E) oversees the operation of the Australia Pacific LNG (APLNG) facilities located on Curtis Island in QLD.

1.5.1 Titleholders

Titleholders will be:

ConocoPhillips Australia Barossa Pty Ltd
53 Ord Street,
West Perth, WA, 6005
Phone: + 61 8 9423 6666
Australian company number: 109 974 932

Santos Offshore Pty Ltd
Ground Floor, Santos Centre
60 Flinders Street, Adelaide, SA 5000
Australian company number: 005 475 589

SK E & S Australia Pty Ltd
c/- 26 Jong-ro,
Jongno-gu
Seoul 03188, KOREA
Australian company number: 158 702 071

1.5.2 Liaison Person

The ConocoPhillips Liaison person is as follows:

Name:	Matt Moroz
Title:	Barossa Project – HSE & Quality Manager
Address:	53 Ord Street, West Perth, WA, 6005
Telephone:	08 9423 6666
Email:	Barossa@conocophillips.com

1.5.3 Relevant Parties and Interfaces

ConocoPhillips (37.5%) with its co-venturers SK E&S Australia Pty Ltd (37.5%), an affiliate of South Korean conglomerate SK Group, and Santos Offshore Pty Ltd (25%) have applied for a pipeline licence, which is currently pending.

While each co-venturer participant of this activity is the petroleum titleholder (i.e. registered holder of the petroleum retention lease area), ConocoPhillips has been nominated as the nominee titleholder for taking eligible voluntary actions for the activity, such as making submissions, under Subsection 775B of the OPGGS Act.

2 ENVIRONMENTAL LEGISLATION AND OTHER REQUIREMENTS

This section presents a summary of the main legislation and legal instruments applicable to the acceptance of this EP. A comprehensive list of legislation is provided in **Appendix A**.

2.1 Commonwealth Legislation

2.1.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)

The OPGGS Act provides protection of the environment in Commonwealth Waters (as well as designated State and NT waters where functions have been conferred), by ensuring that all offshore petroleum and greenhouse gas storage activities are undertaken in a manner where impacts and risks to the environment including those MNES protected under Part 3 of the EPBC Act, are of an acceptable level and reduced to ALARP. The OPGGS Act requires all activities to be consistent with the principles of ecologically sustainable development (ESD), as defined in the EPBC Act (Section 3A) and outlined in **Section 2.1.4** below.

Section 572(3) of the Act requires a titleholder to remove all structures from the title area. To this end the pipeline and associated structures shall be designed to meet the base case for removal.

The OPGGS Act is supported by a range of subordinate legislation. Of primary relevance to this EP are the OPGGS (E) Regulations, which provide further definition and guidance on the environment management of offshore petroleum and greenhouse storage activities. The OPGGS Act and supporting regulations are administered by NOPSEMA.

2.1.2 OPGGS (Environment) Regulations

The OPGGS (E) Regulations provide protection of the environment in Commonwealth waters, as well as designated State and Territory waters where functions have been conferred. The objectives of the OPGGS (E) Regulations are to ensure that petroleum and greenhouse gas activities undertaken in an offshore area are carried out in a manner:

- consistent with the principles of ESD, as defined in section 3A of the EPBC Act;
- by which the environmental impacts and risks of the activity will be reduced to ALARP; and
- by which the environmental impacts and risks of the activity will be of an acceptable level.

The criteria for determining an acceptable EP, as per Regulation 10A of the OPGGS (E) Regulations, are that the EP:

- is appropriate for the nature and scale of the activity;
- demonstrates that the environmental impacts and risks of the activity will be reduced to ALARP;
- demonstrates that the environmental impacts and risks of the activity will be of an acceptable level;
- provides for appropriate EPOs, EPSs and MCs;
- includes an appropriate implementation strategy and monitoring, recording and reporting arrangements;
- does not involve the activity or part of the activity, other than arrangements for environmental monitoring or for responding to an emergency, being undertaken in any part of a declared World Heritage property within the meaning of the EPBC Act;
- demonstrates that the titleholder has carried out the consultations required by Division 2.2A, and the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate; and
- complies with the OPGGS Act and the regulations.

2.1.3 Barossa Offshore Project Proposal

Environmental management of petroleum activities in Commonwealth waters is governed under the OPGGS Act and OPGGS (E) Regulations. As an offshore project, the OPGGS (E) Regulations required ConocoPhillips to submit an OPP for the Barossa Project, which was accepted by NOPSEMA in March 2018.

The OPP was developed in the early stages of the project before front end engineering design was complete. This EP has been developed based on more detailed engineering work and therefore includes more specifics than included in the OPP. In addition, some of the project characteristics and methodology have been refined based on the additional knowledge gained through further studies and surveys. These changes and any implications on the consequence of impacts have been reviewed and are summarised in **Appendix G**. No significant changes to environmental impacts or risks have been identified as a result of front-end engineering design.

The Barossa OPP presented a pipeline corridor within which the gas export pipeline would be installed. The Barossa OPP identified the activities associated with the installation, operation and decommissioning of the pipeline and assessed potential impacts. Subsequent field investigations and engineering studies have been completed and provided further information on potential pipeline routes within the proposed pipeline corridor both inside and outside of the Oceanic Shoals Marine Park Habitat Protection Zone. ConocoPhillips has undertaken a comparative assessment of these candidate pipeline routes and determined a proposed pipeline route based on a number of considerations, including environmental, technical, financial and operational factors. The proposed pipeline route is the subject of this EP.

A more detailed description of the Barossa Project can be found in the Barossa OPP, which is available on the NOPSEMA website at:

- https://www.nopsema.gov.au/environmental-management/assessment-process/offshore-project-proposals/offshore-project-proposals-public-comment/barossa-area-development-offshore-project-proposal/

Links to additional information (e.g. factsheets and current concept image) is also available on the ConocoPhillips Australia website at:

- http://www.conocophillips.com.au/what-we-do/our-projects-activities/barossa-project/

2.1.4 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The EPBC Act and supporting regulations provide for the protection of the environment and conservation of biodiversity in Australia. Under Commonwealth government streamlining arrangements, NOPSEMA's assessment of this EP provides an appropriate level of consideration of the impacts to matters of national environmental significance (MNES) protected under Part 3 of the EPBC Act. This removes the requirement to refer the project to the DoEE.

Regulation 3 of the OPGGS (E) Regulations requires that petroleum activities be carried out in a manner consistent with the principles of ESD set out in section 3A of the EPBC Act, which are:

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

The OPGGS (E) Regulations include requirements for the consideration of MNES, including the following (as per Regulation 13(3):

- the world heritage values of a declared World Heritage property within the meaning of the EPBC Act;
- the national heritage values of a National Heritage place within the meaning of that Act;
- the ecological character of a declared Ramsar wetland within the meaning of that Act;
- the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act;
- the presence of a listed migratory species within the meaning of that Act; and
- any values and sensitivities that exist in, or in relation to, part or all of:
  - a Commonwealth marine area within the meaning of that Act or
  - Commonwealth land within the meaning of that Act.

2.1.4.1 Australian Marine Parks Licence

The proposed Barossa gas export pipeline route traverses two zones of the Commonwealth Oceanic Shoals Marine Park: a 30 km section through the Multiple Use Zone; and 31.5 km through the Habitat Protection Zone.

Multiple Use Zone

Mining operations, including oil and gas operations, may be conducted in a Multiple Use Zone (VI) subject to conditions of a class approval and prescriptions within the North Marine Parks Network Management Plan (Director of National Parks, 2018). The 'Class Approval – Mining Operations and Greenhouse Gas Activities' came into effect on 1 July 2018 at the same time as the management plan for Australian Marine Parks in the North Network. The conditions of the Class Approval for the North Marine Parks Network Management Plan that are considered relevant to the scope of this EP are provided in Table 2-1.

Habitat Protection Zone

Construction and operation of a pipeline (and the carrying on of other activities for the purposes of those operations e.g. surveys) through a Habitat Protection Zone (IV) is authorised through the issue of a Commercial Activity Licence by the Director of National Parks. ConocoPhillips applied for a licence from the Director of National Parks.

As part of the licence application process, ConocoPhillips considered the following in relation to the development of the gas export pipeline route:

- the values of the Oceanic Shoals Marine Park (4.6.3),
- the environmental impacts and risks from the installation, operation and decommissioning of the gas export pipeline within the Oceanic Shoals Marine Park
- consultation outcomes, including consultation in relation to the Barossa OPP, and
- the gas export pipeline route assessment, including potential alternative routes outside the Oceanic Shoals Marine Park.

As per the prescription (4.2.9.6) in the North Marine Parks Network Management Plan, the Director of National Parks will only authorise a pipeline through a Habitat Protection Zone if alternative routes are not feasible or practicable.

The licence application considered the alternative gas export pipeline routes that were identified by ConocoPhillips both through and around the Oceanic Shoals Marine Park. Each of the alternative routes were subjected to an assessment process that considered the:

- footprint of the proposed activity

- feasibility – can the route feasibly be constructed using available technologies and within the constraints of the Barossa project? and
- practicability – comparative assessment of environmental, societal, safety, technical and economic criteria.

As per the above criteria, routing the gas export pipeline through the Oceanic Shoals Marine Park Habitat Protection Zone (i.e. the route presented in this EP) was determined by this process to meet the decision-making criteria of the North Marine Parks Management Plan.

ConocoPhillips received the Commercial Activity Licence from the Director of National Parks in April 2019. The 'Licensed Activities' include "the construction, installation, operation, inspection, maintenance, repair and decommissioning of the GEP and the related capture of images, video and sound within or of the Park". The 'Licence Area' is described in detail in the Licence and includes the pipeline installation corridor buffered by 2000 m on either side. The 'Licence Area' is consistent with the definition of 'Operational Area' in this EP (**Section 3.2.1**).

The licence is comprised of:

(a) Part A – The brief Particulars of the Licence and execution page

(b) Part B – Terms and conditions specific to the Licensed Activities and/or the Park, plus an Annexure specifying further details of the Particulars; and

(c) Part C – The general terms and conditions that apply to the Licence.

Conditions considered relevant to the scope of this EP are provided in **Table 2-2**.

The commencement date of the licence is the date on which the Barossa Gas Export Pipeline Licence is granted under the OPGGS Act.

Table 2-1: Conditions from the Class Approval – Mining Operations and Greenhouse Gas Activities for the North Marine Parks Network Management Plan 2018 relevant to the activities in this EP.

Condition Number	Condition	Relevant Section of EP
1	Approved action must be conducted in accordance with: a) an environment plan accepted under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (2009) (Cth)	This EP
	b) the EPBC Act	**Section 2**
	c) the Environment Protection Biodiversity Conservation Regulations 2000 (EPBC Regulations)	**Section 2**
	d) the North Network Management Plan	**Section 5.2** **Section 5.3**
	e) any prohibitions, restrictions or determinations made under the EPBC Regulations by the Director of National Parks	Not applicable
	f) all other applicable Commonwealth and state and territory laws (to the extent those laws are capable of operating concurrently with the laws and instruments described in paragraphs a-e)	**Section 2 and Appendix A**
2	If requested by the Director of National Parks, an Approved Person must notify the Director prior to conducting Approved Actions within Approved Zones. Note: the timeframe for prior notice will be agreed to by the Director of National Parks and the Approved person.	**Section 7.7.2**

Condition Number	Condition	Relevant Section of EP
3	If requested by the Director of National Parks, an Approved person must provide the Director with information relating to undertaking the Approved Actions or gathered while undertaking the Approved Actions) that is relevant to the Director's management of the Approved Zones. Note: the information required and timeframe within which it is required will be agreed to by the Director of National Parks and the Approved Person.	Not applicable

Table 2-2: Conditions from the Commercial Activity Licence relevant to the environmental management of the activities in this EP.

Condition Number	Condition	Relevant Section of EP
Part B	**Park and Licensed Activities specific conditions**	
4.1	The Licensees must consult the Director as a Relevant Person during the development of all environment plans.	**Section 8**
4.4	The Licensees must: (a) notify the director of the grant of the GEP Licence (if granted) within 24 hours of its grant; (b) notify the Director of the acceptance or refusal of an environment plan by NOPSEMA within 24 hours of its acceptance or refusal. (c) following acceptance of an environment plan by NOPSEMA, provide the Director with a copy of that environment plan within 10 business days of acceptance. (d) following the completion of construction of the GEP, promptly provide the Director with as built coordinates for the location of the GEP in degrees, minutes and seconds using geographic coordinate system GDA94.	**Section 7.8.2**
5.1	The Licensed Activities conducted within the Licence Area must be conducted in accordance with an environment plan.	**Section 7**
5.2	In developing each environment plan, the Licensees must ensure they: a) consult all relevant representative organisations for Aboriginal or Torres Strait Islander persons whose custodianship or traditional use of the Licence Area or the Park may be negatively impacted by the Licensed Activities b) use reasonable endeavours to: (i) address any feedback received in consultation undertaken for the purposes of clause 5.2(a) (ii) mitigate or avoid negative impacts, by amending the proposed environment plan and manner in which the Licensees propose to undertake the Licensed Activities c) at the same time that the Licensees provide the Director with a copy of the relevant Environment Plan in accordance with clause 4.4 (c), provide the Director with a report setting out:	**Section 8**

Condition Number	Condition	Relevant Section of EP
	(iii) the scope of consultation undertaken in accordance with clause 5.2(a), including names of organisations from whom feedback was sought (iv) a summary of the feedback received from organisations with whom consultation occurred (v) a summary of the amendments to the environment plan and manner in which the Licensed Activities are proposed to occur, made by the Licensees in order to address feedback and mitigate or avoid negative impacts on Aboriginal or Torres Strait Islander persons referred to in clause 5.2(a).	
Part C	**General Terms and Conditions**	
9.2	Compliance with Laws and Authorisations a) in undertaking the Licensed Activities within the Licence Area and performing the Licensees' obligations under the Licence, the Licensees must comply with: (i) all applicable laws, including the EPBC Act, EPBC Regulations and any Management Plan (ii) all applicable Authorisations.	**Section 2**

2.2 Northern Territory Legislation

The project is located entirely in Commonwealth waters; however, Northern Territory legislation relevant to emergency response and the environmental values of areas that may be affected by unplanned events is applicable.

2.3 International Agreements

Australia is signatory to several international environmental protection agreements and conventions which are relevant to the region, these include conventions for protecting migratory birds and other marine fauna (Japan–Australia Migratory Birds Agreement/China–Australia Migratory Birds Agreement/Republic of Korea and Australia Migratory Birds Agreement/ACAP/Bonn), wetlands (Ramsar) and environmental values (International Convention for the Prevention of Pollution from Ships (MARPOL)).

3 DESCRIPTION OF THE ACTIVITY

This section has been prepared in accordance with Regulation 13(1) of the OPGGS (E) Regulations and describes the activities that will be undertaken within the scope of this EP.

3.1 Pipeline Route Selection

The Barossa OPP (**Section 2.1.3**) presented a pipeline corridor within which the gas export pipeline would be installed and assessed the potential impacts and risks from undertaking pipeline installation and operational activities within that corridor. The evaluation of potential environmental impacts and risk conducted in the Barossa OPP was based on installation of the Barossa pipeline anywhere within that pipeline corridor. Since the OPP was developed, ConocoPhillips has conducted further field surveys and engineering studies and a number of potential pipeline routes within the corridor assessed.

Following the assessment, the route presented in this EP was selected as it reduces potential environmental impacts and achieves the following benefits compared with alternative routes.

- minimises the length of the pipeline that overlaps the Oceanic Shoals Marine Park Habitat Protection Zone;
- minimises the amount of span correction required and eliminates secondary stabilisation requirements for pipeline installation (which would be required if the pipeline was installed further east in shallower waters outside the Oceanic Shoals Marine Park Habitat Protection Zone);
- minimises the installation of the pipeline over areas of seabed that are associated with the seafloor features/values of the shelf break and slope of the Arafura Shelf and carbonate bank and terrace system of the Van Diemen Rise KEFs;
- reduces inspection, maintenance and repair requirements during operations due to the reduced route length and smoother seabed profile (less spans) as it represents the shortest length of pipeline required and minimises the amount of span supports and mitigation measures; and
- minimises the time required for installation activities as the selected route is the shortest route.

3.2 Activity Overview

An overview of the gas export pipeline installation campaign is detailed in **Table 3-1**.

Table 3-1: Activity Summary

Permit areas	NT/RL5, [Pipeline licence TBC]
Location	Bonaparte Basin, Timor Sea
Pipeline installation	Approximately 262 km of 26-inch outer diameter carbon steel, concrete coated rigid pipeline. The pipeline runs from the PLET assembly in NT/RL5 to the PLET at the tie-in location on the existing Bayu-Undan pipeline.
Subsea infrastructure/hardware	• 2 x PLETs (including PLET foundations and a protection structure at Bayu-Undan tie-in location) • subsea support structures (lateral buckling mattresses, fibre optic cable crossings, span rectification structures).
Proposed schedule	Installation of the pipeline is expected to be undertaken sometime between Q3 2021 and Q2 2023 and take up to nine months to complete. However, pre-lay survey could commence up to nine months earlier than pipeline installation (amending the above Q3 2021 (start date) to Q4 2020),

Water depth	Approximately 33 to 254 m
Vessels	Pipelay vessel and support vessels (including marine survey vessels, construction vessels, DP general cargo vessels, pipe supply vessels and supply vessels). Nominally up to 15 vessels may be used throughout the installation activities. These are collectively referred to as 'activity vessels' throughout this document.
Key activities	Vessel activities within the Operational Area, including: • pre-lay and post-lay surveys • delivering and transferring linepipe (sections of pipe) to the pipelay vessel • installation of supporting structures: – pipeline crossing construction (fibre optic cable) – lateral buckling initiation site(s) construction – PLET foundations – anti-snag frame over PLET located at Bayu-Undan end of gas export pipeline • gas export pipeline installation including PLETs • span rectification: – pre-lay and post-lay span correction – installation of scour mitigation at span shoulders and structures – installation of local stabilisation at span shoulders and at the Bayu-Undan tie-in location (if required) • pipeline pre-commissioning: – flood, clean, gauge and pressure testing (FCGT) – dewatering – preconditioning • nitrogen packing.

3.3 Location and Tenure

The gas export pipeline will be installed within the licence area, which extends from petroleum retention lease area NT/RL5 to the Bayu-Undan pipeline proposed tie-in location (**Figure 3-1**). The start and end locations of the pipeline are outlined in **Table 3-2**.

The proposed gas export pipeline route lies entirely within the Bonaparte Basin, in Commonwealth waters. Water depths along the gas export pipeline route vary from 254 m at the deepest point at the FPSO PLET location, to 33 m at the shallowest point approximately 47 km upstream from the Bayu-Undan PLET location. The water depth at the Bayu-Undan PLET is approximately 55 m. Approximately 30 km of the pipeline route lies within the Oceanic Shoals Marine Park Multiple Use Zone, and approximately 31.5 km lies within the Habitat Protection Zone (**Table 3-3**).

Table 3-2: Pipeline start and end locations

Location	Water Depth	Longitude	Latitude
PLET – Floating Production Storage and Offloading facility (FPSO)	254 m	130° 15' 48" E	9° 49' 15 " S
PLET – Bayu-Undan Tie-In	54 m	129° 54' 27" E	12° 01' 27" S

Table 3-3: Pipeline route coordinates within the Multiple Use Zone and Habitat Protection Zone of the Oceanic Shoals Marine Park

Marine Park zone	Longitude	Latitude	Distance (km)
Enters Multiple Use Zone	130° 17' 05" E	10° 20' 00" S	Approx. 30 km
Exits Multiple Use Zone	130° 16' 26" E	10° 36' 00" S	
Enters Habitat Protection Zone	130° 06' 00" E	11° 00' 19" S	Approx. 31.5 km
Exits Habitat Protection Zone	129° 58' 57" E	11° 15' 31" S	

3.3.1 Operational Area

The Operational Area for this EP (**Figure 3-1**) has been defined as 2,000 m either side of the gas export pipeline route, except in the following locations:

- where the width of Operational Area has been reduced to the east and west of the pipeline centreline to remain within the pipeline installation corridor presented in the accepted OPP;
- at the Barossa FPSO PLET location where the Operational Area has been extended to a radius of 3,000 m for operational purposes (whilst remaining within the pipeline installation corridor in the accepted OPP); and
- at the Bayu-Undan proposed tie-in PLET where the Operational Area has been extended south by 3,000 m for operational purposes (whilst remaining within the pipeline installation corridor in the accepted OPP).

The Operational Area encompasses the installation of the gas export pipeline and support vessel movements in the immediate vicinity of the pipelay vessel.

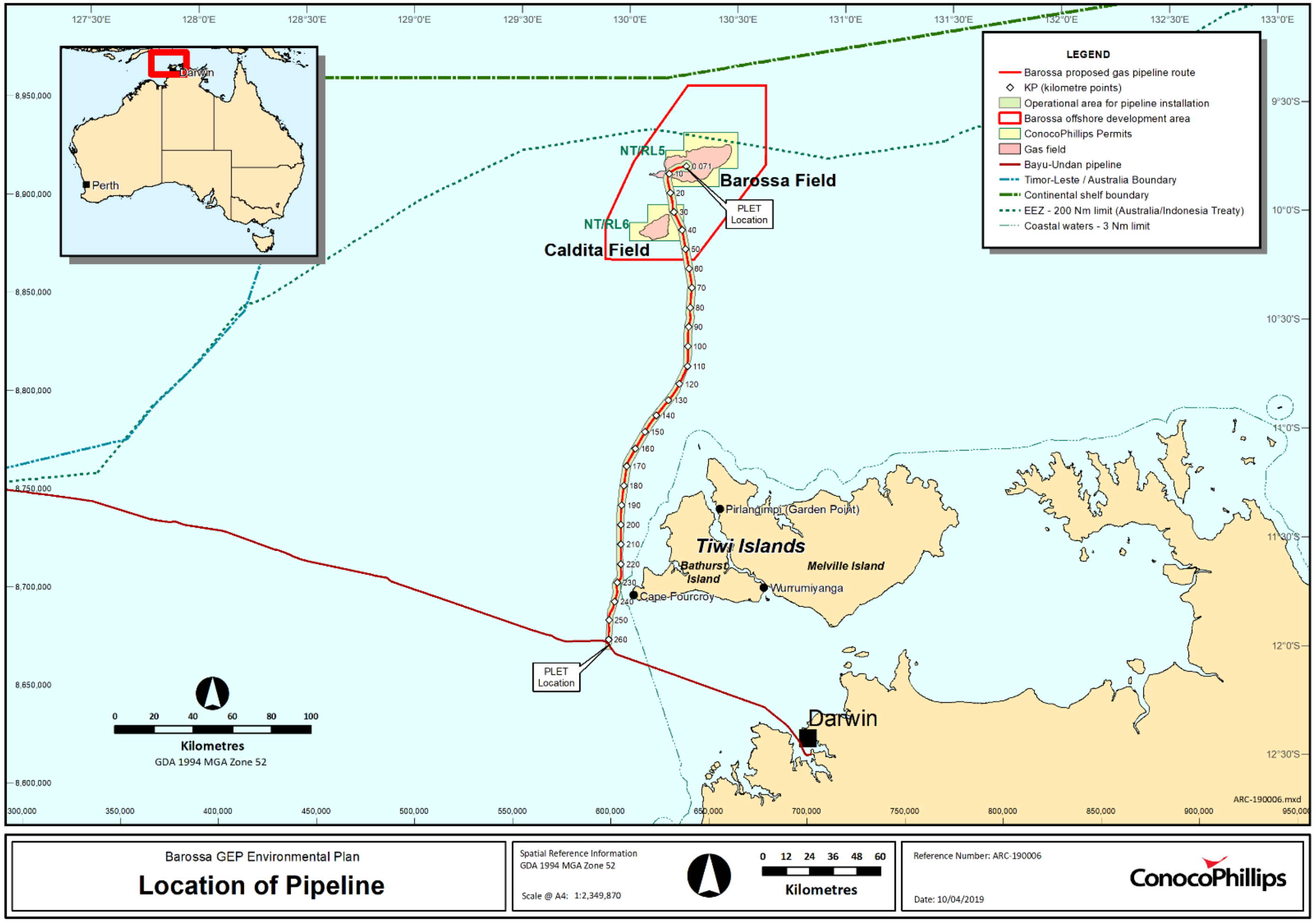


Figure 3-1: Barossa field and gas export proposed pipeline route location

3.4 Activity Vessels

A number of vessel types will be required to complete the activities within the Operational Area to support the gas export pipeline installation campaign. The vessels that may be required are summarised in **Table 3-4**.

Table 3-4: Vessels types that may be used for the gas export pipeline installation activities

Vessel Type	Potential Activities
Marine survey vessel	• pre-lay survey of the pipeline route using multi-beam echo sounder (MBES) and sub-bottom profiler (SBP) • pipelay support activities, and • as laid / post laid survey.
Pipelay vessel	Installation of the gas export pipeline and PLETs.
Construction vessels	• pre-lay and post-lay surveys • pre-lay and post-lay span correction work • installation of supporting structures (PLET foundations, pre-lay pipeline crossing and buckle initiation site construction) • post-lay PLET protection structure installation (at Bayu-Undan tie-in location) • pipelay support activities (touch down monitoring, subsea positioning) • local stabilisation (could include mattresses) • installation of scour mitigation • FCGT activities, and • dewatering and pre-conditioning activities.
Pipe supply vessels and DP general cargo vessels	Transport of linepipe and structures to pipelay vessel.
Supply vessel	Provide support and supplies

Activity vessels will be subject to the ConocoPhillips Contractor Health, Safety and Environment (HSE) Management Process (ALL/HSE/PRO/016). The ConocoPhillips Marine Vessel Vetting Process (**Section 7.2.3**) outlines the requirements that must be met and confirms that vessels meet or exceed the standards and criteria set by standard industry practice, international regulations, and relevant authorities such as AMSA. The marine assurance process includes close inspection of vessel suitability, equipment and design, and personnel training, including officer experience.

Vessels will generate and manage solid wastes. Vessels will also undertake routine discharges include the following: sewage, grey water, putrescible, brine (from desalination), ballast water and cooling water.

Atmospheric emissions will be emitted from power-generating equipment on board the vessels, including engines and generators.

Bunkering of the vessels may take place either at sea within the Operational Area (e.g. if required for the pipelay vessel), in sheltered or inshore waters, or in port (support and other vessels). When in the Operational Area, no bunkering will occur within 20 km of Tiwi Islands.

3.4.1 Pre-lay and Post-lay Survey Vessels

3.4.1.1 Marine survey vessel

A marine survey vessel may be used for pre-lay and post-lay surveys (**Section 3.4.1**). Marine survey vessels are generally 60 to 90 m long with a crew capacity of up to 50 persons. Marine survey vessels will be fuelled by marine diesel oil (MDO) or marine gas oil (MGO), which will be stored in multiple isolatable fuel tanks up to 250 m^3 capacity. Physical anchoring of the marine survey vessel to the seabed within the operational area shall not be performed unless in an emergency.

3.4.2 Pipeline Installation Vessels

3.4.2.1 Pipelay Vessel

The gas export pipeline and PLETs will be installed using a specialised pipelay vessel with an enclosed firing line to shield the external environment from welding flashes and minimise light emissions.

The pipelay vessel will require sufficient capacity to hold the concrete coated linepipe as well as the PLETs. In addition, the pipelay vessel will need space for pre-fabrication areas and pipeline production areas. The pipelay vessel will be equipped with cranes to assist with construction work, pipe-loading, placement of equipment on the seafloor and the transfer of supplies. See **Table 3-5** for typical pipelay vessel specifications.

The pipelay vessel will utilise a dynamic positioning (DP) system, which allows it to maintain position whilst installing the pipeline (laying the pipe). The pipelay vessel will not anchor in the Operational Area unless in an emergency situation.

Throughout the installation of the gas export pipeline, the pipelay vessel will be supported by either a construction or survey vessel, fitted with a remotely operated vehicle (ROV), which will be used to inspect the installed equipment.

The pipelay vessel will require refuelling during the installation of the pipeline. The bunkering schedule will depend on the selected pipelay vessel and other operational criteria. The pipelay vessel may use MDO or MGO. Fuel tanks will be protected by water ballast compartments and no single tank will exceed 1400 m^3.

The pipelay vessel will have a helideck and receive helicopters for crew changes. A helicopter refuelling system will be in place on the helideck.

A 500 m exclusion zone will be in place around the pipelay vessel during the gas export pipeline installation campaign.

Table 3-5: Typical specifications for a pipelay vessel

Vessel Systems	Typical Characteristics
Length	180 to 350 m
Net Tonnage	10,000 to 32,000 tonnes
Gross Tonnage	33,000 to 105,000 tonnes
Total persons on board (POB)	300 to 700
Lighting	Navigational, deck, task-specific and emergency lighting.
Ballast system	Ballast systems can vary in size with total volumes from 20,000 m^3 to 32,000 m^3
Freshwater system	Evaporators/distillation units on board Freshwater tanks vary in size from 1000 m^3 to 1500 m^3
Cooling system	Seawater used to cool main engines, refrigerators and service cooling. Seawater is circulated by pumps.

Sewage system	International Maritime Organisation / International Convention for the Prevention of Pollution from Ships (IMO/MARPOL) compliant sewage treatment plants
Putrescible waste system	MARPOL-compliant communiting (grinding) system
Incinerators	MARPOL-compliant incinerators
Fuel tanks	Multiple isolatable fuel tanks with total capacity 2000 m^3 to 8000 m^3 (no single tank will exceed 1400 m^3)
Power generation	Four to eight main diesel generators

Figure 3-2: Indicative pipeline installation vessel

3.4.2.2 Construction Vessels

Construction vessels vary in size and capability. The gas export pipeline installation campaign may use one or more construction vessels for the following activities:

- pre-lay surveys of the pipeline route and post-lay (as-laid, Out of Straightness and as-built) surveys of the installed gas export pipeline and PLETs;
- pre-lay and post-lay span correction work;
- installation of the PLET foundations (bases);
- pipeline crossing construction where the pipeline crosses existing fibre optic cables;
- lateral buckle initiation site construction (installation of concrete mattresses) where required;
- pipelay support activities such as touch down monitoring (monitoring installation of the pipeline along the seabed), ROV monitoring of installation of supporting structures and subsea positioning of the pipeline;
- installation of the anti-snag frame over the PLET located at Bayu-Undan end of the gas export pipeline;
- local pipeline stabilisation at span shoulders and the Bayu-Undan tie-in location (if required);
- installation of scour mitigation at span shoulders and supporting structures;

- FCGT activities; and
- dewatering and pre-conditioning activities.

It is expected that the construction vessels will vary in size from approximately 90 to 150 m long with crew capacities between 60 and 100. Construction vessels will use either MDO or MGO. Fuel oil capacity and largest single tank volume are dependent on the type and size of construction vessel; however, the largest single tank capacity is expected to be less than 700 m^3. Construction vessels may be in the Operational Area for the duration of offshore operations. Seabed anchoring of the construction vessel within the Operational Area shall not be performed, unless in an emergency situation.

The construction vessel(s) are required to support activities that are performed prior to pipelay commencement (such as pre-lay span correction), after pipelay completion (such as FCGT, as-laid survey and post-lay span correction) as well as during pipelay (such as as-laid survey). The sequence of pre-lay activities, pipelay and post-lay activities shall be scheduled to occur in a single campaign in order to avoid the requirement to perform multiple mobilisations/demobilisations of the construction vessel(s). Performing the work in a single continuous campaign also enables pre-lay and post-lay activities to be performed in parallel with pipelay where practicable to further reduce the schedule and optimise the offshore campaign.

3.4.3 Pipe Supply Vessels

Pipe supply vessels (PSVs) or purpose-built general cargo vessels will be used to transport linepipe to the pipelay vessel on a daily basis. Typical PSVs are approximately 90 m long, with a crew capacity of approximately 30 personnel. PSVs will use either MDO or MGO and typically have a maximum single fuel tank volume of 250 m^3. Purpose built general cargo vessels are typically up to 150 m in length with the maximum single fuel tank capacity of 295 m^3 (either MDO or MGO). As only DP vessels will be used for the transportation and transfer of linepipe, no anchoring within the Operational Area shall be performed, unless in an emergency situation.

3.4.4 Supply Vessels

Supply vessels will be required to undertake specific tasks and will travel to and from the Operational Area for the duration of the gas export pipeline installation campaign.

Supply vessels will transport food, fuel, supplies (e.g. consumables) and equipment between vessels in the Operational Area (pipelay vessel, construction vessel, survey vessel) and port (e.g. Darwin and international ports). Supply vessels will also be used to transfer solid waste from vessels back to the mainland for disposal. It is anticipated that up to two supply vessels will be used. Supply vessels may be up to 70 m in length with DP capability. Supply vessels will utilise MDO or MGO, with a largest single fuel tank volume of approximately 250 m^3.

As supply vessels will be DP, no anchoring within the Operational Area shall be performed, unless in an emergency situation.

3.4.5 Other Support

3.4.5.1 Remotely Operated Vehicles

Remotely operated vehicles (ROVs) may be launched from the survey vessel, pipelay vessel and construction vessels to undertake the following:

- pre and post-lay surveys;
- monitor pipelay (touch down monitoring);
- support PLET installation activities including the PLET foundation placement;
- support installation of scour mitigation measures;
- execution of pipeline crossing construction;
- span correction;
- localised stabilisation; and

- pipeline pre-commissioning activities.

Typically, 150-200 horsepower (hp) Work Class ROVs will be used to support construction activities. These typically weigh between 2450 and 4400 kg and have a footprint of up to 1.8 m by 3.5 m. ROVs are operated using hydraulic control fluids.

3.4.5.2 Helicopters

Helicopters will be used for crew transfers to the pipelay vessel and other helideck-equipped vessels such as the survey vessel and construction vessels. Helicopter operations may include offshore helicopter refuelling on the vessel helidecks, subject to flight distances and weight of the loads the helicopter will be carrying.

3.5 Pipeline Installation Activities

3.5.1 Site Surveys

Site surveys will be undertaken at various stages throughout the gas export pipeline installation campaign. An initial pre-lay survey prior to commencement of pipeline installation will be undertaken up to 9 months before pipelay commences. The pre-lay survey identifies debris, seabed features or obstructions along the pipeline route. It is not a full geophysical survey. There is an allowance of 250 m either side of the pipeline route, allowing for localised re-routing if any significant obstructions and areas of spanning are identified during the pre-lay survey. Site surveys have already been undertaken for the pipeline route and no debris was identified that would require removal prior to installation, however if debris is identified during the pre-lay survey, debris removal could be undertaken by the pipelay vessel, survey vessel or construction vessels, in advance of pipelay where practicable.

The survey methods for identifying debris, seabed features, buried assets (e.g. fibre optic cable) and obstructions are non-intrusive, and the equipment does not disturb the seabed. Survey methods will primarily include MBES and SBP. MBES uses sound pulses to establish the seabed profile. Most modern MBES systems work by transmitting a broad acoustic pulse from a hull or pole mounted transducer. SBP also uses acoustics, although the acoustic pulse is transmitted from a towed surface or deep-sea source and collected by a receival array that is towed below the water surface. ROV mounted equipment such as an altimeter and obstacle avoidance sonar may also be used .

As-laid, as-built and cathodic protection surveys will also be progressively undertaken throughout the gas export pipeline installation campaign. The data from these surveys will be used to determine the pipeline position once laid, inform free-span rectification, identify deviations from straightness etc. Surveys will use the same techniques as outlined above as well as visual inspection using ROVs and cathodic protection equipment such as passive field gradient sensing equipment.

3.5.2 Underwater Acoustic Positioning

Installation of the pipeline requires accurate positioning on the seabed and therefore long base line (LBL) and/or Ultra Short Baseline (USBL) acoustic positioning may be required. These systems allow sub-metre accuracy.

USBL and LBL utilise transponders. Typically, for a USBL array, transponders are installed attached to subsea equipment and recovered once the equipment is correctly positioned on the seabed. For LBL, transponders are typically fixed to seabed frames which are deployed and then fully recovered once subsea equipment is correctly positioned.

Up to six LBL arrays, comprising six to eight LBL transporter frames, may be used within the Operational Area. LBL arrays will be required at both PLET locations. The footprint on the seabed of a typical LBL transponder frame is less than 5 m^2.

LBL and USBL systems work by emitting short pulses of medium to high frequency sound. Transmissions are not continuous but consist of short ‘chirps’ with a duration that ranges from 3 to 40 milliseconds.

3.5.3 Installation of Supporting Structures

Supporting structures include:

- Lateral buckling mattresses, each comprising three mattresses along the pipeline route within NT/RL5;
- Concrete mattresses over the buried Northwest optic fibre cable; and
- PLET foundations at both ends of the gas export pipeline (i.e. at the FPSO and at the tie-in location)

These will be installed prior to pipeline installation at the supporting structure location. The coordinates for the PLETs are provided in **Table 3-2** and shown in **Figure 3 1**.The estimated seabed footprint associated with supporting structures is provided in **Table 3-6**.

Lateral buckling mattresses, used to control the flex and movement of a pipeline on the seabed, will be installed in at least three locations along the pipeline route where the route is within NT/RL5. Front end engineering design has defined the required mattress configurations, with an overall seabed footprint of approximately 42 m^2 (comprising of two mattresses 4m by 3m and one mattress 6m by 3m) at each location. Certain mattresses require the installation of scour protection around their perimeter to ensure that the seabed material (e.g. sand) under the mattress is not undermined during operations (undermining results in the mattress sagging). The scour protection could result in nominally 2 m of additional material around a number of mattresses, increasing the nominal footprint by another 140 m^2 (comprising of two mattresses with scour protection of 8m by 7m and one mattress with scour protection of 10m by 7m) at each location where scour protection is used. The mattresses used to initiate lateral buckling will be installed by a construction vessel.

The gas export pipeline needs to cross over the existing northwest cable system (fibre optic cable), that is located nominally at KP257.3. The fibre optic cable is buried under the surface of the seabed. Concrete mattresses will be installed at the fibre optic cable crossing to ensure adequate separation is maintained between the pipeline and the buried fibre optic cable. Nominally three mattresses with a combined footprint of 66 m^2 shall be included at the crossing.

PLET foundations are steel structures that provide long-term support for the PLETs. Two PLET foundations will be installed (one foundation for each PLET). The PLET foundations will be designed to suit the local seabed geotechnical properties. Based on preliminary engineering, the PLET foundations are expected to have a footprint of approximately 25 m (long) x 15 m (wide), with scour protection that could extend out up to nominally 5 m all around the foundations. The expected total footprint at each PLET location for the foundation and scour protection is 875 m^2. The PLET foundations will be installed using the construction or pipelay vessel. The construction / pipelay vessel crane would be used to lift the structure from the deck of the vessel and lower onto the seabed. An ROV would be used during installation to position and orientate the structures.

3.5.4 Span Rectification

Preliminary analysis of the pipeline route (SEA, 2019) has identified 61 span locations between KP107 to KP250 (**Figure 3-3 (a) – (c)**). These will be fixed using one or more span supports, either mattresses, grout bags or mechanical support structures. Mass flow excavation may also be required in mobile sandwave region between KP237 and KP254.

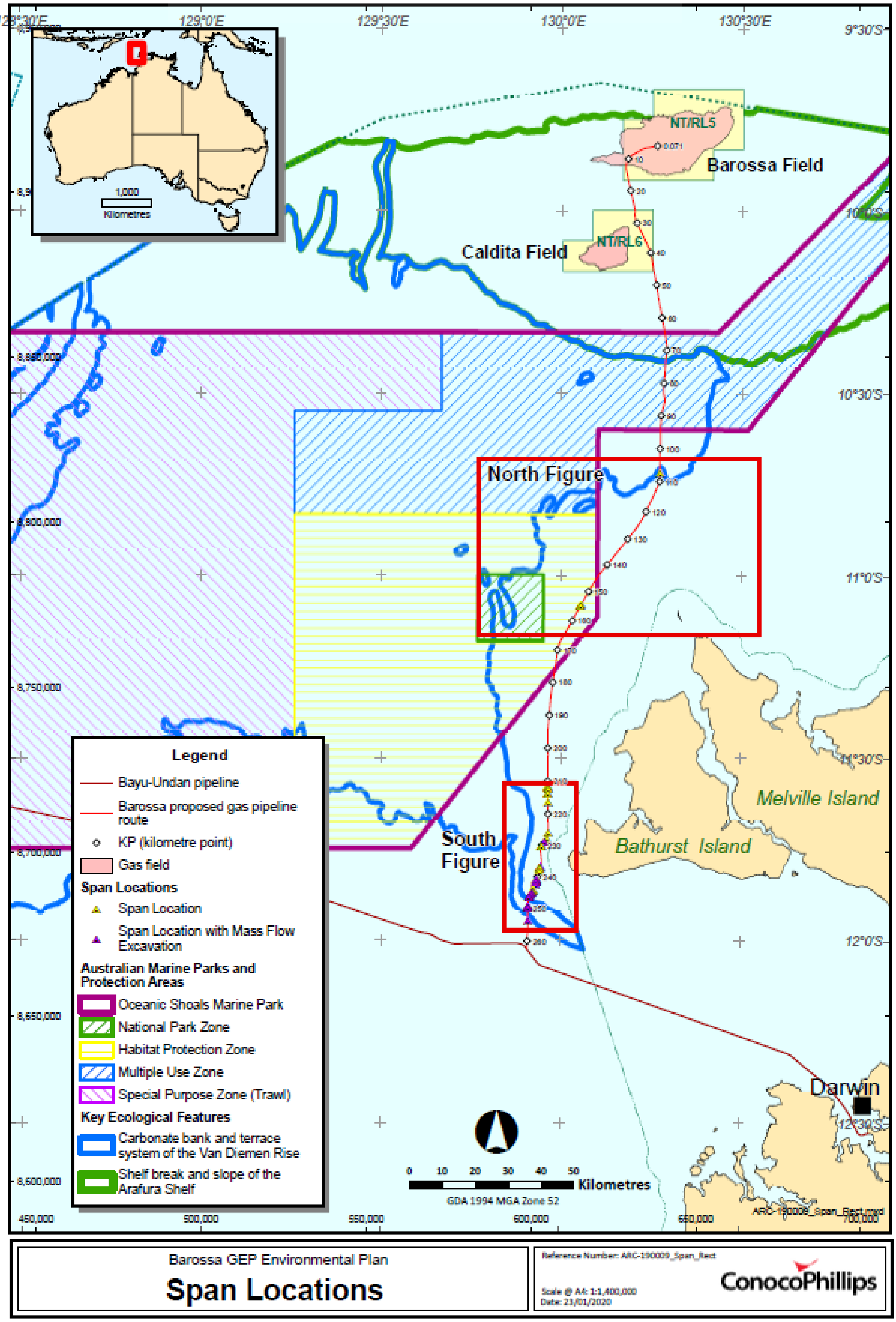


Figure 3-3 (a): Span locations

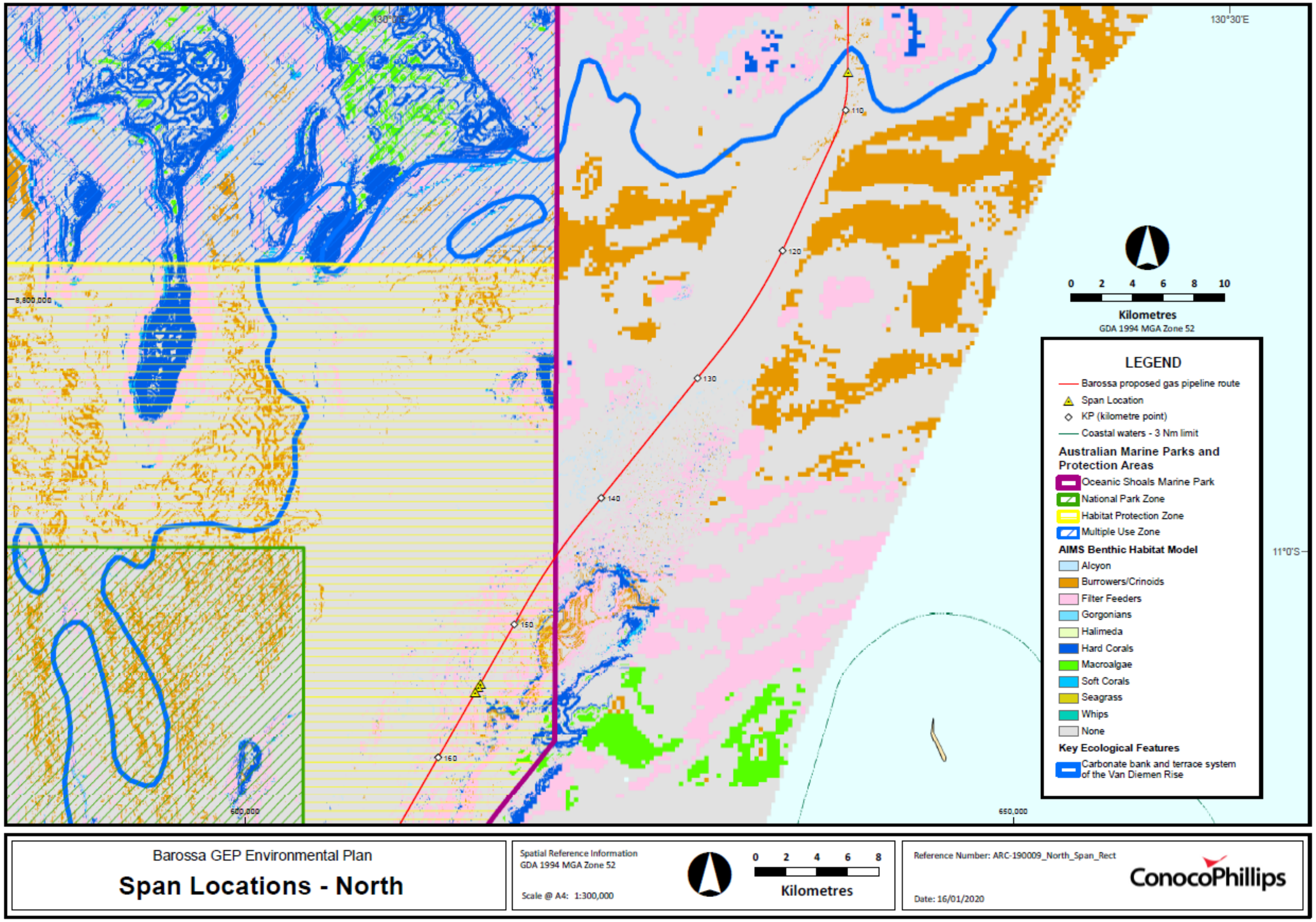


Figure 3-3 (b) Span location - North

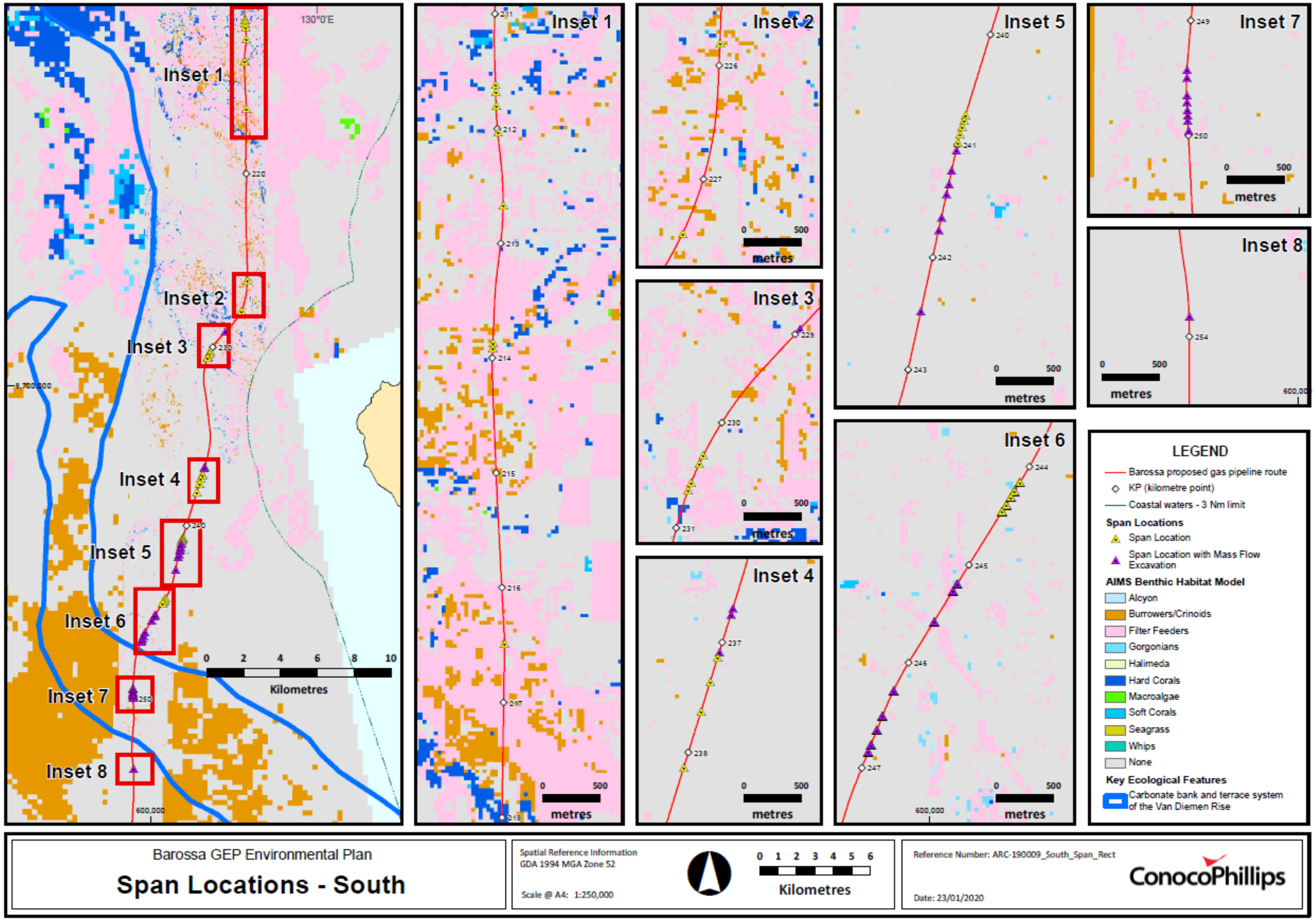


Figure 3-3 (c): Span locations - south

Techniques for pre-lay and post-lay span correction are outlined below. The seabed footprint associated with span rectification is provided in **Table 3-6.**

3.5.4.1 Concrete Mattresses

Mattresses (**Figure 3-4**) are commonly used to correct pre-lay spans and provide scour control at span shoulders to mitigate against span growth during operations. Mattresses consist of blocks of dense material (typically concrete) bound together by flexible cables (usually artificial fibre ropes). The dimensions for each concrete mattress are typically 6 m by 3 m but could be larger if required to suit installation tolerances and seabed topography. The mattresses will be lifted from the deck of the survey or construction vessel and lowered to the seabed by vessel crane. An ROV will be used during installation to position and orientate the mattresses prior to landing out on the seabed.

Figure 3-4: Example of concrete mattresses

Mattresses could also be used to locally supplement or replace concrete weight coating on the pipeline in critical regions, subject to vessel capability, such as at the PLET locations. Mattresses may be required at span shoulders and over mechanical support structures to ensure that the pipeline remains on the span supports during storm conditions and that span shoulders do not erode away increasing the length of the spans during operations.

3.5.4.2 Grout Bags

Grout bags (**Figure 3-5**), are commonly used to correct post-lay spans. Grout bags are made of flexible material (e.g. woven polypropylene) which is filled with granular material such as sand. A binder (typically cement) is included to stabilise the granular material within the bag. Grout bags can also come filled with rock without any binding material subject to size of rock particles. Small prefilled grout bags can be installed individually by ROV or can be lowered slowly to the seabed by crane in bulker bags for individual placement subject to the height of the span.

Higher spans are rectified using post filled grout bags. The empty grout bags are positioned under the pipe by ROV and are filled from the surface using a liquid slurry of grout via a downline. The grout lines are flushed to subsea after each operation to ensure the grout does not set in the downline between filling operations. Post filled grout bags are generally pyramidal in shape and the footprint of each grout bag can be up to 5 m x 5 m subject to span height. Scour protection may also be required subject to the seabed conditions to ensure that the grout bags are not undermined; scour protection could extend nominally 3 m around the circumference of the grout bag.

Figure 3-5: Example of grout bags

3.5.4.3 Mass Flow Excavation

Mass flow excavation (**Figure 3-6**) may be used for span rectification both pre-laying (i.e. by creating a trench for the pipeline) or post-laying (i.e. by facilitating burial) of a pipeline if a given span cannot be effectively rectified using mattresses or grout bags. Mass flow excavation reduces span heights at the span shoulders and assists pipeline stability by facilitating partial or complete burial of the pipeline in unconsolidated sediments. Mass flow excavation may be achieved by localised suction or jetting of water, with resuspended sediments being moved away from the pipeline. This process results in localised lowering of the pipeline into the sediment, with subsequent partial or complete burial of the pipeline providing stabilisation and therefore removal of a pipeline span. The direct disturbance footprint of mass flow excavation is dependent on the depth of excavation required. Use of mass flow excavation will be limited and any associated seabed disturbance has been included in the footprint estimations for span rectification in **Table 3-6**.

Figure 3-6: Example of equipment used for mass flow excavation

3.5.4.4 Vortex induced vibration strakes

The use of vortex induced vibration strakes can alleviate the need for span supports in certain areas as they limit fatigue damage by vortex induced vibration caused by high sea currents. Vortex induced vibration strakes (**Figure 3-7**) are installed on the pipeline onboard the pipelay vessel (in the firing line) prior to the pipe entering the water. Vortex induced vibration strakes work by changing the hydrodynamic profile of the pipeline thereby suppressing vortex induced vibration at critical span locations.

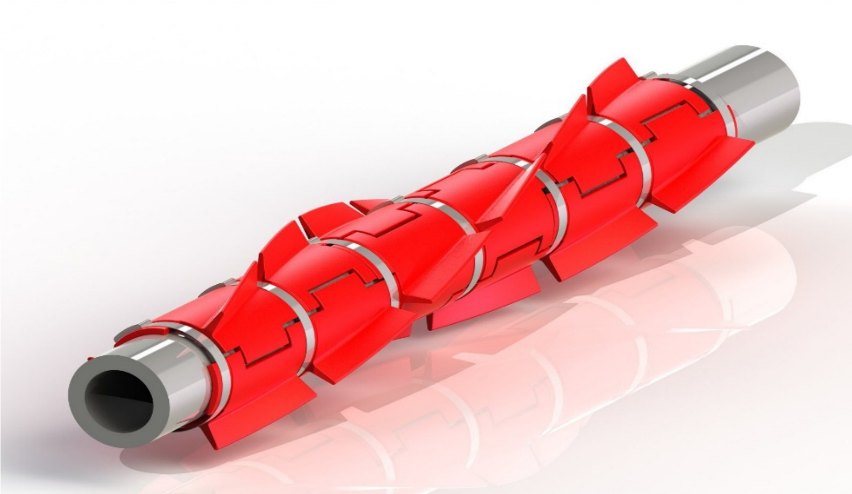


Figure 3-7: Example of equipment used for VIV suppression

3.5.4.5 Mechanical Support Structures

Mechanical support structures (**Figure 3-8**) are made of steel and / or concrete and are typically used for spans having a clearance higher than 1.5 m. The structures are typically lifted from the deck of the survey or construction vessel and lowered to the seabed by vessel crane. An ROV is used during installation to position and orientate the structures prior to landing out on the seabed.

The design of mechanical support structures varies subject to the seabed properties, the installation contractor methodology and pipeline loading. Pre-lay span supports generally have a minimum length matching lateral pipeline installation tolerances. The typical seabed footprint of mechanical support structures is 6 m x 3 m. Scour protection may also be required subject to the seabed conditions; scour protection could extend nominally 3 m around the support structures.

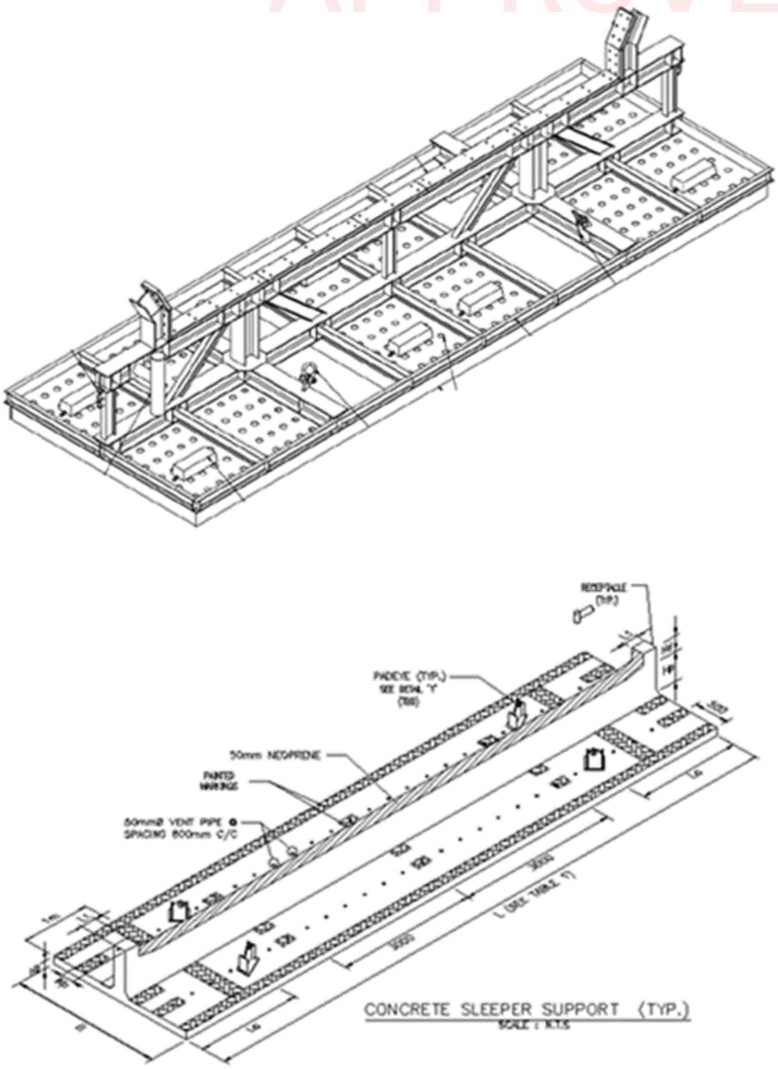


Figure 3-8 Examples of mechanical pre-lay support structures

Wedge-shaped mechanical support modules (**Figure 3-9**) can also be used as post lay span supports. The module is a steel, wedge shaped frame that supports the pipeline. The module is pulled under the pipeline with the assistance of an ROV. When under the pipeline a support arm is installed by the ROV to capture the pipeline on the support's diagonal. The span support design will vary subject to the span height – typical designs that cover span heights between 500 mm and 1000 mm (left below) and the other for span heights greater than 1500 mm (right below) are provided. Wedge-shaped mechanical support modules have a typical seabed footprint of 4 m x 4 m (excluding scour mitigation). Scour protection may also be required and could extend nominally 3 m around the support structures.

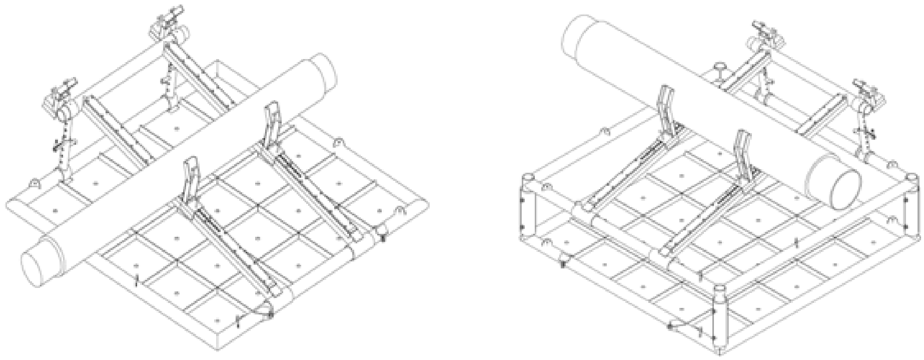


Figure 3-9 Examples of wedge-shaped post lay span correction mechanical support modules.

3.5.5 Pipeline Initiation Structure Deployment

Initiation of the gas export pipeline will require an initiation structure to allow the pipeline to be tensioned. This may be installed at either the Bayu-Undan tie-in PLET location, the FPSO PLET location, or at a point in between. The initiation structure will consist of either a suction pile, drag anchor or clump weight/dead-man anchor. The expected disturbance footprint on the seabed of the structure is up to 1,240 m^2 and is included in **Table 3-6**. Pre – and post – lay benthic habitat surveys shall be undertaken to confirm seabed type and ensure that any sensitive habitats are avoided. Impact will therefore be limited to disturbance of bare seabed with minimal mobilisation of sediment. Post-lay survey will allow verification of the impact.

3.5.6 Pipeline Installation

Pipeline installation will commence either at the FPSO PLET location, the Bayu-Undan tie-in PLET location or an intermediate location along the gas export pipeline to allow both PLETs to be installed as second end structures, i.e. they are laid down at the end of pipelay.

The pipelay vessel will install the pipeline using a traditional s-lay installation method. Once the linepipe is transferred onto the pipelay vessel, it is stored either on deck or in below deck holds subject to the pipelay vessel design.

Each piece of linepipe is inspected before use for damage that may have occurred during transportation and to confirm that the linepipe is clean and free of debris. Once inspected, the linepipe is prepared for welding by machine bevelling each end of the pipe.

The single linepipes are assembled in a horizontal working plane (the firing line) onboard the pipelay vessel. Joints are welded together, inspected using non-destructive testing methods (e.g. ultrasonic testing) and then coated.

As welding progresses the constructed pipeline is continuously lowered from the pipelay vessel to the seabed as the vessel slowly moves along the pre-determined pipeline route. The stinger (a steel structure with rollers extending from the end of firing line/vessel) supports the upper section of the pipeline catenary to control the curvature during installation.

Tension is applied to the pipeline by the vessel's tensioners and forward DP thrust to maintain the catenary and prevent the pipeline from buckling, as it is lowered to the seabed. The pipelay vessel will proceed forward at a speed of nominally 3 km per day.

The seabed footprint associated with installing the gas export pipeline is provided in **Table 3-6**.

3.5.7 Pipeline End Termination Structures

PLETs may be installed in-line (s-lay) or retrospectively stalked onto the pipeline. The adopted methodology is dependent upon detailed installation engineering and potential geometric restrictions within the firing line of the pipelay vessel.

For In-line (s-lay) PLET installation, the PLET (excluding mudmat and protection structures) will be lowered from the pipelay vessel deck into the firing line where it is then welded into the pipe string. The PLET and pipeline are progressively lowered to the seabed, as the vessel moves forwards, until the PLET/pipeline assembly is landed onto the pre-installed foundation, during pipeline initiation or laydown operations.

Should a stalk-on PLET installation be adopted the pipeline will be initially laid down on the seabed (s-lay) with a temporary head, and then recovered to the surface for installation of the PLET. The pipeline is then hung off from the pipelay vessel, the temporary head removed and the PLET welded to the pipeline end. On completion of connection, the PLET/pipeline assembly is then lowered to the seabed and positioned onto the pre-installed PLET foundation.

A PLET Anti-Snag Frame will be installed at the Bayu-Undan Pipeline tie-in location after completion of pipelay and will arch over the PLET. The detailed design is not known at this point in time however it is very unlikely that this structure will add to the seabed disturbance footprint generated by the PLET foundation.

The seabed footprint associated with installing the PLETs is provided in **Table 3-6.**

3.5.8 Seabed Footprint

The overall nominal footprint from the gas export pipeline installation campaign has been estimated by calculating the footprint of the supporting structures (including PLETS) (**Sections 3.5.3** and **3.5.7**), span rectification works (**Section 3.5.4**) and gas export pipeline (including pipeline initiation structure) (**Sections 3.5.5** and **3.5.6**). The calculations are an estimation only, because not all supporting structures or span rectification methods will require scour protection (which increases the footprint of each structure) and further refinements in some areas (e.g. span rectification) will be made to reduce the footprint if practicable. The total estimated footprint is presented in **Table 3-6**.

Table 3-6: Estimated seabed footprint from gas export subsea infrastructure

Subsea Infrastructure	Seabed footprint	Comment
Installation of supporting structures	0.3 ha	Includes pipeline crossing, lateral buckling initiators, PLET foundations Fibre optic crossing – 0.0066 Ha Lateral buckling initiators – assume five buckling initiation sites (5 x 42 m^2), each with an extra 140 m^2 footprint to allow for scour protection
Gas export pipeline installation	21.6 ha	Calculated based on the length of the pipeline multiplied by the diameter of the pipeline (with concrete weight coating included - average diameter 875 mm). It also includes the footprint for the initiation structure
Span rectification and stabilisation works	2.0 ha	Calculated assuming 32 pre-lay spans and 34 post lay spans to give a nominal disturbance area of 0.7 Ha. This area is increased to 2.0 Ha to allow for potential additional span corrections, changes in the footprint of individual spans and/or scour mitigation.
Contingency of 20%	4.8 ha	To address potential increase in span rectification requirements, pipeline route optimisation and growth of supporting structure(s) footprint (subject to detailed design)
Estimated total seabed footprint	**28.7 ha**	

3.5.9 Flood, Clean, Gauge and Pressure Testing

Once installed, the pipeline internal surfaces need to be cleaned and inspected to determine if any unacceptable restrictions and/or obstructions exist in the pipeline. This is conducted through pigging. A series of pigs will be pushed through the pipeline to clean the pipeline, gauge the pipeline and ensure all air is removed during the flooding process. The pigs are pushed using chemically treated seawater delivered via a downline from the vessel. The chemically treated seawater is typically a mixture of biocides (to prevent biofouling on the internal surfaces), an oxygen scavenger (to control corrosion of the pipeline) and a dye (allows for leaks to be detected through visual inspections).

The chemical concentration will be dependent on the preservation period, which is the period of time the pipeline will be left filled with chemically treated seawater before being dewatered for tie-in and commissioning (**Section 3.5.10**).

Treated seawater will separate each pig in the train and will be discharged to sea as each pig completes a run. A slug of filtered and chemically treated forewater will be injected ahead of the first pig to lubricate the rubber sealing discs on the pig and control pig speed. There is potential that some debris remaining from pipeline installation activities within the pipeline may be discharged with this water. It is estimated that up to ~15,000 m^3 of treated seawater may be discharged at the FPSO PLET location if the pipeline is flooded from the shallow end (Bayu-Undan tie-in PLET location) to the deep end (FPSO PLET location). Up to ~12,000 m^3 of treated seawater may be discharged at the Bayu-Undan PLET location if the pipeline is flooded from the deep end to the shallow end. Flooding water may be discharged at the seabed or the surface. Any discharges at the seabed will be through a vertical diffuser which assists in dilution and dispersion of the discharges. The treated seawater will be discharged over one to two days.

Once the pigging operations are completed and the condition of the gauge plates has been confirmed, the pipeline will be subjected to a hydrostatic pressure test (hydrotest). Water used for hydrotesting will be treated seawater, similar to the water used for flooding (as described above). The hydrotest pressure will be held for a period as per the relevant standard to test the pipeline integrity. There will be small localised discharges around each of the PLETs as that infrastructure is tested and the gas export pipeline is depressurised. Hydrotest water is expected to be discharged over half a day and up to ~2000 m^3 of treated seawater may be discharged, at either end of the pipeline and may be discharged at the seabed or the surface.

FCGT activities will be undertaken in accordance with ConocoPhillips approved Contractor Pipelines Flooding, Cleaning, Gauging and Testing procedures. All chemicals used in FCGT activities will be subject to a chemical selection assessment process described in **Section 3.6**

In the event of an issue that indicates remedial construction work is required, or in case of a pipeline wet buckle during pipelay, contingency plans will be implemented, and the affected lines may be dewatered to the environment to allow the repairs to be undertaken (refer **Section 3.7**).

3.5.10 Dewatering and Pre-conditioning

On completion of FCGT, the flooded pipeline will be dewatered, conditioned with MEG and purged with nitrogen. The gas export pipeline will be dewatered using a train of dewatering pigs separated by MEG slugs. Discharge of the majority of the dewatering fluid will occur at the seabed through a vertically orientated diffuser at the FPSO PLET location, in the Barossa field. The MEG could be discharged at the seabed or the surface, subject to the methodology adopted to sample the MEG in order to confirm that pipeline has been correctly preconditioned. This activity will require the discharge of chemically treated seawater and MEG. Approximately 85,000 m^3 of treated seawater will be discharged over 3 to 7 days, and up to approximately 1,000 m^3 of MEG will be discharged over a period of less than one day.

On completion of dewatering, the gas export pipeline will be purged and packed with nitrogen and left as is, ready for installation of the remainder of the export system (subject to a future EP).

3.6 Chemical Selection Procedure

Prior to commencement of the activity, all chemicals that may be discharged to the marine environment during the activity will be listed in the gas export pipeline installation campaign chemical register. This register will be checked during the activity and when new chemicals or substitutes are required.

All approved chemicals (hazardous and non-hazardous) are kept on the gas export pipeline installation campaign chemical register and have an environmental risk rating assigned to them. The environmental risk rating is allocated by the ConocoPhillips Environmental Specialist and is based on the information supplied in the Chemical Approval Application Form and material safety data sheet (MSDS).

Subsea chemicals will be assessed in accordance with the UK OCNS Ranked List of Notified Chemicals. The CHARM model, under the OCNS, is the primary tool to rank offshore chemicals based on assessment of toxicity, biodegradation and bioaccumulation data provided by the chemical supplier. The CHARM model calculates the ratio of predicted effect concentration against no effect concentration (PEC: NEC) and expresses this as a Hazard Quotient (HQ), which is then used to rank the product **Table 3-7**). The HQ is converted to a colour banding.

Products not applicable to the CHARM model (i.e. inorganic substances, hydraulic fluids) are assigned an OCNS grouping (**Table 3-8**). The overall ranking is determined by that substance having the worst case OCNS ranking scheme assignment in terms of biodegradability and bioaccumulative criteria. Group A includes products considered to have the greatest potential environmental hazard and Group E the least. Chemical products within Group D or E are considered inherently biodegradable and non-bioaccumulative.

Table 3-7: OCNS CHARM HQ and ranking

Minimum HQ value	Maximum HQ value	Colour banding	Hazard
>0	<1	Gold	Lowest
≥1	<30	Silver	
≥30	<100	White	
≥100	<300	Blue	
≥300	<1000	Orange	
≥1000		Purple	Highest

Table 3-8: OCNS groupings

OCNS grouping	Aquatic toxicity (LC_{50}) (mg/L)	Sediment Toxicity (LC_{50}) (mg/L)	Hazard
A	<1	<10	Highest
B	>1-10	>10-100	
C	>10-100	>100-1000	
D	>100-1000	>1000-10,000	
E	>1000	>10,000	Lowest

Subsea chemicals for which the chemical products meet at least one of the following environmental criteria are considered suitable for use and can be discharged to the marine environment:

- rated as Gold or Silver under OCNS CHARM model; and
- if not rated under the CHARM model, has an OCNS group rating of D or E.

The use of non-rated subsea chemicals will only be considered following approval from the Lead Pipeline Engineer, in consultation with the ConocoPhillips Environmental Specialist, after the completion of an environmental risk assessment. The environmental risk assessment includes the following:

- technical justification for the usage;
- consideration of additional controls;
- how each chemical may be used; and
- quantity to be used.

The environmental risk assessment will develop a residual risk rating based on:

- evaluation of the receiving marine environmental characteristics, values and sensitivities, with respect to the nature and scale of the proposed chemical product to be discharged;
- review of alternative chemical products that are equivalent in meeting the technical requirements of the scope of work and selection of the least hazardous chemical; and
- evaluation of ecotoxicity thresholds and application of OCNS ratings which may include:
  - establishment of an alternative ‘pseudo’ rating that can be applied to the chemical in accordance with international standard protocols or guidelines (e.g. International Organization for Standardization (ISO) test guidelines, Organisation for Economic Cooperation and Development (OECD) test guidelines, and OSPAR guidelines); or
  - use of alternative similar toxicity data if insufficient toxicity information is available on the non-rated chemicals.

ConocoPhillips will use chemical products considered to be ALARP following the risk assessment.

The ‘pseudo ranking’ for individual substances will be defined based on the CHARM model or on the OCNS ranking system (**Table 3-9**).

Table 3-9: OCNS chemical ranking system (from CEFAS[1])

− The OCNS grouping

During the hazard assessment process, each individual substance is ranked by applying the OCNS ranking scheme. The overall ranking for a product is determined by the product substance which has the worst case OCNS ranking. The method of assignment of the OCNS letter grouping is described below.

Initial grouping

The initial group is determined using Table 2. All submitted toxicity data for each substance is compared against the table. The most toxic response is used as the initial Group for the substance.

Table 2: Initial OCNS grouping

Initial grouping	A	B	C	D	E
Result for aquatic-toxicity data (ppm)	<1	>1-10	>10-100	>100-1,000	>1,000
Result for sediment-toxicity data (ppm)	<10	>10-100	>100-1,000	>1,000-10,000	>10,000

- Aquatic toxicity refers to the Algae EC50, Crustacean LC50, and Fish LC50 toxicity tests (units = ppm or mg/kg)
- Sediment toxicity refers to the Sediment re-worker LC50 test (units = ppm or mg/kg)

Adjustment of final OCNS group

The final grouping is determined using Table 3 as a guide.

Select the column that applies to the candidate substance and adjust the initial Group accordingly. If the classification should theoretically move beyond Group A or E, the product will be assigned to that Group.

[1] https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/hazard-assessment-process/

Table 3: Adjustment criteria for OCNS grouping

Increase by 2 groups (e.g. from C to E)	Increase by 1 group (e.g. from C to D)	Do not adjust initial grouping	Decrease by 1 group (e.g. from C to B)	Decrease by 2 groups (e.g. from C to A)
Substance is readily biodegradable and is non-bioaccumulative	Substance is inherently biodegradable and is non-bioaccumulative	Substance is not biodegradable and is non-bioaccumulative or	Substance is inherently biodegradable and bioaccumulates	Substance does not biodegrade and bioaccumulates
		Substance is readily biodegradable and bioaccumulates		

The Definitions of the terms are:

- **Readily biodegradable**: results of >60% biodegradation in 28 days (OECD 306,301B -F method), >70% in28 days (OECD 301A, 301E) to an OSPAR HOCNF accepted ready biodegradation protocols
- **Inherently biodegradable**: results of >20% and <60% (<70%) to an OSPAR HOCNF accepted ready biodegradation protocol.
- **Not biodegradable**: results from OSPAR HOCNF accepted ready biodegradation protocol or inherent biodegradation protocol are <20%, or half-life values derived from aquatic simulation tests indicate persistence
- **Non-bioaccumulative**: Log P_{ow} <3, or BCF ≤100, the molecular weight is ≥700
- **Bioaccumulative**: Log P_{ow} ≥3, or BCF >100, the molecular weight is <700, or if the conclusion of a weight-of-evidence expert judgement under OSPAR Agreement 2008-5 is negative

3.7 Pipeline Installation Contingencies

Unplanned situations may arise during pipeline installation. The pipelay contractor will develop contingency procedures for these unplanned but potential situations. Two contingent activities, wet buckle and a stuck pig contingency have potential environmental impacts.

3.7.1 Wet Buckle

A wet buckle is when there is a failure in the pipeline during installation which results in the ingress of raw / untreated sea water into the pipeline. In the event of this occurring the untreated seawater will need to be removed from the pipeline and the pipeline may need to be flushed with treated seawater, subject to cause of the wet buckle and the activities required prior to pipelay operations being able to safely recommence.

A detailed incident investigation shall be performed in the instance of a wet buckle and any findings must be satisfactorily addressed before pipelay can recommence. If modifications are required to the pipelay vessel or procedures that will result in an extended period before pipelay can recommence then the pipeline will be flooded with inhibited seawater to safely preserve the pipeline in the intervening period before pipelay is recommenced. In this instance the seawater will be treated with the same chemicals used for FCGT, as described in **Section 3.5.9** and will need to be dewatered immediately prior to pipelay recommencing in order to enable the pipeline to be recovered to the surface.

Should preservation, and subsequent dewatering be required, a detailed assessment shall be performed to confirm the direction the pipeline shall be dewatered from to minimise the environmental impact. Due to the uncertainty on the lay direction, the amount of pipe installed, the required preservation period (which will drive the required chemical concentration) and the location of buckle event it is not practicable to perform this assessment in advance.

The requirement to temporarily preserve the pipeline is not required if pipelay can safely be recommenced in a timely manner, typically less than 30 days from the introduction of raw seawater into the pipeline. In this instance the raw seawater shall be displaced using a series of bidirectional pigs and pipelay operations shall recommence. Once the pipelay is completed the full pipeline shall be flooded, cleaned and gauges as detailed in **Section 3.5.9.**

3.7.2 Stuck Pig

In the event that a pig gets stuck in a pipeline it would need to be forced out. This would require the use of additional treated seawater to push the pig out resulting in a discharge to the environment (**Section 3.5.9**).

4 EXISTING ENVIRONMENT

In accordance with Regulation 13(2) and 13(3) of the OPGGS (E) Regulations, this section provides a description of the existing environment, including details of any particular relevant values and sensitivities, that may be affected by both routine/planned and non-routine/unplanned activities. The spatial extent of the environment that may be affected (EMBA) has been defined using stochastic modelling for hydrocarbons, based on the thresholds defined in **Section 5.3.7,** from the credible hydrocarbon spill scenario of a vessel to vessel collision (**Section 5.3.7**), as this represents the largest geographic extent of the environment that may be affected by the activity (**Figure 5-10**).

The existing environment description (i.e. within the EMBA) is based on a comprehensive environmental baseline studies program (**Section 4.2**), literature reviews of scientific information, and material provided by DoEE (e.g. EPBC Protected Matters Search tool (PMST), species profile and threats database and the Conservation Values Atlas). Review of the available information identified a range of environmental receptors, such as Australian Marine Parks, Biologically Important Areas (BIAs), Key Ecological Features (KEFs) and shallow bathymetric features such as shoals, banks and reefs, occur within the EMBA. These receptors were subsequently researched and are reported in this section, along with other values and sensitivities within the Operational Area and EMBA. A summary of the key environmental characteristics is provided in **Table 4-1**. A description of the regional environment is also included to provide context for the characteristics of the existing environment values and sensitivities in and around the EMBA.

The description provided in this section has been used to inform the risk assessment for the activity (**Section 5**).

Table 4-1: Key Environmental Characteristics of the Operational Area and EMBA

Key Environmental Characteristics	Operational Area	EMBA
Bathymetry and Seabed Features	• Water depths range from 254 to 33 m. • Northern section of pipeline route has smooth to moderate slopes of fine to medium sands/silts and clay, with pockmarks and occasional outcrops • Southern section of pipeline route has areas of highly irregular relief, smooth sandy/silty seabed (with megaripples and sand waves) and rock/reef outcrops with coarse sediments (sand, gravel and shells).	• Water depths generally from 10 to 200 m but exceed 1000 m in the northern region. • A number of shoals, banks and reef patches are present
Habitats and Communities		
Intertidal and benthic primary producers	• No coral or seagrass habitat was identified within the Operational Area • Based on habitat modelling there may be small areas of macroalgae	• Coral is generally confined to the shallower regions of banks, shoals and pinnacles e.g. Tassie Shoal and Evans Shoal • Seagrass may be present within shallow sheltered areas of the Tiwi Islands. • Mangroves occur along the Tiwi Islands tidal creeks
Other benthic communities	The benthic habitats within the Operational Area predominantly support burrowers/crinoids (12%), filter feeders (7%) and abiotic areas that support little biota (81%).	Benthic habitat within the EMBA is dominated by bare sand and abiotic areas that support little biota.

<table>
<tr><th>Key Environmental Characteristics</th><th>Operational Area</th><th>EMBA</th></tr>
<tr><td colspan="3">Marine Fauna of Conservation Significance</td></tr>
<tr><td>Biologically Important Areas</td><td>One BIA overlaps the Operational Area – flatback turtle internesting habitat</td><td>Four BIAs overlap the EMBA:
• flatback turtle internesting habitat
• green turtle internesting habitat
• olive ridley internesting habitat
• crested turn breeding habitat</td></tr>
<tr><td>Habitat Critical to the Survival of a Species</td><td colspan="2">‘Habitat critical to the survival of a species’ for two marine turtle species (flatback turtles and olive ridley turtles) were identified as overlapping the Operational Area and EMBA</td></tr>
<tr><td>Marine Mammals</td><td colspan="2">The following threatened and/or migratory marine mammals potentially occur in the Operational Area and EMBA:
• sei whale, blue whale, fin whale, humpback whale, Bryde’s whale, dugong, Australian snubfin dolphin, Irrawaddy dolphin, killer whale (orca), sperm whale, Indo-Pacific humpback dolphin, Indo-Pacific bottlenose dolphin (Arafura/Timor Sea populations), spotted bottlenose dolphin, Omura’s whale*.</td></tr>
<tr><td>Marine Reptiles</td><td colspan="2">The following threatened and/or migratory marine reptiles potentially occur in the Operational Area and EMBA:
• loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, olive ridley turtle, flatback turtle, salt-water crocodile.</td></tr>
<tr><td>Fish</td><td colspan="2">The following threatened and/or migratory fish potentially occur in the Operational Area and EMBA:
• grey nurse shark*, great white shark, northern river shark, speartooth shark, dwarf sawfish, freshwater, largetooth sawfish, green sawfish, whale shark, narrow sawfish, knifetooth sawfish, shortfin mako, longfin mako, giant manta ray, reef manta ray.</td></tr>
<tr><td rowspan="2">Seabirds and migratory Shorebirds</td><td colspan="2">The following threatened and/or migratory fish potentially occur in the Operational Area and EMBA:
• red knot, knot, curlew sandpiper, eastern curlew, common sandpiper, common noddy, sharp-tailed sandpiper, pectoral sandpiper, streaked shearwater, lesser frigatebird, great frigatebird, osprey.</td></tr>
<tr><td>(Not applicable)</td><td>Six additional species were identified to only occur within the EMBA
• western Alaskan bar-tailed godwit
• northern Siberian bar-tailed godwit
• oriental reed-warbler
• oriental plover
• oriental pratincole
• crested tern</td></tr>
<tr><td colspan="3">Other value and sensitivities</td></tr>
<tr><td>Key Ecological Features</td><td colspan="2">Two KEFs overlap the Operational Area and the EMBA
Carbonate bank and terrace system of the Van Diemen Rise
Shelf break and slope of the Arafura Shelf</td></tr>
<tr><td>Shoals and banks</td><td>No shoals and banks occur within the Operational Area</td><td>A number of shoals and banks were identified within the EMBA (distances in brackets below are distances from Operational Area):
• Mesquite Shoal (2.1 km)
• Marie Shoal (2.3 km)
• Goodrich Bank (adjacent)
• Moss Shoal (7.8 km)
• Lynedoch Bank (58.2 km)
• Parry Shoal (24.7 km)</td></tr>
</table>

Key Environmental Characteristics	Operational Area	EMBA
		• Flat Top Shoal (40.5 km) • Mermaid Shoal (14.6 km) • Evans Shoal (61 km) • Afghan Shoal (10 km) • Shepparton Shoal (0.9 km)
Socio-economic		
Australian Marine Parks	Sections of the Operational Area traverse through the following zones of Oceanic Shoals Marine Park: • Category VI (Multiple Use Zone – Managed resource protected area) • Category IV (Habitat Protection Zone – Habitat/species management area)	The EMBA overlaps all zones of the Oceanic Shoals Marine Park, including the: • Multiple Use Zone (VI); • Special Purpose Zone (Trawl) (VI); • National Park Zone (II); and • Habitat Protection Zone (IV).
Reef Protection Areas	The Operational Area does not overlap any reef protection areas	The EMBA overlaps the Bathurst Island and Lorna Shoal Reef Protection Areas
European Heritage	No known listed historic shipwrecks or plane wrecks occur within the Operational Area.	Three listed historic shipwrecks occur within the EMBA: • I-124 (submarine) • Florence D • Don Isidro USAT
Aboriginal Heritage	There are no recorded Indigenous heritage sites within the Operational Area.	The Tiwi Islands are a declared Aboriginal reserve and comprise a number of protected sacred sites.
Commercial Fisheries	The Operational Area and EMBA overlap one Commonwealth managed fishery (Northern Prawn Fishery) and five NT managed fisheries: • Demersal Fishery • Coastal Line Fishery • Offshore Net and Line Fishery • Spanish Mackerel Fishery • Timor Reef Fishery	
Traditional Fishing	No traditional fishing areas have been identified within the Operational Area.	Traditional fishing in the EMBA is mainly focused in the coastal areas of the Tiwi Islands and includes catching fish, hunting (turtles and dugongs) and gathering turtle eggs.
Tourism and Recreation	Offshore activities (e.g. deep-water fishing and diving) may occur within the Operational Area but are expected to be limited and infrequent.	Tourism and recreational activities in the EMBA are likely to be more concentrated within coastal waters (e.g. around the Tiwi Islands) but activities may potentially take place in offshore areas.
Defence Activities	The Operational Area does not overlap any Defence areas.	The EMBA overlaps the North Australian Exercise Area (NAXA)

4.1 Regional Setting

The Operational Area is located in Australian Commonwealth Waters of the North Marine Region (NMR), predominantly overlapping the Northwest Shelf Transition Provincial Bioregion, with approximately 40 km of the northern extent crossing into the Timor Transition Provincial Bioregion (**Figure 4-1**). Within the Northwest Shelf Transition Province, the Operational Area crosses two mesoscale bioregions; the Oceanic Shoals (also a Commonwealth managed marine park) and the Bonaparte Gulf. Where appropriate, these provincial and mesoscale bioregions have been used to describe the existing environment within the Operational Area.

The EMBA covers a wider area than the Operational Area. Within the Northwest Shelf Transition Province, the EMBA crosses four mesoscale bioregions; the Oceanic Shoals, Bonaparte Gulf, Tiwi and Anson Beagle. The EMBA also extends north towards waters of Indonesia and Timor-Leste, and south into NT coastal waters. Where appropriate, the NMR and Timor Sea have been used to describe the broad environmental characteristics of the EMBA.

The key physical characteristics of the NMR relevant to the EMBA include (DSEWPaC, 2012):

- a wide continental shelf, with water depths averaging less than 70 m;
- the Van Diemen Rise, which provides an important link between the Joseph Bonaparte Gulf and the Timor Trough. This feature includes a range of geomorphological features, such as shelves, shoals, banks, terraces and valleys;
- a series of shallow calcium carbonate-based canyons (approximately 80 m – 100 m deep and 20 km wide) in the northern section of the region;
- the Arafura Shelf, which is up to 350 km wide and has an average water depth of 50 m – 80 m. The shelf is characterised by features such as canyons and terraces; and
- currents driven predominantly by strong winds and tides i.e. the Indonesian throughflow current (ITF).

The Northwest Shelf Transition Provincial bioregion covers an area of 305,463 km^2 and includes NT and Commonwealth Waters. The bioregion extends from the Tiwi Islands to Cape Leveque with most of the area located over the continental shelf. The oceanographic environment in the Northwest Shelf Transition Province is mainly influenced by the Indonesian throughflow which varies in strength seasonally (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2008a). Water depths average between 10 to 100 m, with a maximum depth of 330 m. Topography of the Northwest Shelf Transition Province is considered complex and comprises a diversity of features, including submerged terraces, carbonate banks, pinnacles, reefs and sand banks (DEWHA, 2008a). KEFs within the bioregion, such as the Carbonate Banks and Terrace System of the Van Diemen Rise, are considered distinct features of the Northwest Shelf Transition Province and likely support higher diversity of marine species compared to the surrounding seabed. Sections of the KEF overlapping the EMBA are discussed in greater detail in **Section 4.5.6.1**. Species occurring within the Northwest Shelf Transition Province are typical of Indo-west Pacific tropical flora and fauna (DEWHA, 2008a), and the region includes a number of BIAs for marine turtles and dolphins. BIAs overlapping the Operational Area and EMBA are outlined in **Section 4.5.5.3**.

The Timor Transition Provincial Bioregion covers an area of 24,040 km^2 and includes Commonwealth Waters. The bioregion extends offshore adjacent to Timor- waters. The region is characterised by cooler pelagic waters (DEWHA, 2008a) influenced by the ITF. Water depths range between 15 and 357 m. Topography of the Northwest Shelf Transition Province is considered complex and comprises a diversity of features, including canyons, submerged terraces, ridges and deep escarpments (DEWHA, 2008a).

4.2 Baseline Studies Conducted by ConocoPhillips

ConocoPhillips has undertaken an extensive and robust environmental baseline studies program to characterise the existing marine environment within and surrounding NT/RL5, within which the Barossa field is located. The studies have involved the collection of detailed baseline data over 12 months (July 2014 to July 2015) in order to capture seasonal variability in the area. These studies also informed the Barossa Area Development OPP prepared in accordance with the requirements of the OPGGS (E) Regulations. In addition to providing specific data and information across the area, the studies collected data that have been used to validate the hydrodynamic model developed by RPS which underpins the credible hydrocarbon spill modelling and the dewatering modelling.

The baseline studies undertaken by ConocoPhillips were preceded by early engagement with key agencies (e.g. the Australian Institute of Marine Science (AIMS)) and were informed by a comprehensive literature review and gap analysis. Subsequent environmental and geophysical and geotechnical studies have also been undertaken to enhance the understanding of the existing environment and inform the impact assessment presented within the EP. A summary of the studies relevant to this EP is provided in **Table 4-2** below and **Figure 4-2** presents the extent of environmental sampling undertaken.

Table 4-2: Summary of Barossa studies

Study type	Description of study	Reference
Field-based studies		
Metocean data collection	Collection of metocean data on the surface and through the water column from July 2014 to March 2015, within and near the Barossa field, e.g. current, conductivity, wave and wind data.	Fugro, 2015
Water quality survey	Collection of baseline data on physical and chemical components of water quality near the Barossa field. The surveys were completed in June 2014, January 2015 and April 2015.	Jacobs, 2015a, 2015b, 2014
Sediment quality and infauna survey	Collection of baseline data on sediment quality and infauna communities in the vicinity of the Barossa field.	Jacobs, 2015c
Benthic habitat survey	Collection of baseline data to characterise topographic features, benthic habitats and macrofaunal communities near the Barossa field location and surrounding areas, including around Evans Shoal, Tassie Shoal and Lynedoch Bank, through the use of a specialised ROV.	Jacobs, 2016
Underwater noise survey	Collection of baseline data on ambient underwater noise (physical, biological and anthropogenic sources) at three locations from July 2014 to July 2015 within the vicinity of the Barossa field and surrounding areas. One noise logger was deployed adjacent to the Operational Area (J2) and the other two were between ~12 and 38 km from the Operational Area.	JASCO Applied Sciences (JASCO), 2015
Shoals and shelf survey 2015: • benthic habitats • fish communities	A seabed biodiversity survey of three shoals to the west of the Barossa field (Evans Shoal, Tassie Shoal and Blackwood Shoal) and two mid- continental shelf regions relevant to the potential pipeline route. The survey was undertaken in September/October 2015 by AIMS and involved characterisation of the seabed habitats, associated biota and fish communities (shoals only).	Heyward et al., 2017
Geophysical Survey	This survey undertook a preliminary geophysical survey of potential pipeline routes within the pipeline installation corridor presented in the accepted OPP	Fugro, 2016
Barossa Pipeline Environmental Survey	Collection of baseline data to characterise water quality, plankton, sediment quality and infauna communities. Sampling was undertaken in July to August 2017 along the southern end of the pipeline route in water depths from ~80 m to 25 m.	Jacobs, 2017
Oceanic Shoals Marine Park Benthic Habitat and Fish Diversity Assessment	A seabed and fish biodiversity survey conducted between September and October 2017, by AIMS. The survey focused on six key sites inside and outside of the Oceanic Shoals Marine Park, including in the Habitat Protection Zone, and Shepparton Shoal. The objective was to incorporate this new data to update the predictive habitat model an undertake statistical comparison of the proportion and spatial diversity of habitats within and outside the Oceanic Shoals Marine Park.	Radford et al., 2019
Geophysical Survey Report. Export Pipeline Route	This report presents the results from a geophysical survey carried out along the GEP route and provides a comprehensive assessment of the seafloor and shallow geological features along the GEP.	DOF Subsea (2018)

Study type	Description of study	Reference
Desktop/modelling studies		
Environmental literature review and gap analysis	Collection and collation of publicly available information pertaining to the marine environment within the vicinity of the Barossa field and gap analysis to determine whether there is sufficient information to inform an environmental impact assessment and any future regulatory approvals for a potential full field development.	JacobsSKM, 2014
Hydrodynamic model validation study	Data from the metocean study and through the deployment of drifter buoys near the Barossa field and surrounding areas, were used to validate the underlying hydrodynamic model used to develop the spill and discharge models.	RPS APASA, 2015
Tiwi Islands sensitivity mapping study	Collection of data on environmental, social, cultural and economic sensitivities for the Tiwi Islands. A desktop review of available data (spatial datasets) was followed by workshops with Traditional Owners to identify cultural and environmental sensitivities along the coast of the Tiwi Islands.	Jacobs, 2019

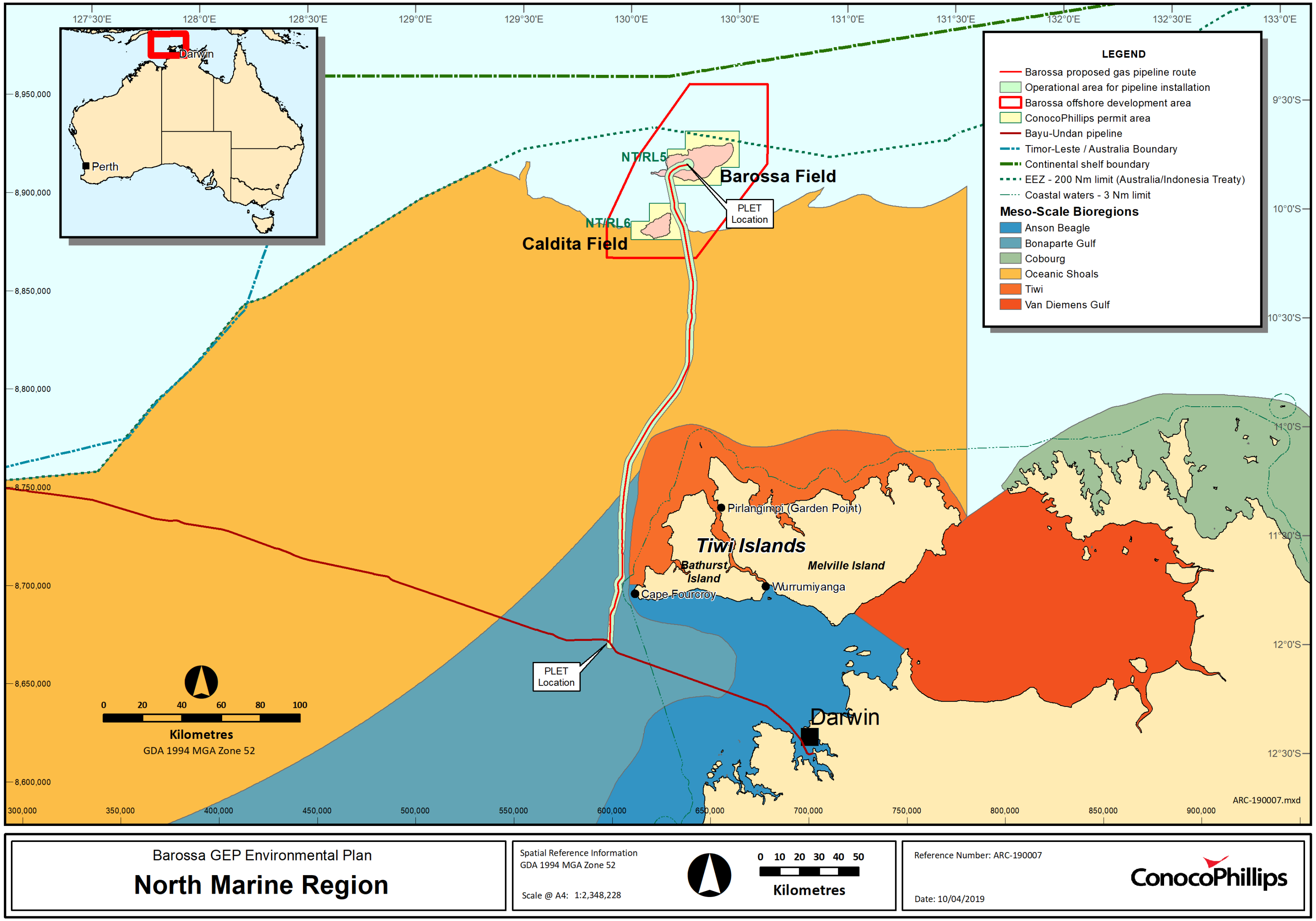


Figure 4-1: Location of the NMR and the Operational Area

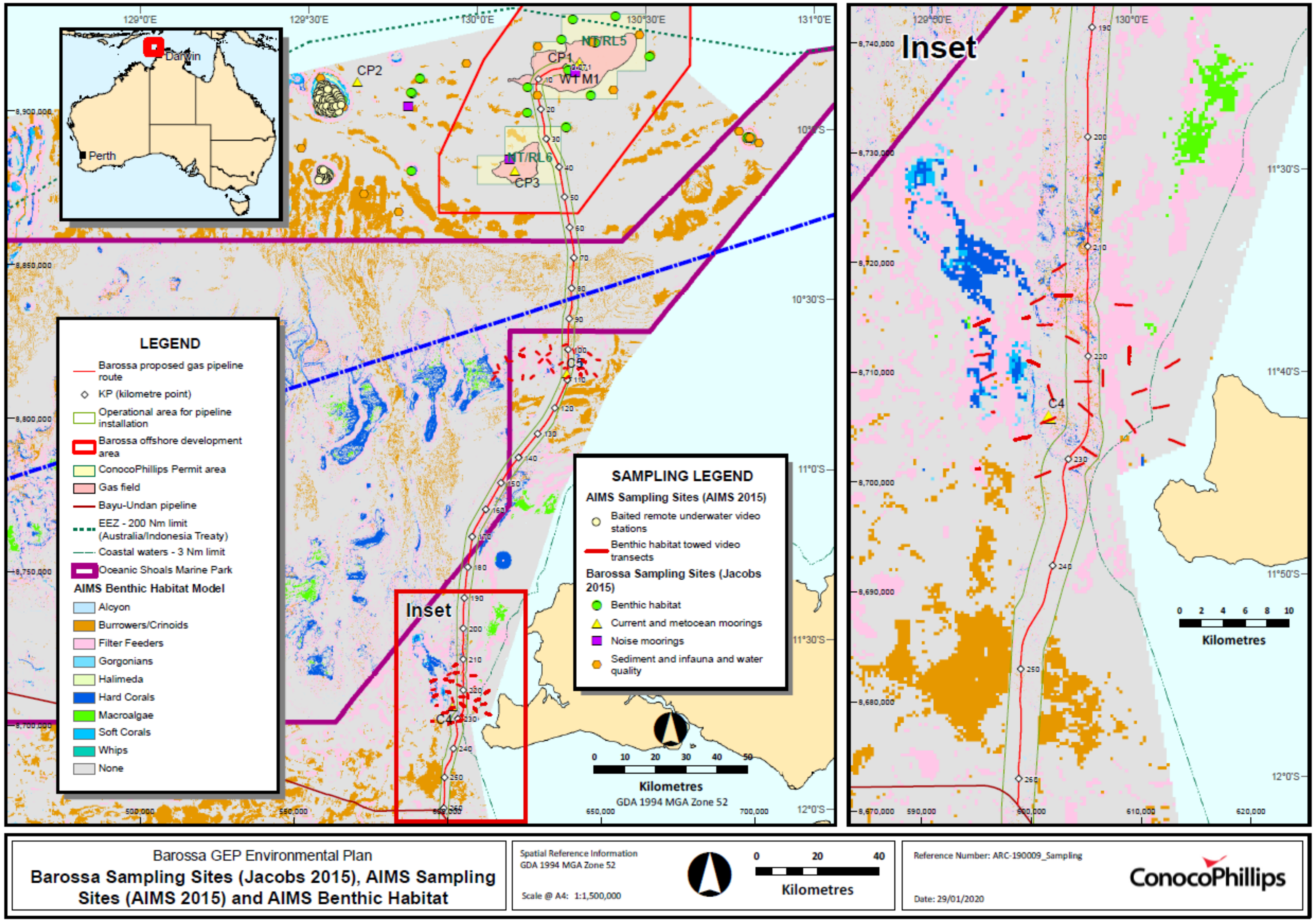


Figure 4-2: Locations of sampling undertaken as part of the Barossa baseline studies program (refer Table 4-2 for a summary of each)

4.3 Physical Environment

4.3.1 Climate

The Bonaparte Basin and Timor Sea experiences a tropical climate and a distinct summer monsoonal wet season from December to March (north-west monsoon) followed by a typically cooler winter dry season from April to September (south-east monsoon). During the wet season the south-westerly winds can generate thunderstorm activity, high rainfall and cyclones, while in the dry season the easterly winds result in dry and warm conditions with very little rainfall. In addition, the region may also be subject to tropical squalls which are characterised by very high short period wind gusts.

Wind measurements in the Timor Sea indicate that large-scale ocean currents are typically not influenced by local scale wind conditions. The winter season is dominated by south east trade winds with wind speeds peaking in July with speeds up to 44-50 km per hour (km/h). The transitional period is characterised by generally light and variable winds while the summer season is characterised by cyclonic activity where wind speeds can exceed 120 km/h.

Within the NMR, the variation in seasonal air temperatures in the region is small. The mean maximum air temperatures recorded at Point Fawcett, Melville Island between 1961 and 2018 (the closest meteorological station to the Operational Area) range between 32.1 °C in July to 34.6 °C in November (Bureau of Meteorology (BOM), 2019). The annual mean maximum temperature is 32.9 °C and the mean minimum temperature 30.9 °C (BOM, 2019).

The Operational Area and EMBA are located within a cyclone-prone region. Tropical cyclones form in the area generally south of the equator in the Indian Ocean and the Timor and Arafura Seas. Most cyclones approach the area heading in a west or south-west direction. The average tropical cyclone frequency for the Timor Sea is one cyclone per year (BOM, 2017). Cyclones can bring vast amounts of rain to the area, with strong swell and rough seas common during these meteorological events. Most cyclones approach the region from the east-north-east, veering to a southerly track the further south they go.

4.3.2 Oceanography

4.3.2.1 Regional current system

Regionally, circulation in the Timor Sea is dominated by the Indonesian throughflow system. This brings warm, low salinity, oligotrophic (low in nutrients) waters through a complex system of currents, linking the Pacific and Indian Ocean via the Indonesian Archipelago (DEWHA, 2008a). The strength of the Indonesian throughflow fluctuates seasonally, reaching maximum strength during the south-east monsoon, and weakening during the north-west monsoon. The Holloway Current, a relatively narrow boundary current that flows along the north-west shelf of Australia between 100 m – 200 m depth, also influences the seas in the area (DEWHA, 2008a). The direction of the current changes seasonally with the monsoon, flowing towards the north-east in summer and the south-west in winter (DEWHA, 2008a).

4.3.2.2 Tides

Tides in the region are predominantly semi-diurnal (two highs and two lows per day) with a distinct inequality between successive tides during a single day. Ranges increase as the tide propagates over the Sahul shelf, increasing to 7 - 8 m in the Joseph Bonaparte Gulf. At the northern end of the pipeline, spring tidal ranges are 2.70 m, whilst at the southern end they are around 4.5 m.

4.3.2.3 Currents

Currents were measured along the pipeline route at four locations, CP1, CP3, C4 and C5 shown in **Figure 4-3**). Offshore surface currents are dominated by wind and oceanic drift (**Figure 4-4**) whilst further south tidal forces dominate with strong rectilinear currents opposite Bathurst Island (**Figure 4-7**).

At the FPSO location (Station CP1; **Figure 4-4**), speeds reached a maximum of 0.88 m/s with mean current speeds ranging from 0.14 m/s at depth to 0.22 m/s at the near surface. Current directions were predominantly south-westward to south-eastward during winter months, with dominant westward to north-westward flow in summer. The tidal component of flow became more prominent with greater depth, with flow along a south-eastward to north-westward axis. Near-bed the currents were predominantly tidal.

Just off the shelf, at Station CP3 (**Figure 4-5**), current speeds reached a maximum of 1.08 m/s with mean current speeds ranging from 0.19 m/s at depth to 0.27 m/s at the near surface. Current directions were dominated by south-eastward flow throughout depth during winter, reversing to a predominant north-westward flow during summer months. As at CP1, the tidal component of flow became more prominent with greater depth, with flow along a south-eastward to north-westward axis.

On the shelf at Station C5 tidal currents dominate. Current speeds were measured up to 0.71 m/s. The tide ebbs towards the north-north-east and floods towards the south-south-west. At Station C4 (**Figure 4-7**), adjacent to Bathurst Island currents were strongly rectilinear, flooding towards the south and ebbing towards the north. On the spring tide, maximum current speeds were around 1.1 m/s reducing to around 0.3 m/s on the neaps.

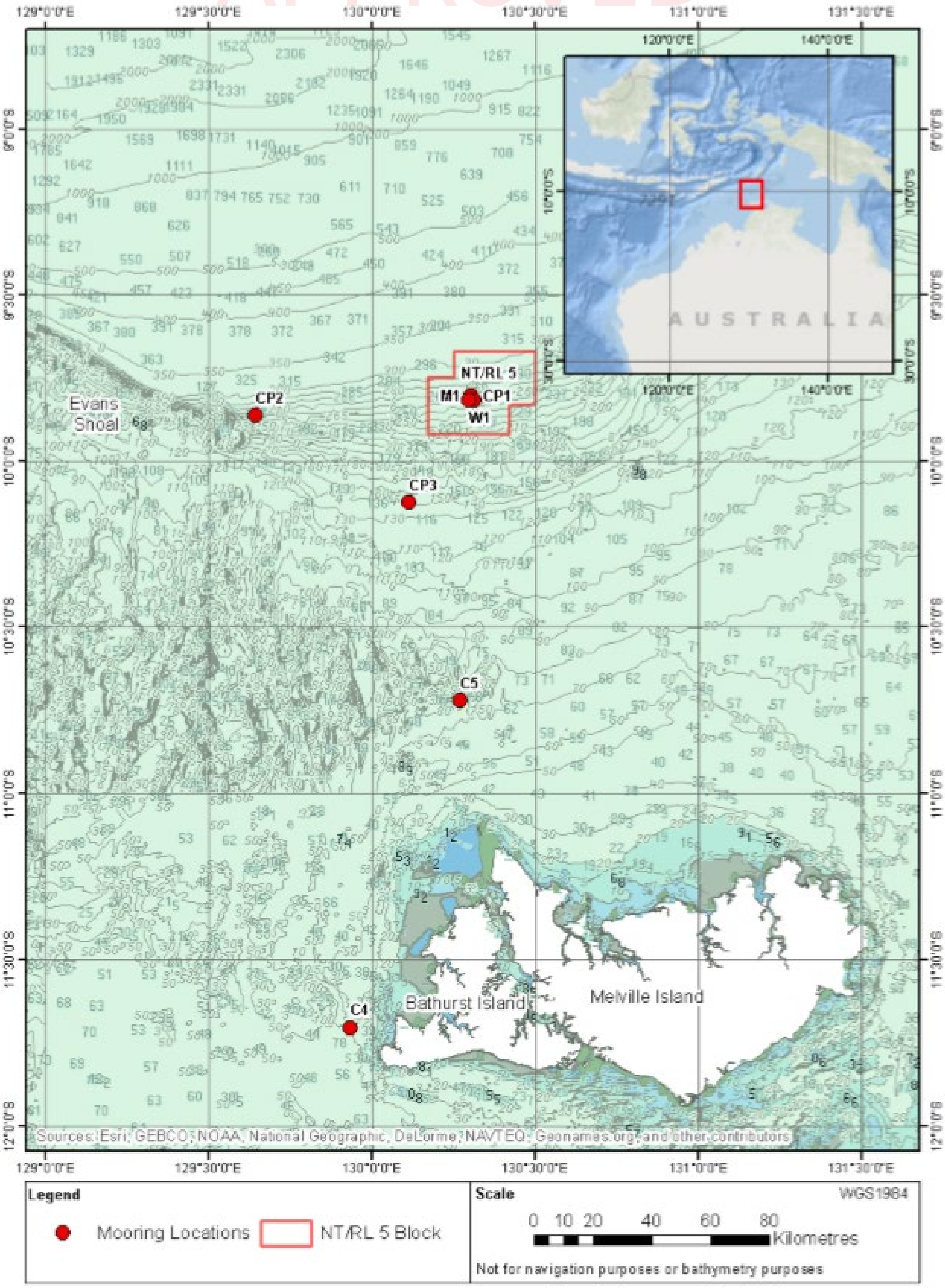
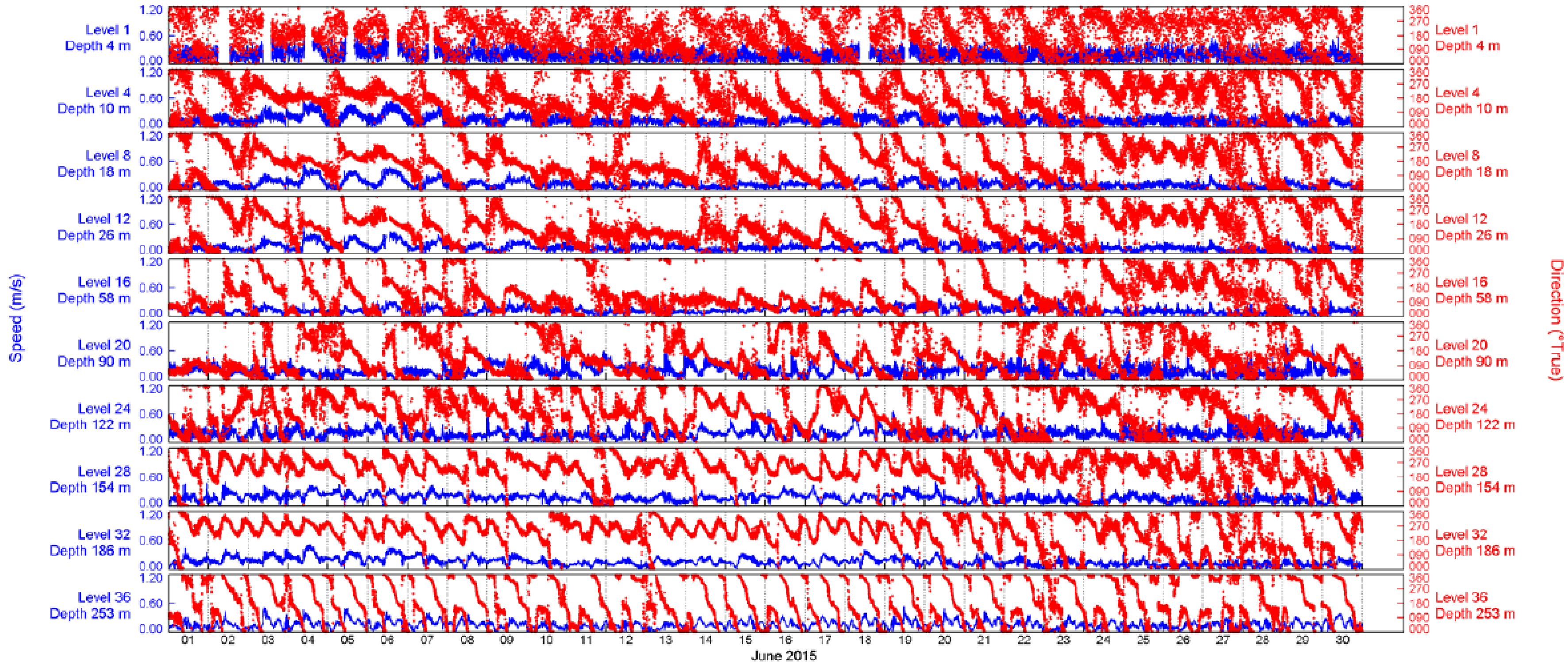
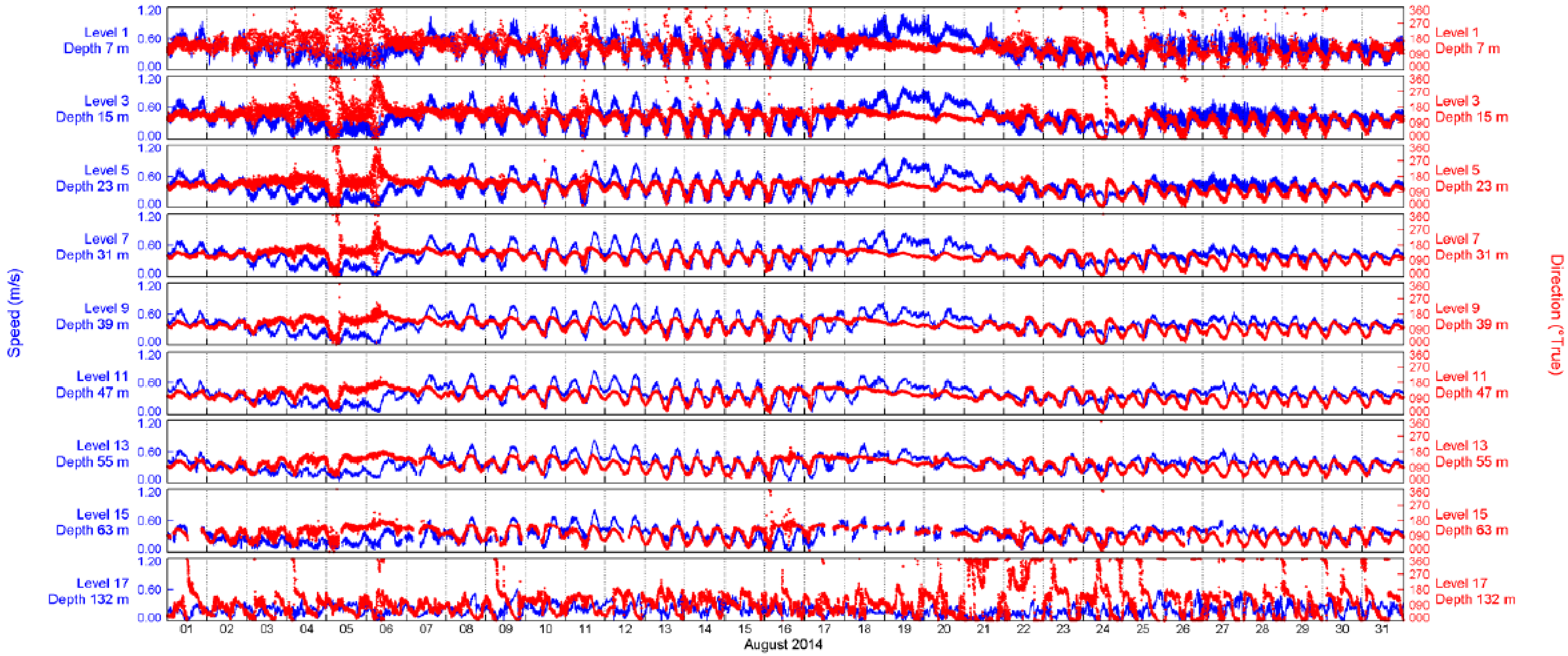


Figure 4-3: Oceanographic mooring locations (from Fugro, 2015)



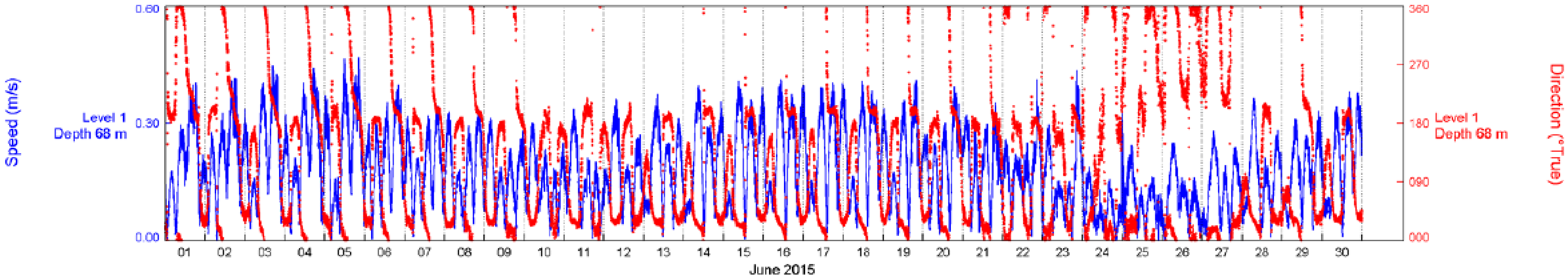
Location: CP1	**Position:** 09° 48.315' S, 130° 18.228' E	**Datum:** MSL
Water depth: 260 m	**Instrument type:** WH ADCP, QM ADCP, SG	
Notes: Time Zone = UTC.		

Figure 4-4: Time series of current speed and direction at the FPSO in-field location CP1 (from Fugro, 2105)



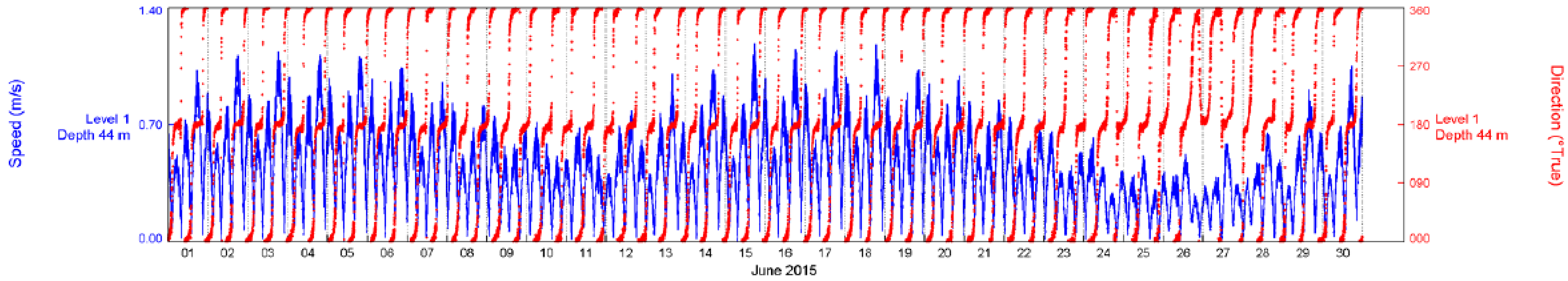
Location: CP3	**Position:** 10° 07.560' S, 130° 06.796' E	**Datum:** MSL
Water depth: 139 m	**Instrument type:** WH ADCP, Lower SG	
Notes: Time Zone = UTC.		

Figure 4-5: Time series of current speed and direction off the shelf at CP3 (from Fugro, 2015)



Location: C5	**Position:** 10° 43.447' S, 130° 16.170' E	**Datum:** MSL
Water depth: 75 m	**Instrument type:** SG	
Notes: Time Zone = UTC.		

Figure 4-6: Time series of current speed and direction on the shelf at C5 (from Fugro, 2015)



Location: C4	**Position:** 11° 42.283' S, 129° 55.915' E	**Datum:** MSL
Water depth: 51 m	**Instrument type:** SG	
Notes: Time Zone = UTC.		

Figure 4-7: Time series of current speed and direction adjacent to Bathurst Island at C4 (from Fugro, 2015)

4.3.2.4 Waves

In general, the wave climate and significant wave heights in the NMR are low. Approximately 67 % of the significant wave height records are less than 1 m, and less than 3% exceed 2 m. The calmest months are March, April, and September to November. Significant wave heights above 2 m are most common in December to February, particularly during monsoon conditions, and in May to July. Swells are generally low and from the west (originating in the Indian Ocean) but can enter the area from the east following cyclonic development in the Arafura Sea.

4.3.2.5 Temperature

The sea surface temperature in the Timor Sea does not vary significantly during the year and typically ranges from approximately 26 °C to 27 °C. This temperature is characteristic for the top 50 m of the water column. Beneath that layer, there is typically a steady decrease in temperature with depth to about 23 °C at 110 m depth. The water temperatures of the Timor Sea are largely influenced by the Indonesian throughflow and a highly pronounced thermocline. Seawater temperature in the region ranges from 25ºC to 31ºC at the surface and 22ºC to 25ºC at the seafloor (Brewer et al., 2007).

4.3.3 Bathymetry and Seabed Features

Water depths throughout most of the Timor Sea range between 70 and 200 m, however, exceed 1,000 m in the northern region, towards Indonesia and Timor-Leste (Harris et al., 2003). Topography of the Northwest Shelf Transition Province is considered relatively complex and comprises a diversity of features including coastal areas, shelf and basins within the Joseph Bonaparte Gulf and the banks/shoals, terraces and reefs within the Van Diemen Rise and Sahul Shelf (DEWHA, 2008b) (). Water depths along the gas export pipeline route vary from 254 m at the deepest point to 33 m at the shallowest point (**Figure 4-8**).

South of the Operational Area, towards coastal waters of the NT, the Bonaparte Gulf is relatively uniform with simple geomorphology and comprises mostly of shelf waters and a shallow depression (Joseph Bonaparte Gulf) (Rochester et al., 2007). NT coastal waters include numerous rocky reefs and shoals scattered throughout, as well as a number of fringing coral reefs and patch reefs (Rochester et al., 2007). A number of shoals, banks and reef patches overlap the EMBA throughout the NMR and beyond Commonwealth Waters towards Indonesia and Timor-Leste, however, none of these overlap the Operational Area (**Figure 4-8)**.

The Operational Area and EMBA overlap two KEF's (the 'Carbonate bank and terrace system of the Van Diemen Rise' the 'Shelf break and slope of the Arafura Shelf')**).** The value of these KEF's are defined as "unique seafloor feature with ecological properties of regional significance" (DSEWPaC, 2012) (see **Section 4.5.6.1).**

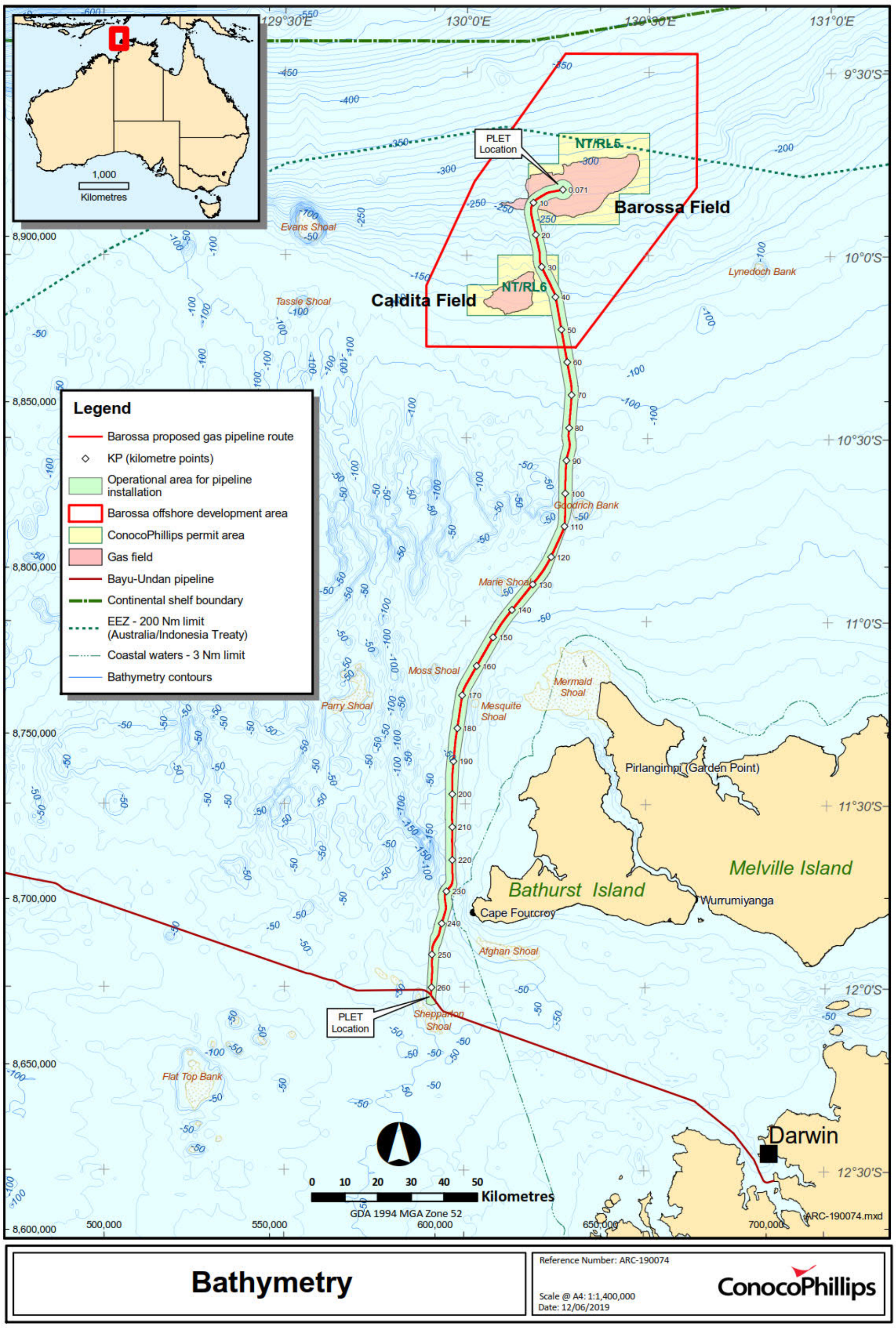


Figure 4-8: Bathymetry of the Operational Area

4.3.4 Water Quality

Water quality in the Northwest Shelf Transition Province is influenced predominately by the Indonesian throughflow, which brings warm, low salinity, oligotrophic (low in nutrients) waters into the region from Indonesia (DEWHA, 2008b). Offshore waters are generally clear, with the euphotic zone extending down to 100 m across the shelf (DEWHA, 2008b). Localised upwellings of cooler and higher nutrient content waters occur throughout the Northwest Shelf Transition Province, however, the influence and extent of these upwellings are mostly unknown (DEWHA, 2008b).

Water quality was monitored as part of the Barossa marine studies program (**Table 4-2**) Temperature, pH, salinity and dissolved oxygen remained relatively consistent throughout the seasons. The pH in the surface waters ranged from 8.1-8.3 pH units while the pH at the seabed was ranged from 7.7-7.9 pH units (Jacobs, 2015a, 2015b, 2014). There was little difference in salinity between the surface water and the bottom water at all sites during all seasons. Salinity at the surface waters were approximately 34 parts per thousand (ppt), which was approximately 0.7 ppt lower than the bottom water of the deepest sites (Jacobs, 2015b). As the water quality sampling sites were remote from any large land masses, the only potential factors affecting surface water salinity are climatic ones (i.e. precipitation or evaporation). Dissolved oxygen was high in the surface water (90%-100% saturation at all sites for each season) decreasing to approximately 35% saturation in the bottom water of the deepest sites (Jacobs, 2015b). Dissolved oxygen was highest near the ocean surface, where light for photosynthesis is strongest and oxygen exchange between the atmosphere and the ocean is at a (Jacobs, 2015b).

Within the northern extent of the Operational Area turbidity was very low throughout the water column and displayed minimal seasonal variability (<0.2 nephelometric turbidity units (NTU)) (Jacobs, 2015b). 20 - 50 m above the seabed, the turbidity was slightly elevated and increased with depth, possibly caused by the action of currents passing over the seabed causing turbulence and resuspension of sediments (Jacobs, 2015b). Jacobs (2017) found that turbidity levels appeared to be dependent on the location of the site in relation to the Tiwi Islands, with sites just to the north and south of Bathurst Island characterised by relatively low turbidity (<0.8 NTU) and the sites closest to Bathurst having high turbidity (5.7 – 36.7 NTU) for bottom water samples.

Chlorophyll ‘a’ concentrations were low (>0.9 micrograms per litre (µg/L)) throughout the water column at all sites and during each season. Chlorophyll ‘a’ concentrations peaked at shallower depths during winter (30 - 50 m) and deeper depths during summer and autumn (50 m-70 m) (Jacobs, 2015b). During summer the zone of maximum productivity lies some distance below the surface, most likely due to optimising the requirement for light and nutrients (Jacobs, 2015b).

Nutrient concentrations increase with depth and light penetration is greater in summer therefore the depth of maximum productivity would be greater in summer than winter.

Whilst the majority of metal concentrations were below the Australian and New Zealand Environment and Conservation Council and Agricultural and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ) (2000) guidelines, copper concentrations were occasionally slightly above the ANZECC & ARMCANZ guideline for 99% species protection of 0.3 µg/L. Further sampling along the pipeline route in 2017 did not identify any levels of aluminium, cadmium, chromium, cobalt, copper, nickel and lead above ANZECC & ARMCANZ (2000) dissolved metal trigger values (Jacobs, 2017).

Total recoverable hydrocarbons and benzene, toluene, xylenes and naphthalene were below the laboratory reporting limits at all sites and depths for each season (Jacobs, 2017, 2015b). There was little difference in the hydrocarbon profiles between sites, indicating a lack of hydrocarbons in the areas sampled (Jacobs, 2015b).

Overall, there was very little change in the majority of water quality parameters recorded between the surveys, indicating minimal seasonal variation is experienced in the area. The water quality throughout the water column was consistent with expected trends given the location and natural processes like wind, waves and current movements that are found in deeper water offshore environments. However, nearshore waters may experience more variability due to seasonal change.

4.3.5 Sediment Quality

The dominant sediments within the offshore NMR are very soft to soft silts, sandy silts and very loose to loose silty sands with variable shell content and sand fraction ranging from fine to coarse (Le Provost Dames and Moore, 1997). Between the described isolated features of the Northwest Shelf Transition Province, are large extents of soft substrate (Przeslawski et al., 2011a). Further inshore, sediment within the Bonaparte Gulf is relatively uniform, predominately comprising sand. Within NT coastal waters, sediments are a mixture of gravelly, sandy sediment (Rochester et al., 2007).

Sediment types observed during the Barossa marine studies program were comparable with those found in local and broader regional seabed habitat mapping studies undertaken in the Eastern Joseph Bonaparte Gulf and Timor Sea (Anderson et al., 2011; Fugro, 2006; Przeslawski et al., 2011b; URS Australia Pty Ltd (URS), 2008, 2005). As such, data are likely representative of the Operational Area and EMBA. Sediments sampled showed a gradual transition in composition over large spatial areas, particularly between the deep waters and shallow shoals (Jacobs, 2015c). In general, sediments transitioned from the finer sediments in deeper water to coarse sediments (i.e. gravelly sands) in shallow water around the shoals/banks (Jacobs, 2015c, Jacobs 2017). In addition, sites to the north of Bathurst Island had finer sediments (higher percentage of clay and slit) compared to sites further south, likely due to the prevailing current direction which flows along a south-eastward to north-westward axis near the seabed (Jacobs, 2017).

Sediments along much of the pipeline route are characterised by sand- (0.063 mm to 2 mm) and gravel-sized (2 mm to 64 mm) particles, likely dominated by carbonates from weathering of hard substrate or biogenic production (DOF Subsea 2018, Jacobs 2017). The relatively low portion of fine sediments may be the result of tidal currents winnowing fine sediments, which may also account for the naturally high levels of turbidity observed near the seabed. Laboratory analysis of sediment samples collected by Jacobs (2017) indicated that most resuspended sediments would be deposited within 12 hrs or less, with sediments from half of all sites expected to have > 90% deposition in less than an hour (Jacobs 2017).

Whilst the majority of metal concentrations were below the ANZECC & ARMCANZ (2000) guidelines, cobalt and nickel were recorded above the trigger values (Jacobs, 2015c). Generally, sites to the north of Bathurst Island, had higher metal concentrations than those in the southern section of the pipeline and were likely to be associated with finer sediments (Jacobs 2017). Nickel is commonly recorded at high levels in Australian sediments. Total recoverable hydrocarbons and BTEXN were below the laboratory reporting limits at all sites (Jacobs, 2015c).

Nitrogen, phosphorus and organic carbon are released when organic compounds decay. The highest concentrations of nitrogen and organic carbon were associated with deepest and the finest sediments (Jacobs, 2015c). Deep water sediment habitats are predominantly depositional, as indicated by their relatively high particle size distribution fines component and nutrient content. The benthic communities of these habitats are consumers rather than primary producers and therefore utilise the increased nutrient component of sediments (Jacobs, 2015c). The highest concentrations of nitrogen and organic carbon were associated with sediments with a higher percentage of fine particles (Jacobs, 2017).

4.3.6 Air Quality

Within the offshore and remote areas of the Operational Area and EMBA, there are no permanent sources of air pollution. Therefore, the air quality of this region of the EMBA is expected to be pristine with only localised and temporary anthropogenic influences (e.g. from oil and gas and shipping activity).

4.4 Seabed characteristics along the pipeline route

Two geophysical surveys have been undertaken over the pipeline route (Fugro, 2016 and DOF, 2018). Each of these consisted of multi beam echo sounder, side scan sonar and sub bottom profiling (CHIRP - Compressed High Intensity Radar Pulse). Benthic habitat interpretations have been corroborated with sediment sampling undertaken in 2015 and in 2017 (Jacobs, 2015 and 2017; and AIMS, 2015) (**Figure 4-28**). Results are reported in kilometres relative to the distance from the northern to the southern PLET (referred to a KPs, or Kilometre Points) as illustrated in **Figure 3-1**.

The Barossa GEP covers three main geomorphic regions:

- Continental Outer Shelf/Slope (Infield area and GEP KP0 to ~KP73), comprising the shelf break and slopes of the Arafura Shelf characterised by gentle (up to 0.2°) slopes;
- Continental Middle Slope (GEP ~KP73 and ~ KP106), comprising a carbonate bank and terrace system of the Van Diemen Rise with intersecting valleys between banks;
- Continental Inner Shelf (GEP ~KP106 to KP262.39), comprising variable sediment types, including sub-aerially exposed cemented materials and significant terrestrial sediments especially in shallower water depths.

Figure 4-9, **Figure 4-11**, **Figure 4-17**, **Figure 4-19** and **Figure 4-23** show the bathymetric profile along the pipeline along with soil units. Six primary geotechnical units are identified with general properties listed as follows:

- Unit 1: soft silty siliceous-calcareous clay with a fines content greater than 50%;
- Unit 1a: stiff carbonate clay with a fines content generally greater than 80%;
- Unit 2: medium dense clayey and silty siliceous-calcareous sand, fines content of 20 to 40% with median diameter of approximately 0.2 mm;
- Unit 3: dense clayey and silty siliceous-calcareous sand, with occasional gravel; fines content of 20 to 40% with median diameter of approximately 0.9 mm;
- Unit 4: dense to very dense clayey siliceous-calcareous sand, with occasional gravel.; fines content of 10 to 35% with median diameter of 2.97 mm, and
- Unit 5: cemented sand/gravel/calcarentite.

4.4.1 KP0 to KP60

The pipeline route starts in 254 m of water and is essentially flat for the first 5km. Thereafter, the seabed gradually shallows to 186 m at KP26.6. The seabed is generally smooth and featureless. Jacobs (2015) observed the seabed in the Permit Area as predominantly silty sand lacking in any hard substrate, with relic seabed features (namely sand waves <25 cm in height) widespread.

Bathymetry rises from 156m depth at KP34.3 to 103m at KP70.7. Between KP34.3 to KP41.8 the seabed is typically flat and featureless, the exception being a channel that crosses the route at KP39.8. A large sandwave field occurs between KP41.8 and KP50.75. The sandwaves are typically small with a wavelength in the order of 20-30m and a height less than 1m. Smaller megaripples are often superimposed on the larger sandwaves. Habitat is bare sand (**Figure 4-10**).

4.4.2 KP60 to KP110

The route shallows from 101m depth at KP 70.7 to 73.5m at KP87.7 before rising again to 78.6m at KP109 (**Figure 4-11**). Isolated and clustered pockmarks occur throughout the area (**Figure 4-13**). Pockmarks tend to be more prevalent in topographic lows. Thicker (>2m) and softer sediments, interpreted as very soft to soft cohesive material, are associated with the topographic lows whilst the topographic highs including the ridges and plateaus have typically less penetration indicating denser (and harder) conditions. Coarser material including sand and gravel, possibly of a calcareous nature, are associated with the ridges and plateaus. These positive relief features comprise hardgrounds and outcrop of a calcareous nature.

Habitat between KP70 and KP108, within the KEF and Marine Park, consists of burrowers and crinoids with a small outcrop of filter feeders at KP80 (**Figure 4-12**). Between KP100 and KP110, the pipeline passes adjacent to Goodrich Bank (**Figure 4-14**). Goodrich bank typically consists of coarse sandy substrate and sparse filter feeders. Hard coral habitat is rare and only encountered at the shallowest sites on the bank (**Figure 4-16**). Along the pipeline route, the seabed is sand (**Figure 4-15**).

4.4.3 KP110 to KP165

The route shallows from 79m in the northeast to 56.5m in the southwest (**Figure 4-17**). The seabed is typically smooth and featureless except for numerous pockmarks and a large area of small depressions (attributed to biological activity) which occurs between KP109 and KP122.5.

The shallow geology generally consists of 1-2m of sediment which is largely thought to comprise sand and gravel, especially where associated with hardgrounds and outcrop. Finer material, possibly softer, may be associated with the thicker sequences, especially in topographic lows.

Habitat between KP110 and KP140 is mainly bare sediment with outcrops of burrowers and crinoids and filter feeders either side (**Figure 4-18)**. At KP135, the pipeline passes approximately 2.3 km to the east of Marie Shoal. Between KP145 and KP175 it passes through the Habitat Protection Zone **(Figure 4-22**). Hard corals are predicted to the east of the pipeline. Between KP135 and KP165 filter feeding habitat becomes more prevalent.

4.4.4 KP165 to KP210

Between KP 187 and KP 188.5 (DOF (2018) reports a large single sandwave bedform which has an asymmetrical shape indicating a current direction from the north. The structure is approximately 3.5km long and has a height of 9.5m. Between KP 191.5 and KP 193.5 there is a distinctive sandwave field. Individual sandwaves are linear to cuspate in shape and have a wavelength typically 50-100m and a height of 5-9m. Secondary superimposed smaller sandwaves and megaripples area also common. Between KP 206 and KP 220 the route shoals across a wide area which is typically around 45m depth but shallows to around 33m at KP216 (**Figure 4-19**).

Habitat between KP165 and KP210 is mainly bare sand with outcrops of filter feeders (**Figure 4-20**). The habitat model predicts hard corals between KP200 and KP210. Note that AIMS (2017) found that phototropic species such as hard corals were rare along the shelf area due to high turbidity and lack of light (see **Figure 4-2** for AIMS sampling locations). The sparse nature of the seabed is confirmed by photograph in **Figure 4-21**. Moss shoal is approximately 7.8 km to the west of KP165 and Mesquite Shoal 2.1 km to the east of KP170 (**Figure 4-22)**.

4.4.5 KP210 to KP262.5

This section of the pipeline route is located between 34m and 75m and comprises an undulating topography that is locally rugged (**Figure 4-23**). The seabed is dominated by a series of ridges and plateaus formed from harder material. Hardgrounds occur as low to high relief topography which includes specific areas of outcrop. Outcrop areas may exhibit a karst weathering which may include potholes.

The AIMS habitat model (**Section 4.5.2**) predicts outcrops of hard corals and filter feeders (**Figure 4-24**) adjacent to the pipeline route between KP210 and KP235. AIMS (2107) reports macroscopic biota was generally sparse but low – medium density filter feeder habitats were encountered. Sponges tended to dominate the filter feeder habitats with various small to medium sized soft corals contributing less biomass. In all cases these communities were associated with small scale patches and consolidated substrate, either sandy pavement or minor rocky outcrops.

The inner shelf sediments (KP235 to KP262.5) typically comprise loose sand and cohesive deposits which form a flat and featureless seabed. The exception being where coarser material, possibly biogenic in origin from nearby reefs, forms discreet ripple and megaripple 'trains' which cut across the seabed (**Figure 4-27**). Sediment ribbons are also a feature on the seabed and are attributed to strong currents. The subsurface comprises a 1-5m thick surficial horizon (**Figure 4-27**). Between KP247 and KP252 the pipeline re-enters the Van Diemen Rise KEF.

In the vicinity of the existing Bayu-Undan pipeline, the seabed comprises a generally flat topography with discreet 'trains' of mega ripples crossing across the otherwise featureless seabed which typically comprises >1m of sand and gravel.

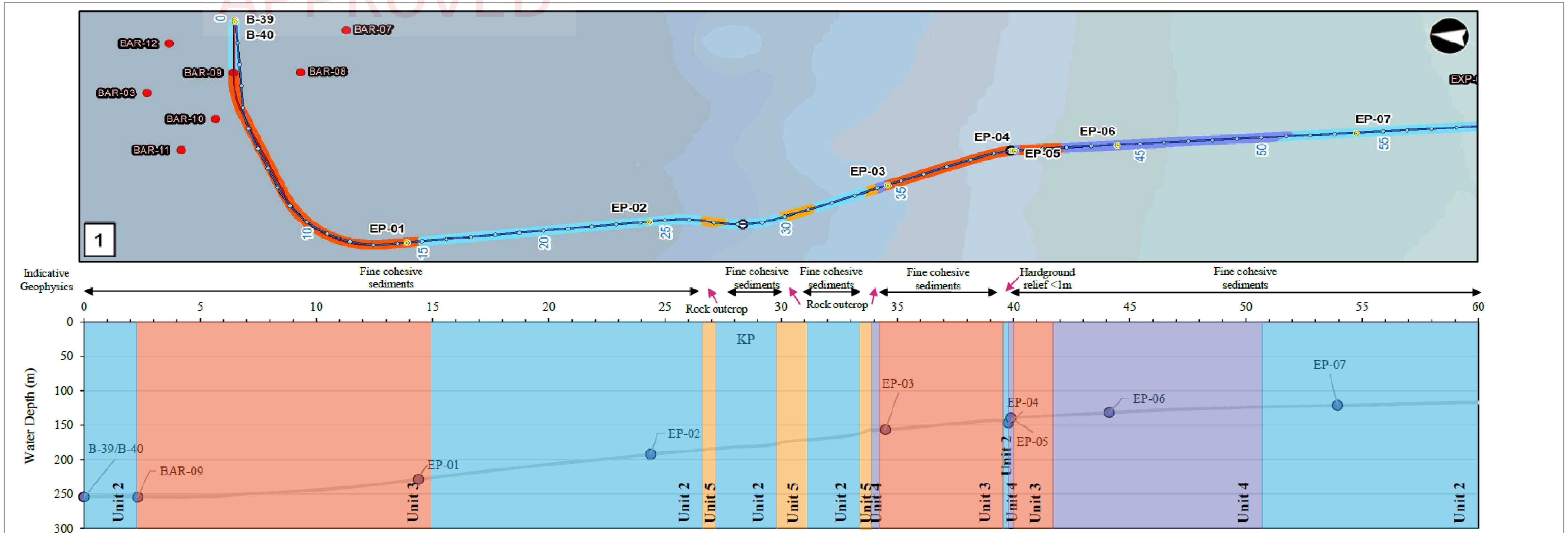


Figure 4-9: Bathymetric profile along the gas export pipeline route KP0 to KP60

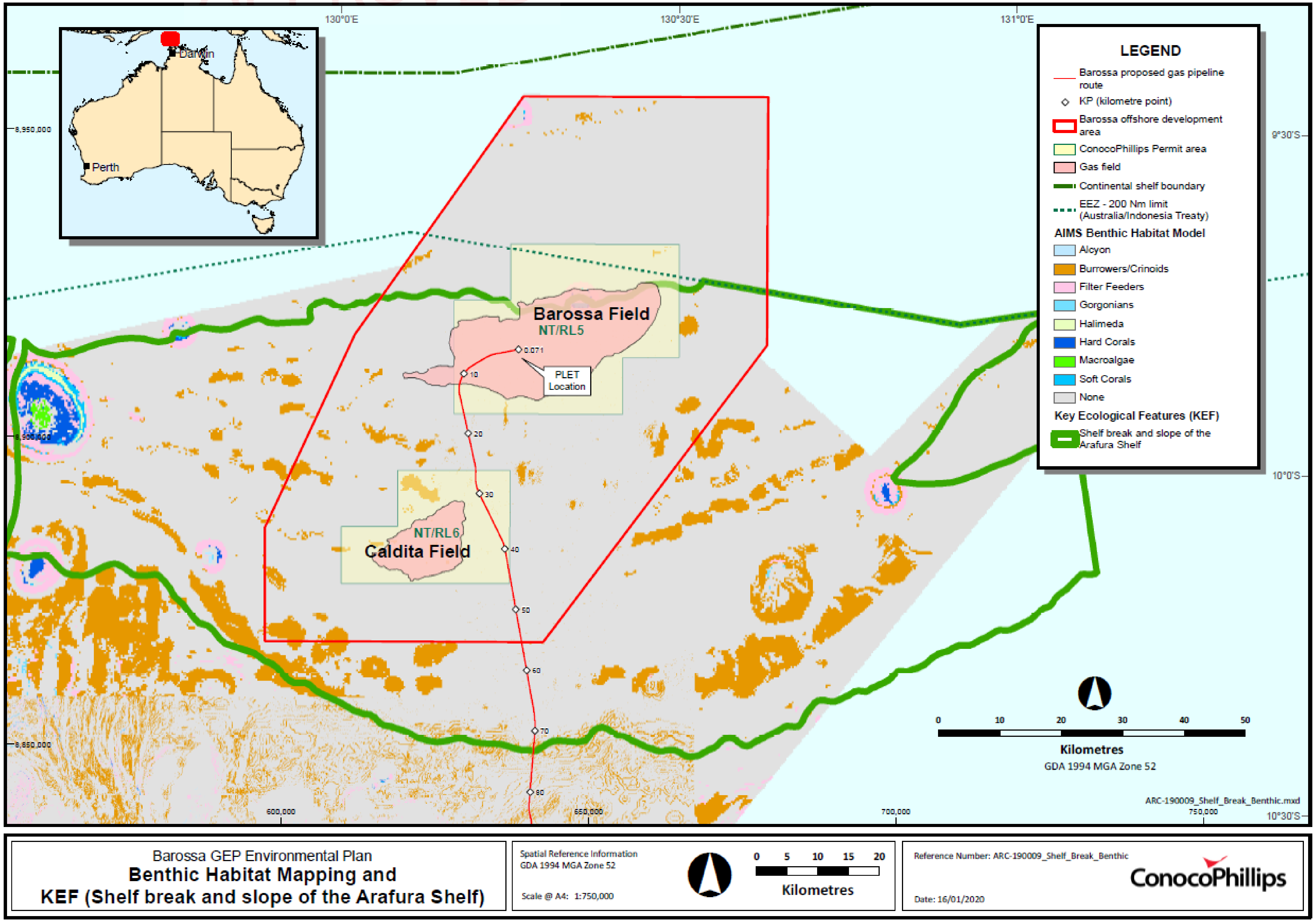


Figure 4-10: Benthic habitat mapping along the gas export pipeline route KP0 to KP60

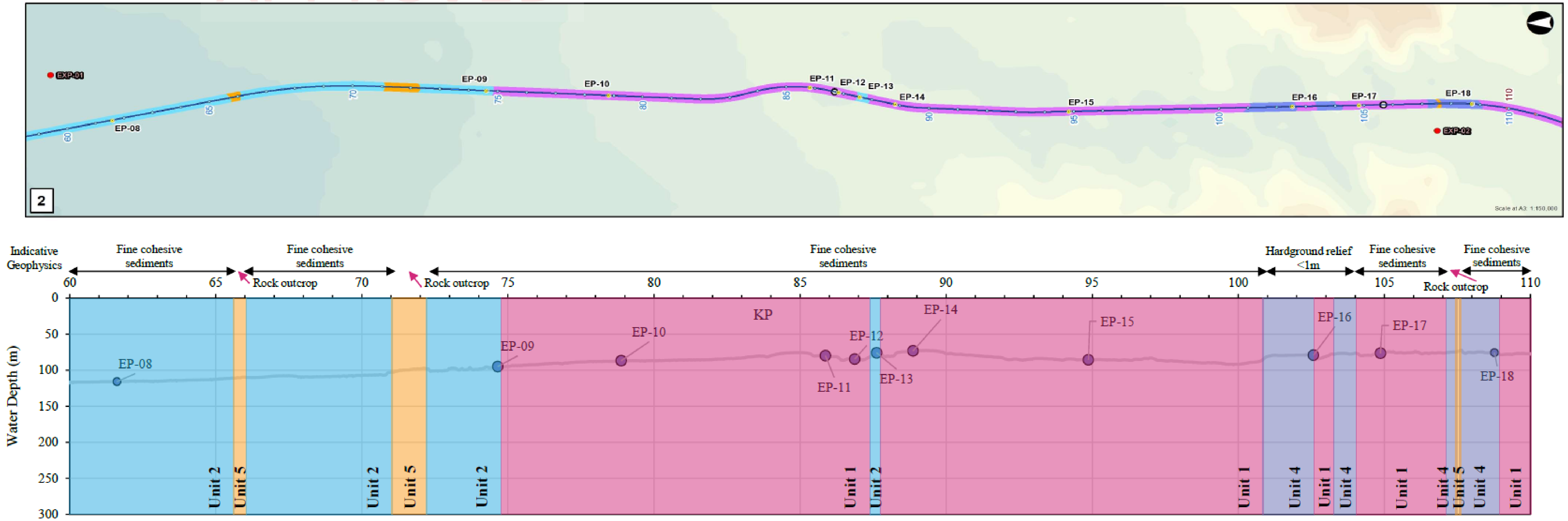


Figure 4-11: Bathymetric profile along the gas export pipeline route KP60 to KP110

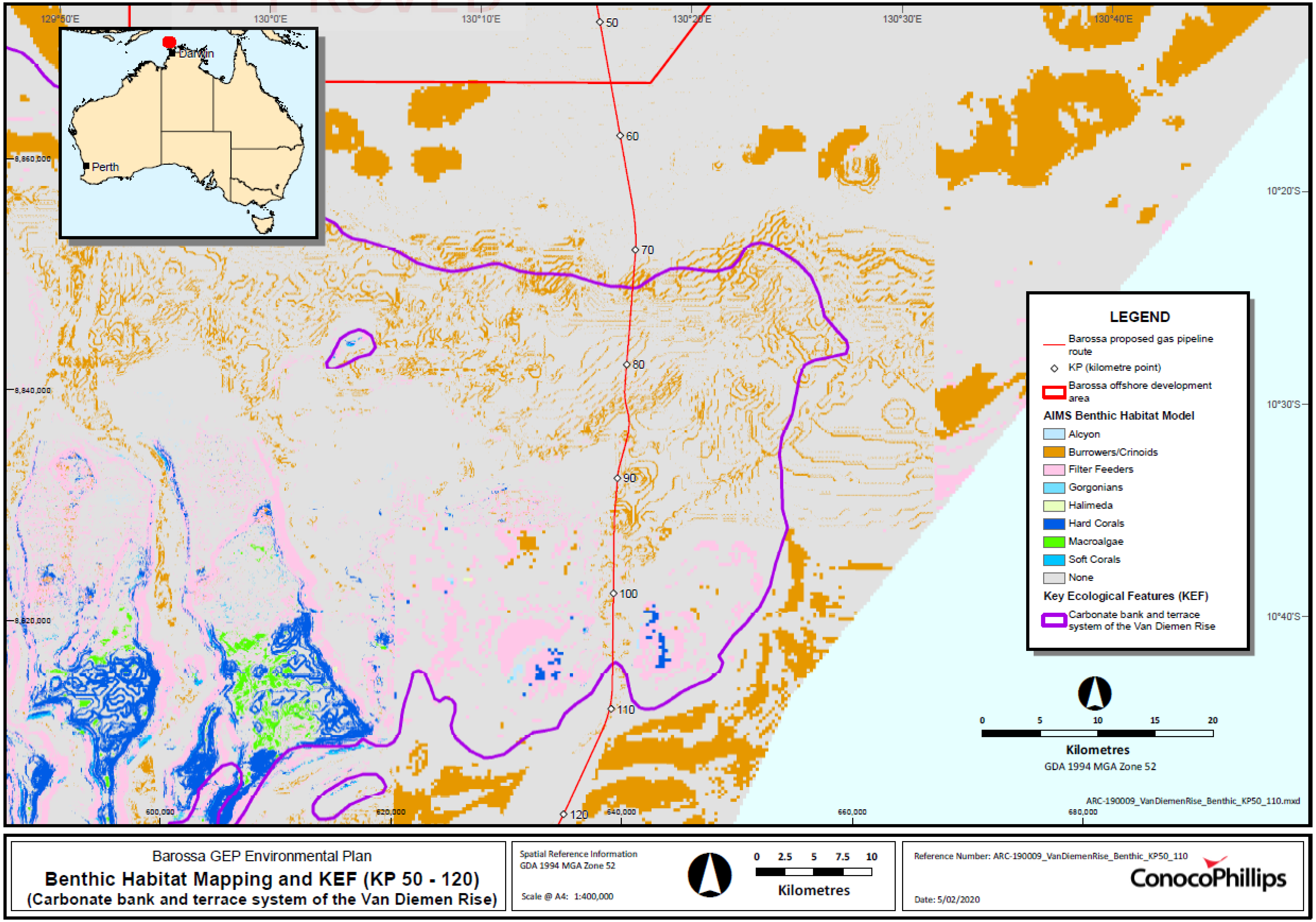


Figure 4-12: Benthic habitat mapping along the gas export pipeline route KP50 to KP120

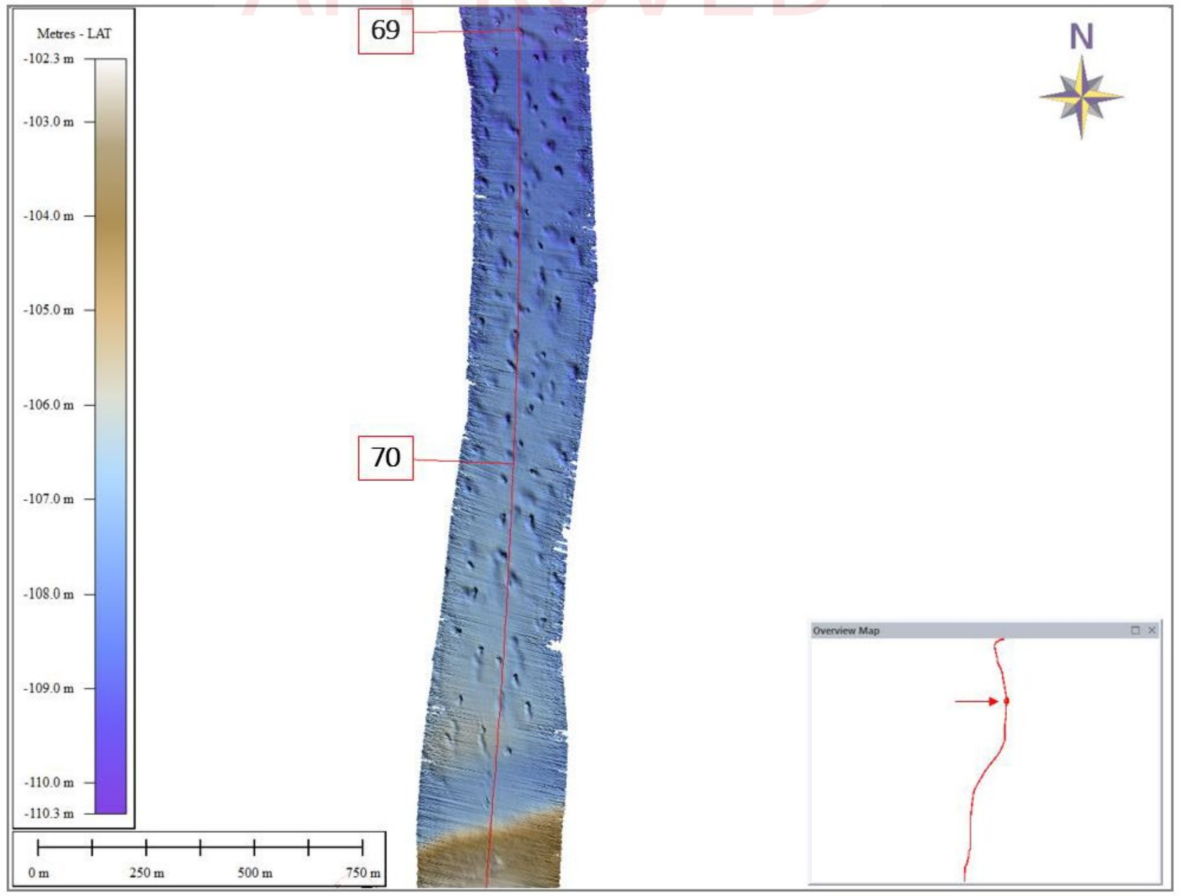


Figure 4-13: Multibeam image showing numerous isolated pockmarks in the vicinity of KP69 and KP70.

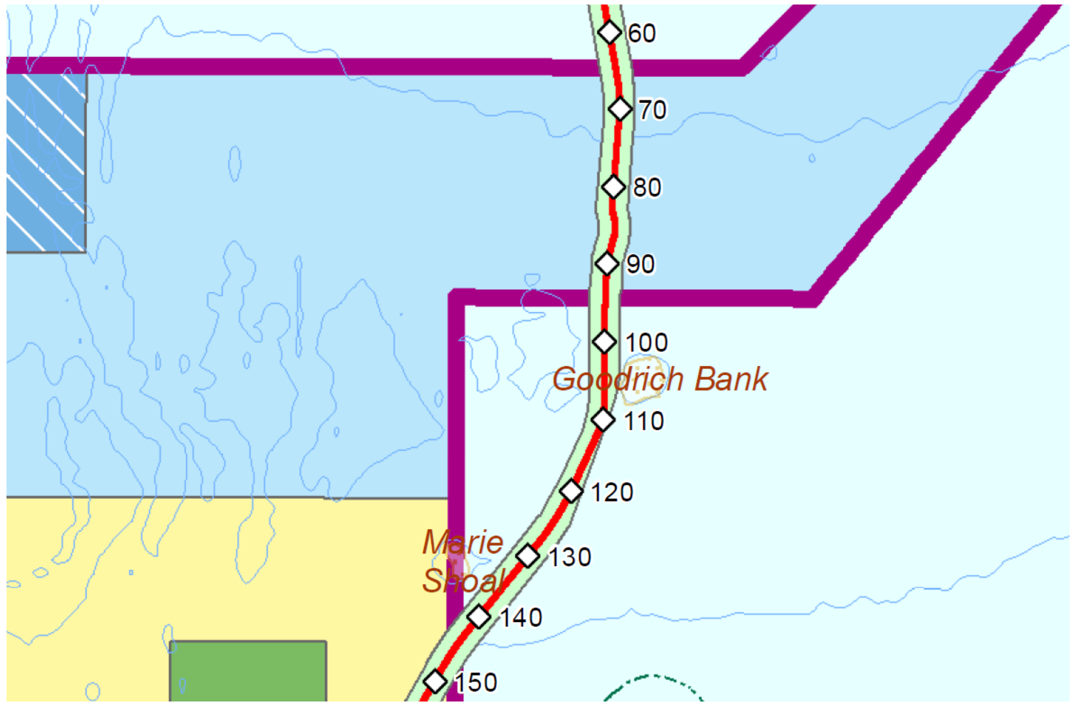


Figure 4-14: Location of the pipeline in relation to Goodrich Bank.

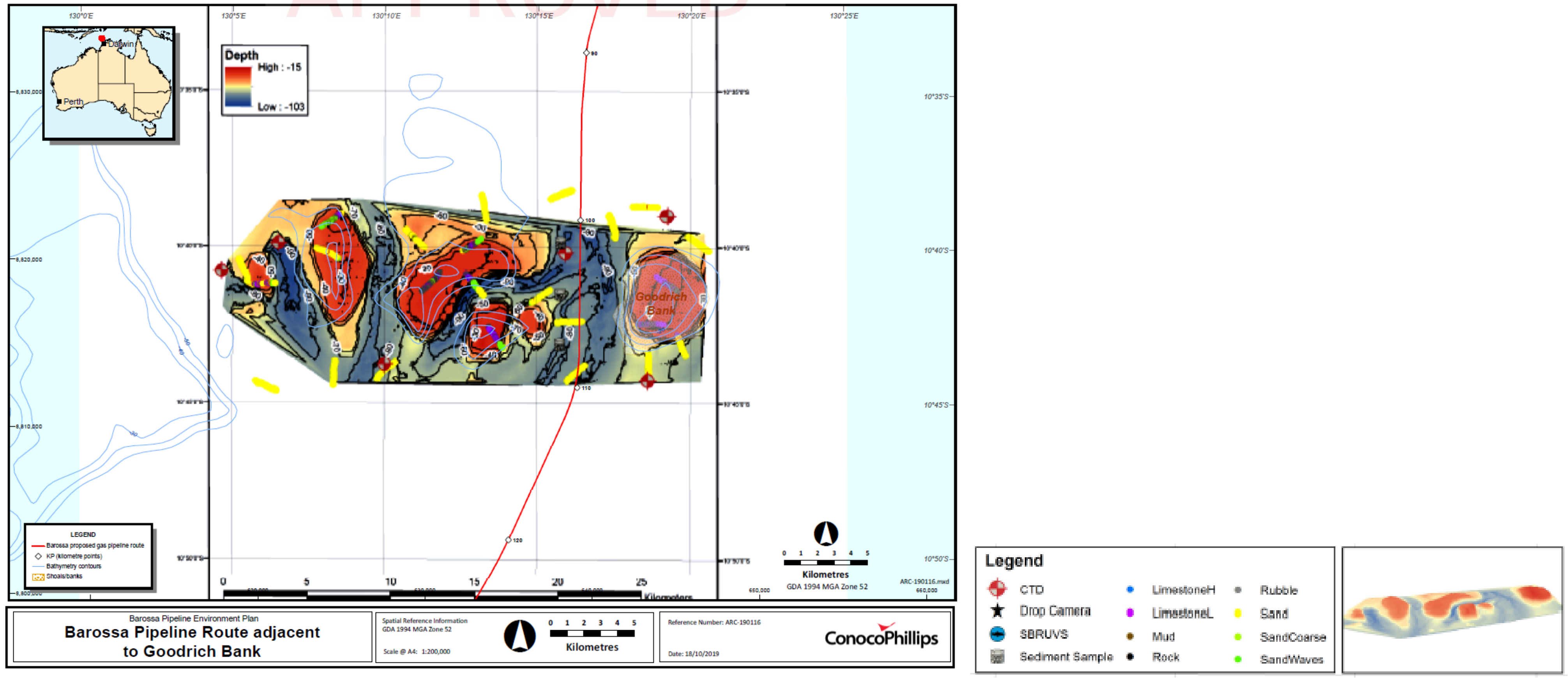


Figure 4-15: Bathymetry of Goodrich Bank (from AIMS, 2015)

Notes: Limited partial hard coral habitat at 25 m depth (left image) was rare and only encountered at the shallowest sites, while coarse sandy substrate and sparse filter feeders (right image) were more typical.

Figure 4-16: Images of Goodrich Bank (from AIMS, 2015)

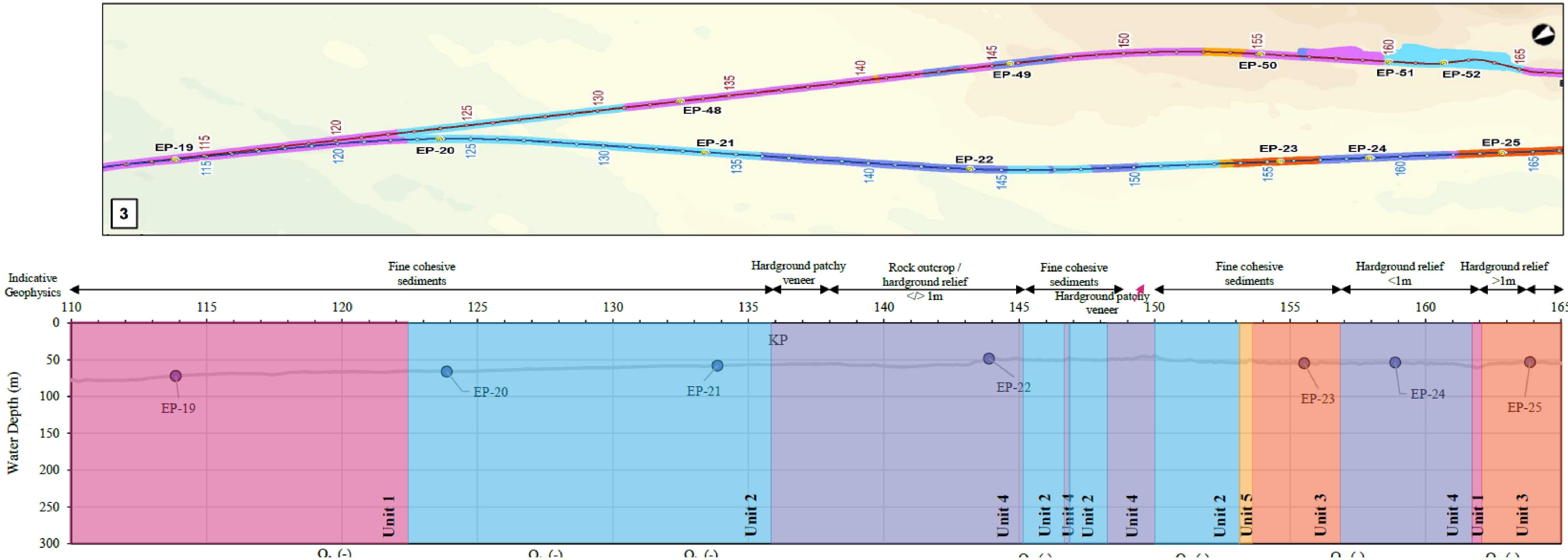


Figure 4-17: Bathymetric profile along the gas export pipeline route KP110 to KP165

Note: the lower route (EP-20 – EP-25) is the proposed pipeline route

Figure 4-18: Benthic habitat mapping along the gas export pipeline route KP110 to KP165

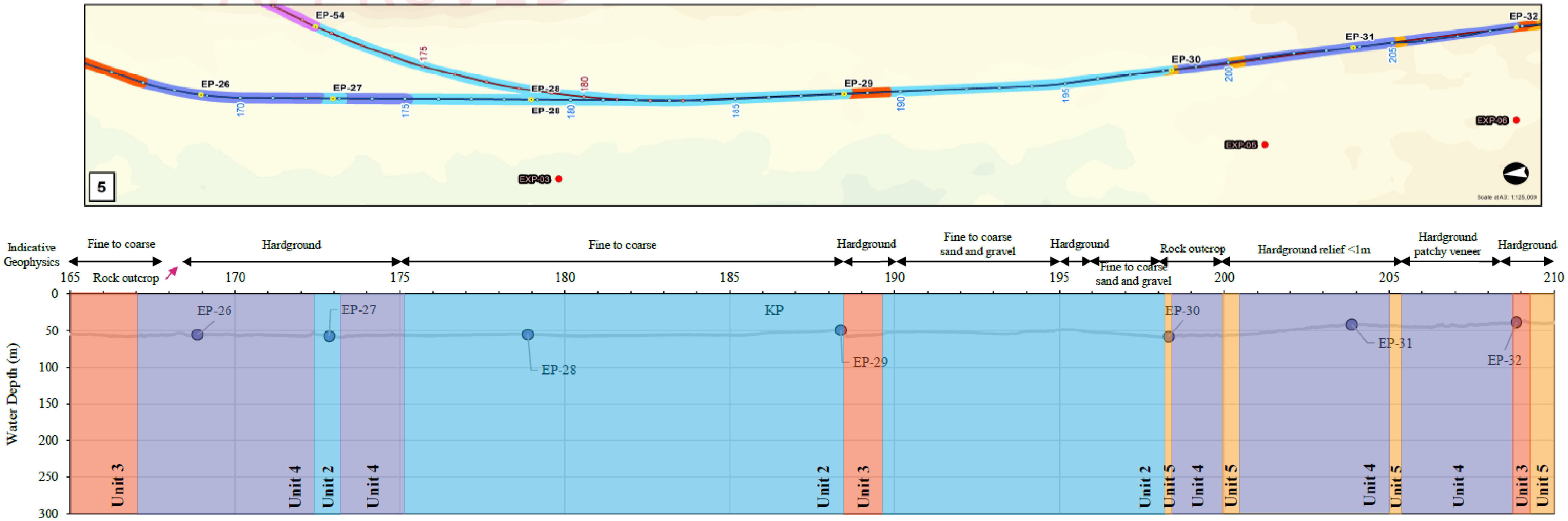


Figure 4-19: Bathymetric profile along the gas export pipeline route KP165 to KP210

Note: the lower route (EP-26 – EP-27) is the proposed pipeline route

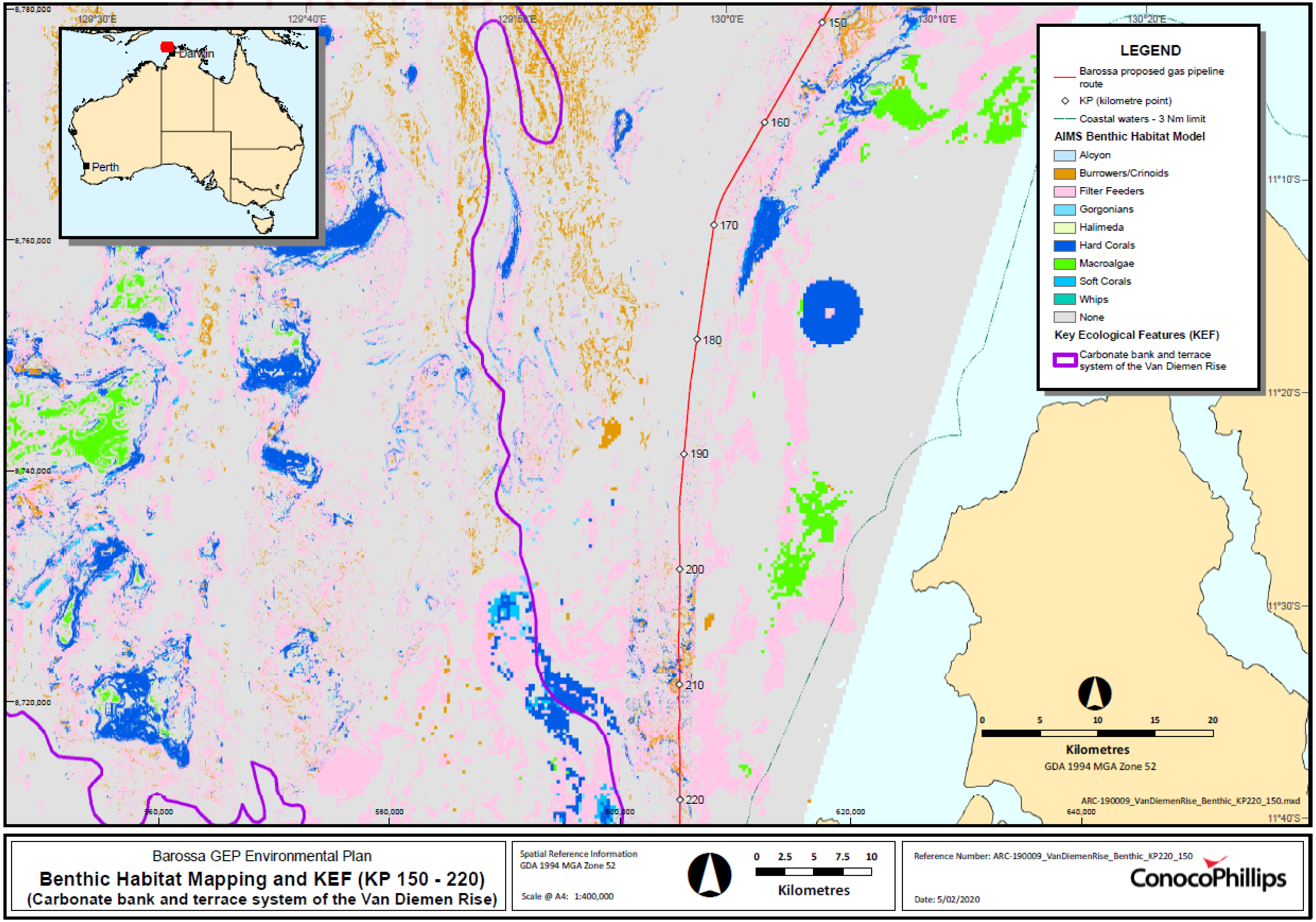


Figure 4-20: Benthic habitat mapping along the gas export pipeline route KP165 to KP210

Figure 4-21: Photographic image of seabed at KP208.7 (from DoF, 2018) showing sparse habitat

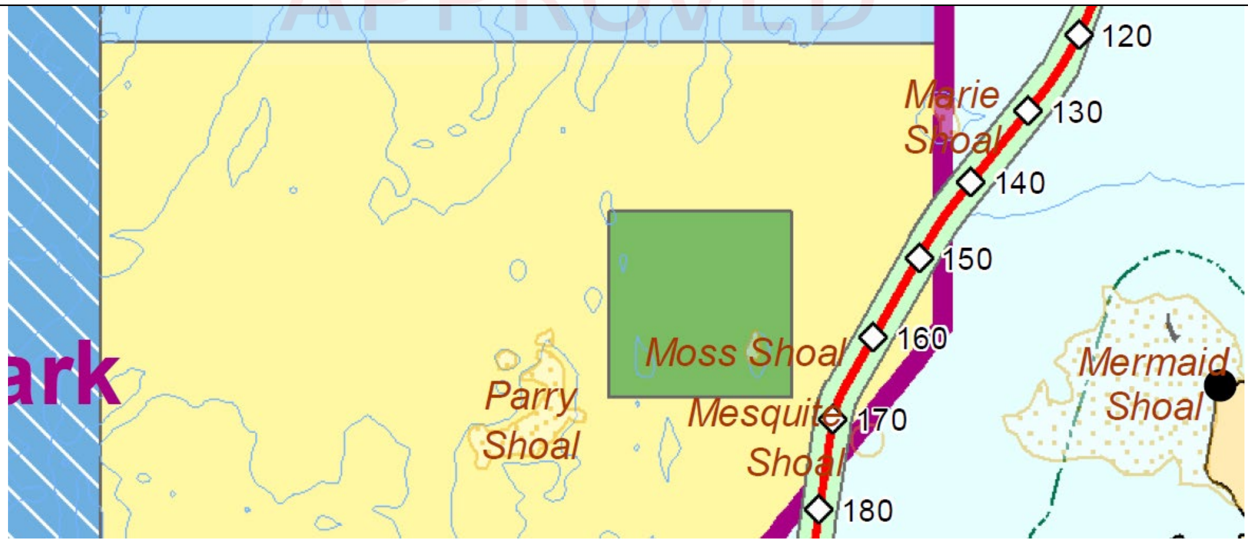


Figure 4-22: Location of the pipeline in relation to the Marine Park Habitat Protection Zone, Moss Shoal and Mesquite Shoal.

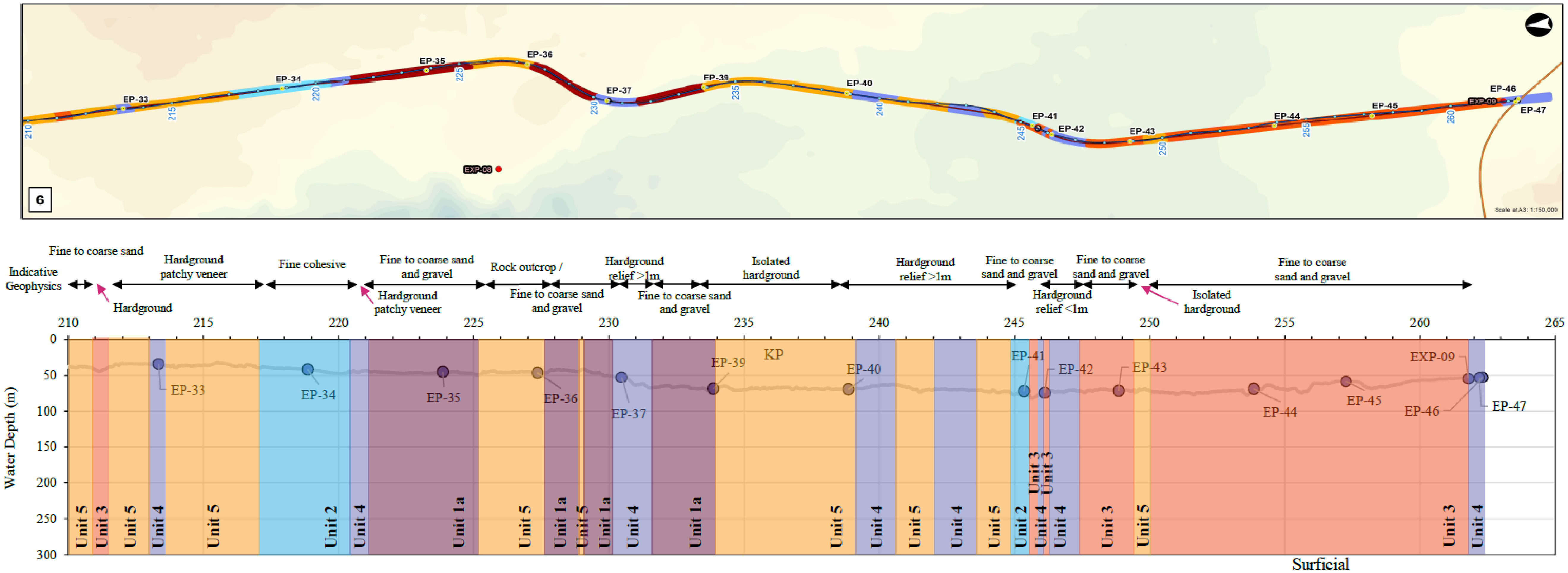


Figure 4-23: Bathymetric profile along the gas export pipeline route KP210 to KP265.5

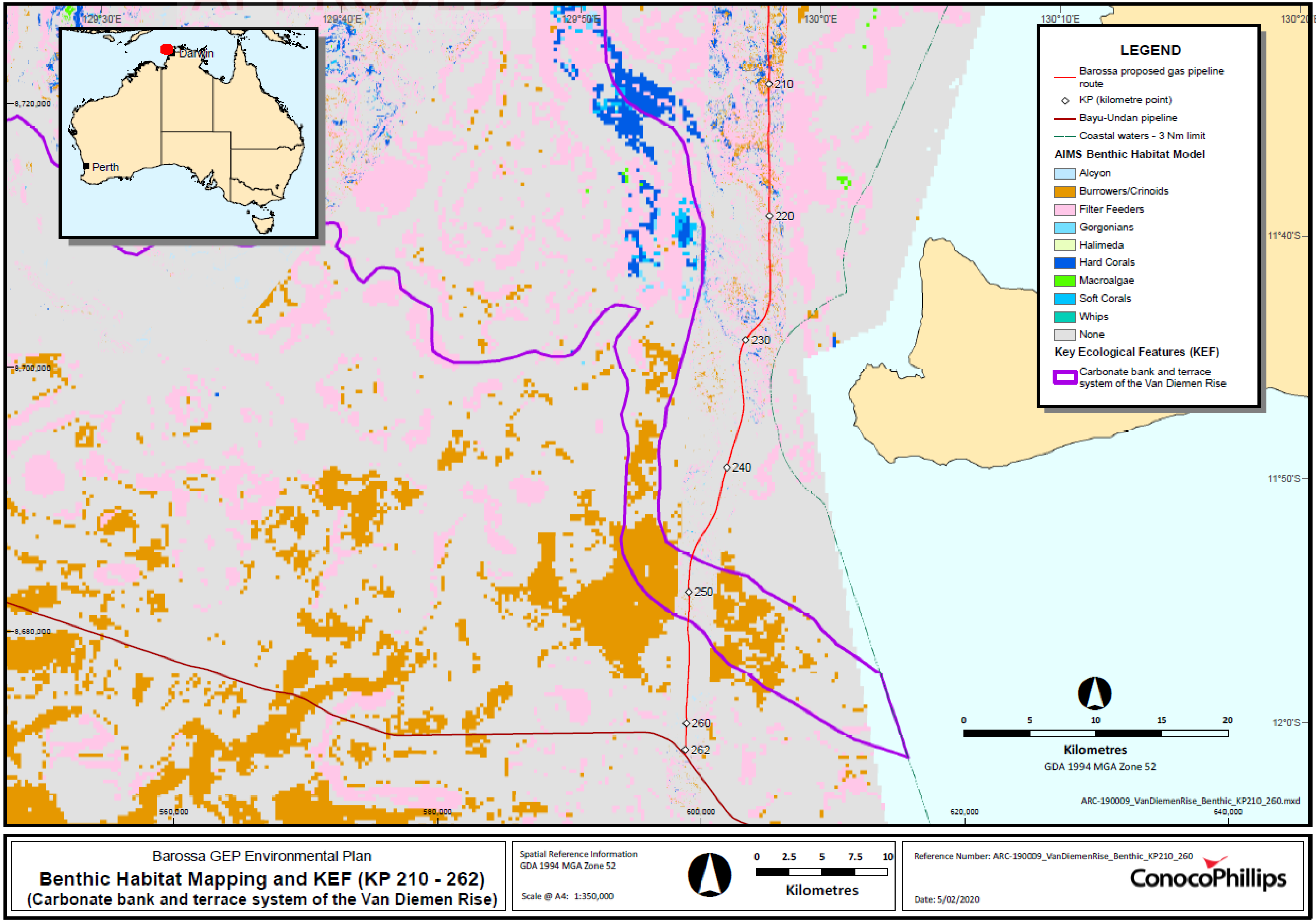


Figure 4-24: Benthic habitat along the gas export pipeline route KP210 to KP265.5

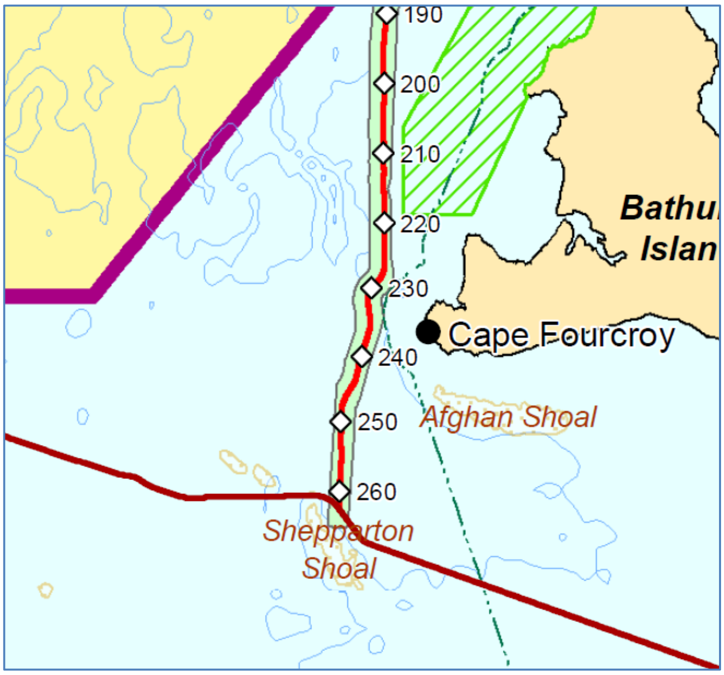


Figure 4-25: Location of pipeline from KP250.1 to KP262.5

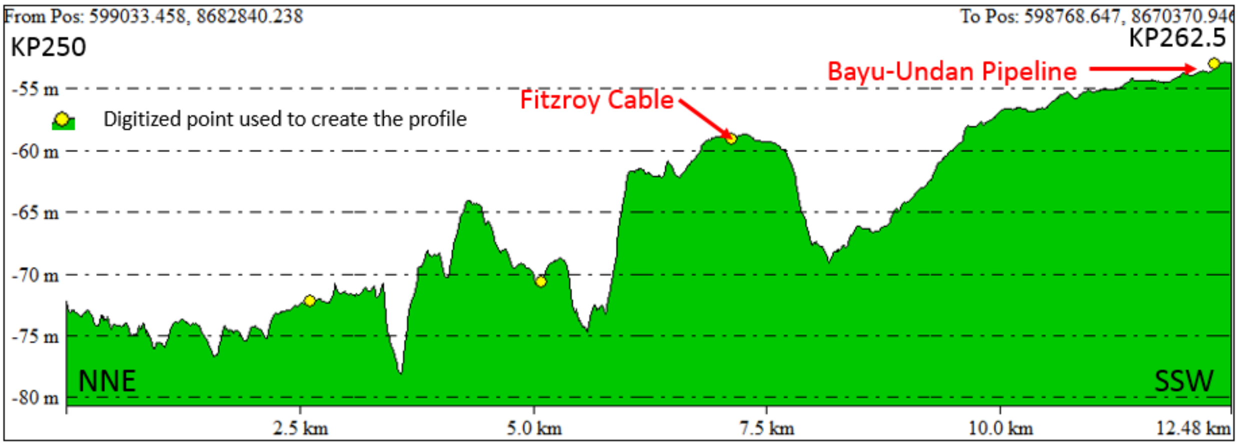


Figure 4-26 Seabed profile from KP250 to KP262.5.

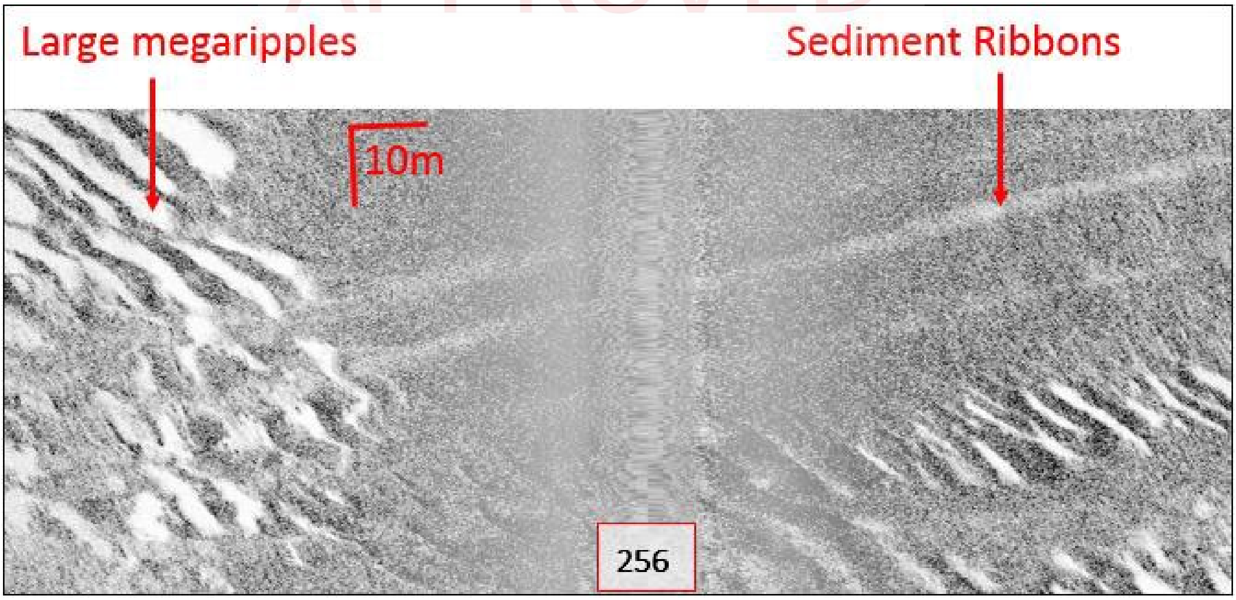


Figure 4-27: SSS image from KP256 showing large megaripples and sand ribbon lineations indicating significant currents

4.5 Biological Environment

4.5.1 EPBC Matters of National Environmental Significance

Two EPBC Act PMST database searches were conducted to identify threatened species and communities occurring within the Operational Area and EMBA. The search areas are considered adequate to represent those listed marine species that may occur, or have habitat, in the marine environment which is encompassed by the Operational Area and EMBA. The EPBC PMST reports are included in **Appendix B.**

The full results of the PMST reports, including species excluded and justification for their exclusion, are included in **Appendix B**. **Table 4-3** summarises the relevant results from the reports, including the 20 threatened and 39 migratory species to be considered further in **Section 4.5.5** (i.e. those identified as potentially occurring within the Operational Area and EMBA).

Table 4-3: Summary of MNES identified as potentially occurring within the Operational Area and EMBA

MNES	Number
World Heritage properties	None
National Heritage places	None
Wetlands of International Importance	None
Listed Threatened Ecological Communities	None
Listed threatened species (**Section 4.5.5.1**)	**22** (4 mammals, 6 reptiles, 7 fishes, 5 birds)
Listed Migratory species (**Section 4.5.5.1**)	**43** (11 mammals, 7 reptiles, 10 fishes, 15 birds)
Commonwealth marine areas (**Section 4.5.2**)	**2** – Exclusive Economic Zone (EEZ), Territorial Sea and Extended Continental Shelf
Great Barrier Reef Marine Park	None

4.5.2 Intertidal and Benthic Primary Producers

The understanding of intertidal and benthic habitats, both primary producers and other benthic communities has been developed based on the extensive field sampling undertaken (refer **Section 4.2,** including **Table 4-2** and **Figure 4-2**) and through the interpretation of habitat modelling and mapping undertaken by AIMS (Heyward et al., 2017; Radford et al., 2019).

A spatial predictive benthic habitat model of the Oceanic Shoals Marine Park had previously been developed by AIMS as part of the Australian National Environmental Science Programme (NESP) to determine the spatial heterogeneity of the benthic environment and key classes of organisms within the reserve (Radford and Puotinen, 2016 and refer https://northwestatlas.org/node/1710 for an interactive version of the map). To ensure the model was robust, ecologically meaningful and accurate, it was verified through the use of field data and statistical relationships (between the predictors and field data presence/absence of benthic classes) using a non-parametric statistical method of classification trees (Radford and Puotinen, 2016).

Using the data collected during the Barossa baseline studies program, AIMS (Heyward et al., 2017) were able to extend the benthic habitat model of the Oceanic Shoals Marine Park to develop a regional habitat map that encompassed the entire gas export pipeline corridor and the offshore development area. The regional habitat model was also subject to testing of random data points to assess the predictive accuracy (as per methods outlined in Radford and Puotinen, 2016) which demonstrated that 10 benthic habitat classes were successfully modelled and mapped with a total accuracy of 82.97%.

With any modelling, consideration must be given to any limitations and AIMS (Radford and Poutinen, 2016) identified the following points to be considered:

- The distribution of training data across the area of interest can affect the quality of the model and model quality may be lower in areas far from testing and training data points.
- The spatial scale of at which the habitat classes can be modelled, i.e. broader scale vs finer scale bathymetry data, can affect what features are identified and the implications of this need to be kept in mind, e.g. the relative proportion of the different habitat types predicted to be present may vary and could influence the impact assessment.
- When considering the accuracy of the model to predict the presence/absence of individual habitat classes, it is important to not only consider absolute accuracy, but also consider how the model misclassifies different classes and how this may affect decisions and conclusions that can be made.

In relation to the first point, the data collected through the Barossa baseline studies program provided data that were directly from the area of interest (**Figure 4-2**), providing confidence that the models will be of high quality and that the relationships between the physical and biological parameters identified by the model are representative of the area (compared to if the training data were further away). To the second point, the spatial scale of the mapping presented in the accepted OPP was the best available and reviewing the collected environmental and geophysical field data over the pipeline route (including multibeam bathymetry and side scan sonar which is collected over very fine spatial scales), provided confidence that the regional habitat map was accurately representing the benthic habitats present, particularly in deeper water where there is less topographic complexity. Despite having confidence in the interpretation of the modelling results, interpretations presented in the accepted OPP were made with caution and with the consideration that some finer scale features may not have be identified.

Following this, additional work was undertaken with the objective of providing a more robust impact assessment for this EP. There were two aspects that have been able to be combined which further address the modelling limitations above and provide greater confidence in the modelling outputs and the interpretation for the impact assessment. Firstly, ConocoPhillips collaborated with AIMS to undertake an additional baseline survey of habitats inside and outside the Oceanic Shoals Marine Park (Radford et al., 2019). Secondly, higher resolution regional bathymetric data (30 m vs the previously used 250 m bathymetry grid) became available for use in the modelling (Beaman 2018, see https://www.deepreef.org/publications/conference/236-nthaus-ausseabed.html).

Subsequently, the habitat models were revised to include both the additional field data collected in the area of interest and the newly available finer scale bathymetry data (Radford et al., 2019) which further addressed the limitations identified above in the following ways.

The additional data collected during the AIMS survey of the Oceanic Shoals Marine Park not only provided additional data for the area of interest and thus further increased confidence in the quality of the models, but it also included data from environments that were previously less well sampled, e.g. shallower waters, which further increases confidence that the models will be able to better define the environmental relationships between the physical and biological parameters that are used to predict the habitat distributions across the area.

Similarly, by using the finer scale bathymetry data, the rugosity and topographic complexity data used in the models was of a higher resolution and could better define smaller patches and identify features at a finer scale. Consequently, this provided the opportunity to more precisely define the environmental relationships between the physical and biological parameters as these data (rugosity and topographic complexity) along with depth are often responsible for driving patterns of habitat distribution in the area (Heyward et al., 2017).

Given it is the relationships between the physical and biological parameters that are used to predict the habitat distributions, using more data across the environmental gradients present and using finer scale data should also improve model predictive performance which would address the third consideration above.

To evaluate the predictive accuracy of the models developed using the additional data and finer scale bathymetry data, model error and accuracy statistics were calculated, as for previous versions of the models, using a confusion matrix and resulting Kappa statistic which is presented in **Table 4-4**. As shown, all habitat classes had very high predictive accuracy (>80%) with the exception of the ‘Alcyon’ class (74% due to the model overpredicting the presence of ‘Gorgonians’ and ‘Hard Corals’) and the ‘Whips’ class (64% due to overpredicting ‘Gorgonians’ and ‘Alcyon’ classes).

From discussion with AIMS (B. Radford, 2019, pers. comm., 7 Jan) the improved model accuracy is the result of both having additional data across the environmental gradient and having the finer scale rugosity and topographic complexity data (derived from the bathymetry data) with which the modelling could better define the environmental relationships between the physical and biological parameters.

Table 4-4: Confusion matrix showing the predicted habitat classes (x axis) verses hold out in field towed video classes (y axis) from the revised Oceanic Shoals model modified to include the additional data from the Oceanic Shoals Marine Park study and a higher resolution 30 m bathymetry. 30% of all data were selected at random and retained from the modelling process to act as testing data. Overall all Kappa value for this matrix is 0.88 and global predictive accuracy is 91.0% (from Radford et al., 2019)

	Alcyon	Burrowers/ Crinoids	Filter Feeders	Gorgonians	Halimeda	Marcoalgae & Hard Corals	Macroalgae	Soft corals	Whips	None
Alcyon	1352	6	33	179	0	164	8	22	24	194
Burrowers/Crinoids	0	5205	61	0	0	0	0	1	0	206
Filter Feeders	9	68	14650	6	15	576	53	49	3	939
Gorgonians	147	0	22	1536	0	17	0	0	43	193
Halimeda	0	0	9	0	875	134	2	16	0	138
Marcoalgae & Isolated Hard Corals	122	0	394	1	84	43267	15	307	7	931
Macroalgae	0	0	23	0	0	17	1560	0	0	114
Soft corals	34	0	52	0	12	250	0	3545	0	164
Whips	15	0	4	80	0	38	0	0	173	38
None	141	91	706	114	73	1405	84	155	19	29939
Predictive Accuracy	**74%**	**97%**	**92%**	**80%**	**83%**	**94%**	**91%**	**87%**	**64%**	**91%**

4.5.2.1 Coral reef

Coral reefs provide habitat for a high diversity of corals, associated fish and other species of both commercial and conservation importance. Within the Northwest Shelf Transition Province, waters are relatively clear, and the euphotic zone can extend to 100 m across the shelf (Rochester et al., 2007). Within offshore water of the NMR, coral reefs are generally confined to the shallower regions of banks, shoals and pinnacles which contain sufficient hard substrate for corals to establish communities on. Although none of these features exist within the Operational Area, there are a number of shoals and banks in proximity which may sustain coral communities. The nearest features to the Operational Area which may support coral communities include Mesquite Shoal, Goodrich Bank, Marie Shoal and Shepparton Shoal, located 0.3 to 2 km from the boundary of the Operational Area (Refer to **Section 4.5.6.3** for a summary of shoals and bank overlapping the EMBA).

Shoals are relatively shallow and isolated areas of built up unconsolidated material which are often associated with discrete coral patches and other important benthic habitats within the NMR. A study conducted as part of the Barossa marine studies program surveyed coral cover on submerged shoals within outer continental shelf waters of the NMR. The results showed maximum coral cover of three surveyed submerged shoals (Tassie, Evans and Blackwood shoals) to be varied; however, typical coral cover was 21 to 32% (Heyward et al., 2017).

The Operational Area and EMBA overlap a small portion of the Oceanic Shoals Marine Park which supports areas of coral communities. Results from further survey work by AIMS (Radford et al., 2018) within the Oceanic Shoals Marine Park and Shepparton Shoal were consistent with the predictions made for the extended benthic habitat modelling, with the distribution of corals restricted to relatively shallow areas where sufficient photosynthetically active radiation reaches the seabed. Of the six areas surveyed by Radford et al. (2018), only three contained light-dependent communities such as zooxanthellate corals; these areas were all < 30 m water depth. Coral cover was < 1% and none was observed in the Operational Area. Given the Oceanic Shoals Marine Park is representative of benthic habitats in similar depths within the region, the patterns of coral distribution across the region are likely to be similar (i.e. largely restricted to < 30m water depth) and therefore unlikely to be found along the proposed pipeline route which is in water depths greater than 30 m. Refer to **Section 4.5.3** for information on the Oceanic Shoals Marine Park.

Within shallow NT coastal waters, there are a number of coralline fringing reefs and patch reefs, as well as a number of rocky reefs which may support coral reef communities (DEWHA, 2008b). Several shoals and banks also overlap the EMBA, mainly between the Tiwi Islands and NT mainland.

4.5.2.2 Seagrass/macroalgae

Seagrass and macroalgae communities provide important habitat for various marine species. Similar to coral reefs, seagrass communities are light restricted and generally occur only within shallow coastal areas. No seagrass communities have been identified in the Operational Area, however small areas of macroalgae were identified within the extended AIMS benthic habitat model (**Figure 4-28**). The model results were verified by subsequent survey work by Radford et al. (2018). Results of this survey work were consistent with model predictions, with no seagrass observed within the Oceanic Shoals Marine Park or at Shepparton Shoal and isolated, sparse macroalgal communities in < 30 m water depth. Within the NMR seagrass communities are also restricted to sheltered waters where they are protected from strong tidal currents, high turbidity, and substantial sediment mobility characteristic of the region (Przeslawski et al., 2011a).

Within the Northwest Shelf Transition Province, high levels of turbidity restrict light penetration and as a result significant seagrass communities do not occur within this region and are confined to the intertidal areas of the adjacent Northern Shelf Province (DEWHA, 2008b). Within NT coastal waters of the EMBA, significant seagrass communities are unlikely to occur; however, small discrete patches of seagrass may be present within shallow, sheltered areas of the Tiwi Islands, and potentially around shallow offshore shoals/banks.

4.5.2.3 Mangroves/saltmarshes

Mangroves provide important habitat for a number of species, including nesting, feeding and staging areas for seabirds, waterbirds, waders, and migratory birds (DEWHA, 2008b). Mangroves and saltmarshes are confined to shoreline habitats and will not occur within the Operational Area. In the NMR, mangrove communities are concentrated mostly within the Gulf of Carpentaria (to the east of the EMBA), with over 136 identified mangrove-line estuaries within NT coastal waters (DEWHA, 2008b) However, mangroves also occur across the NMR's shorelines, including the Tiwi Islands. Along the shoreline of the Tiwi Islands mangroves are predominantly within tidal creeks and not exposed along the shoreline. Within the EMBA, mangroves will occur within NT coastal waters.

There are no saltmarshes within the Operational Area or EMBA.

4.5.3 Other Benthic Communities

Benthic communities across the Operational Area and EMBA are expected to vary with distance offshore and substrate or benthic composition. Within the offshore areas of the Northwest Shelf Transition Province, the distribution of epibenthic and infauna communities are highly correlated with geomorphology and substrate type (Nichol et al., 2013). A survey of the Oceanic Shoals Marine Park found benthic communities within relatively featureless areas (terraces and plains) to be restricted to infauna communities, with almost no visible presence of epifauna (Nichol et al., 2013). Banks were found to have generally moderate to dense biological communities and were the only geomorphic feature found to support reef-forming corals; however, the types of communities and coverage were highly varied with some banks completely void of epifauna (Nichol et al., 2013). The study indicated variation in epibenthic biodiversity in the Oceanic Shoals Marine Park is a function of substrate, water depth, light and turbidity, with data showing banks in >45 m water depth supported the highest levels of biodiversity, while plains and terraces showed almost a complete absence of epibenthic communities (Nichol et al., 2013).

As described above, the habitat modelling undertaken demonstrates that most of the habitats present across the gas export pipeline route within the Oceanic Shoals Marine Park are abiotic (supporting no benthic habitats) and filter feeders. These habitat classes are well represented elsewhere in the Habitat Protection Zone and wider marine park (Radford et al., 2019). Filter feeder communities were frequently sparse, with decreasing density with depth. For the area in and surrounding the Habitat Protection Zone of the Oceanic Shoals Marine Park, there was limited and patchy distribution of filter feeding habitats, and points to associations with high spots and regions of steeper bathymetry (Radford et al., 2019).

The three sites where higher diversity was observed in the Oceanic Shoals Marine Park were all further north into the marine park (outside the Operational Area) and included site 3, the National Park Zone, which included some hard coral, soft coral and Halimeda, site 2, which had sparse areas of macroalgae and site 1 which had hard coral, soft coral in addition to filter feeders (refer **Section 4.5.3** for a description of the Oceanic Shoals Marine Park and its values).

Another study observing benthic habitats across the Northwest Shelf Transition Province identified dominant fauna groups based on geomorphic feature (Przeslawski et al., 2011a). The study found the same relationship between epifaunal communities and substrate, with highest species richness observed on banks, followed by medium richness at terraces and ridges, and lowest richness over plains and within valleys (Przeslawski et al., 2011a). A nearly reverse relationship with infaunal communities was found, with highest infaunal species richness observed over plains, and the lowest over terraces and ridges, with medium levels found on banks and within valleys (Przeslawski et al., 2011a). Infaunal communities within the Operational Area ranged from depauperate communities (two individuals per 0.1m^2) to more diverse communities with abundances of 10 to 20 individuals per 0.1m^2, from 15 different taxa (Jacobs 2017) The dominant fauna over banks were sponges, octocorals and hard corals; terraces and ridges comprised mainly sponges and octocorals, and plains and valleys comprised mainly polychaetes, amphipods and isopods (Przeslawski et al., 2011a).

The Oceanic Shoals Marine Park contains a range of benthic habitats including bare sand (84.0%), burrowers / crinoids (7.5%) and filter feeders (6.0%), with remaining habitat classes comprising ≤1% each). The benthic habitats within the Operational Area (**Figure 4-28**) predominantly support burrowers/crinoids (6.2%), filter feeders (10.2%) and abiotic areas that support little biota (82.8%) with some small areas of Alcyon (0.3%).

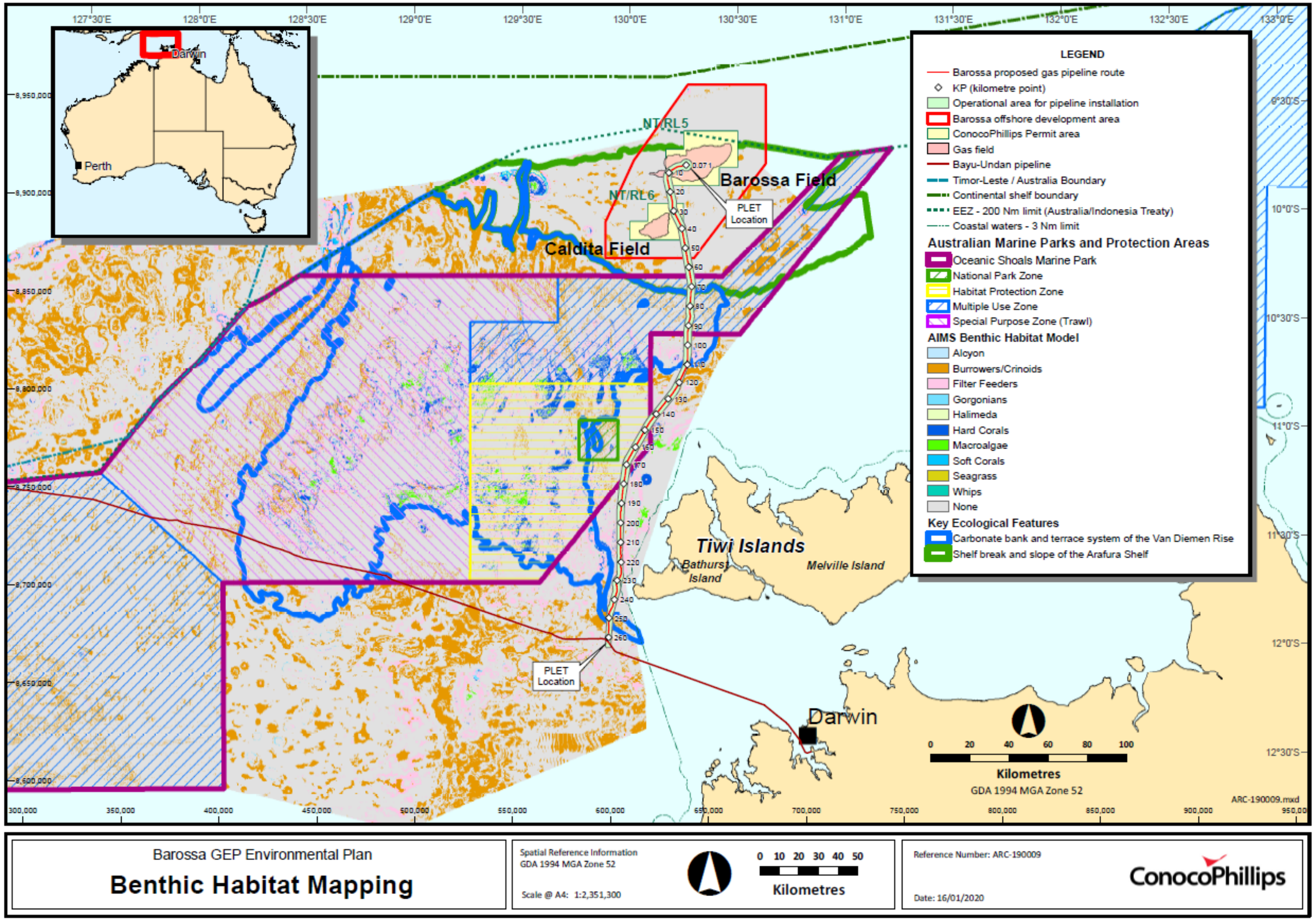


Figure 4-28: Benthic Habitats of the Operational Area (Note: the Filter Feeders category includes sponges)

4.5.4 Other Communities

Plankton

Plankton distribution is often patchy and linked to localised and seasonal productivity that produce sporadic bursts in phytoplankton, zooplankton and tropical krill production (DEWHA, 2008). Fluctuations in abundance and distribution occur both horizontally and vertically in response to the tidal cycles, seasonal variation (light, water temperature and chemistry, rainfall, currents and nutrients) and cyclonic events. The seasonal cycles and spatial distribution/abundance of biological productivity remain largely unknown globally. However, in general, the mixing of warm surface waters with deeper, more nutrient-rich waters (i.e. areas of upwelling) generates phytoplankton production and zooplankton blooms.

Phytoplankton in the NMR is diverse (approximately 200 species) and Chlorophyll ‘a’ concentration and productivity are considered relatively high (Rochester et al., 2007), although recent field studies found Chlorophyll ‘a’ concentration and productivity within the gas export pipeline route were low (Jacobs, 2015b). Jacobs (2017) found that diatoms (Bacillariophyceae) were the most abundant marine phytoplankton. Other phytoplankton within the water column included silicoflagellates (Dictyochophyceae), dinoflagellates (Dinophyceae), euglenids (Euglenophyceae) and unicellular green algae (Prasinophyceae) (Jacobs, 2017). In offshore waters of the NMR (deeper than 50 m), plankton communities are dominated by dinoflagellates *Dinophysis*, *Ceratium*, *Prorocentrum* and *Caratocorys*, while shallower offshore waters support cyanobacterium *Trichodesmium* and the diatoms *Rhizosolenia* and *Thalassonema* and inshore NT coastal waters support diatoms *Rhizosolenia* and *Thalassonema* (DEWHA, 2008b).

Pelagic and demersal fish communities

Fish occupy a range of habitats, from coral reefs to open offshore waters, and play an important ecological role with many species being of conservation value and important for commercial and recreational fishing. Within the NMR, higher order predatory fish including snappers, emperors and groupers are common to rocky reef and coral habitats (DEWHA, 2008b). A number of commercially important demersal fish also occur across the NMR, such as trevallies, giant queenfish, barramundi, grunters, emperors, snappers, blue salmon, king threadfin and black jewfish, as well as 61 species of pelagic fish species (DEWHA, 2008b). Of the pelagic fish species approximately 90% of commercial catch in the NMR is from six species: longtail tuna, grey mackerel, Spanish mackerel, mackerel tuna, black pomfret, and spotted mackerel (DEWHA, 2008b). In the coastal areas of the NMR, fisheries trawl data have identified 460 teleost and 56 elasmobranch fish species (DEWHA, 2008b).

High species diversity is generally associated with more complex habitat and areas of upwelling which increase levels of productivity. Given this, offshore areas of high fish diversity within the EMBA will be restricted to shoals/banks. Refer to **Section 4.5.6** for further information on KEFs, shoals and banks, and **Section 4.6** for further information on commercial, indigenous and recreational fishing in the EMBA.

4.5.5 Marine Fauna of Conservation Significance

4.5.5.1 Threatened and Migratory fauna

Reports from the EPBC Act PMST Database for the Operational Area (dated 4 January 2019) and EMBA (dated 20 March 2019) identified a total of 72 species listed as threatened, migratory or both. Twenty five MNES species identified were excluded from further consideration as they were assessed as not credibly impacted by the activities outlined in this EP (e.g. terrestrial species identified as an artefact of the PMST reporting capabilities). Of the species considered within this EP, 47 may occur within the EMBA, while only a subset (41 species) may occur within the Operational Area. **Table 4-5** summarises the species identified and differentiates between those which may occur within the Operational Area and EMBA.

Two additional species, Omura's whale and the grey nurse shark, have been added to **Table 4-5** although they were not identified in PMST reports. The Omura's whale and grey nurse shark were observed during the Barossa marine studies program. These species are described in the relevant species sections below. McPherson et al. (2016) distinguish Omura's whale (*Balaenoptera omurai*) as a distinct species from Bryde's whale (*B. edeni*), however the taxonomy of Omura's whale is unclear; *B. omurai* is a recent description. Many authorities (including the DoEE) do not make any distinction between *B. omurai* and *B. edeni* or retain *B. edeni* as this species name has priority status. Note Omura's whales are not currently listed under the EPBC Act as threatened or migratory.

In addition, the scalloped hammerhead (*Sphyrna lewini*), a conservation dependent species, may occur within the Operational Area and EMBA.

Table 4-5: EPBC Act listed threatened and listed migratory marine species potentially occurring within the Operational Area and EMBA

Scientific name	Common name	EPBC listing status		Relevance to gas export pipeline installation campaign	
		Threatened Status	*Listed as Migratory*	*Operational Area*	*EMBA*
Mammals					
Balaenoptera borealis	Sei whale	Vulnerable	x	✓	✓
Balaenoptera musculus	Blue whale	Endangered	x	✓	✓
Balaenoptera physalus	Fin whale	Vulnerable	x	✓	✓
Megaptera novaeangliae	Humpback whale	Vulnerable	x	✓	✓
Balaenoptera edeni	Bryde's whale		x	✓	✓
Dugong dugon	Dugong		x	✓	✓
Orcaella brevirostris	Australian snubfin dolphin, Irrawaddy dolphin		x	✓	✓
Orcinus orca	Killer whale, orca		x	✓	✓
Physeter macrocephalus	Sperm whale		x	✓	✓
Sousa chinensis	Indo-Pacific humpback dolphin		x	✓	✓
Tursiops aduncus	Indo-Pacific bottlenose dolphin (Arafura/Timor Sea populations), spotted bottlenose dolphin		x	✓	✓
Balaenoptera omurai	Omura's whale*			✓	✓
Reptiles					
Caretta caretta	Loggerhead turtle	Endangered	x	✓	✓
Chelonia mydas	Green turtle	Vulnerable	x	✓	✓
Dermochelys coriacea	Leatherback turtle	Endangered	x	✓	✓
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	x	✓	✓
Lepidochelys olivacea	Olive ridley turtle	Endangered	x	✓	✓
Natator depressus	Flatback turtle	Vulnerable	x	✓	✓
Crocodylus porosus	Salt-water crocodile		x	✓	✓
Fish					

Carcharias taurus	Grey nurse shark*	Critically Endangered/Vulnerable	x	✓	✓
Carcharodon carcharias	Great white shark	Vulnerable	x	✓	✓
Glyphis garricki	Northern river shark	Endangered		✓	✓
Glyphis glyphis	Speartooth shark	Critically Endangered		✓	✓
Pristis clavata	Dwarf sawfish	Vulnerable	x	✓	✓
Pristis pristis	Freshwater, largetooth sawfish	Vulnerable	x	✓	✓
Pristis zijsron	Green sawfish	Vulnerable	x	✓	✓
Rhincodon typus	Whale shark	Vulnerable	x	✓	✓
Anoxypristis cuspidata	Narrow sawfish, knifetooth sawfish		x	✓	✓
Isurus oxyrinchus	Shortfin mako		x	✓	✓
Isurus paucus	Longfin mako		x	✓	✓
Manta birostris	Giant manta ray		x	✓	✓
Manta alfredi	Reef manta ray		x	✓	✓
Seabirds and Shorebirds					
Calidris canutus	Red knot, knot	Endangered	x	✓	✓
Calidris ferruginea	Curlew sandpiper	Critically endangered	x	✓	✓
Numenius madagascariensis	Eastern curlew	Critically endangered	x	✓	✓
Actitis hypoleucos	Common sandpiper		x	✓	✓
Anous stolidus	Common noddy		x	✓	✓
Calidris acuminata	Sharp-tailed sandpiper		x	✓	✓
Calidris melanotos	Pectoral sandpiper		x	✓	✓
Calonectris leucomelas	Streaked shearwater		x	✓	✓
Fregata ariel	Lesser frigatebird		x	✓	✓
Fregata minor	Great frigatebird		x	✓	✓
Pandion haliaetus	Osprey		x	✓	✓
Limosa lapponica baueri	Western Alaskan bar-tailed godwit	Vulnerable	x		✓
Limosa lapponica menzbieri	Northern Siberian bar-tailed godwit	Critically endangered	x		✓
Acrocephalus orientalis	Oriental reed-warbler		x		✓
Charadrius veredus	Oriental plover		x		✓
Glareola maldivarum	Oriental pratincole		x		✓
Thalasseus bergii	Crested tern		x		✓

** The grey nurse shark and Omura's whale were included in this list given they was observed at an offshore seamount during the Barossa marine studies program and identified in noise monitoring, respectively. These species are described in the relevant section below.*
Note – red shading = Operational Area; blue shading = EMBA

4.5.5.2 Threatened Species Recovery Plans

The species' recovery plans and conservation advices have been considered to identify any requirements that may be applicable. Recovery plans are enacted under the EPBC Act and remain in-force until the species is removed from the threatened list. Conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken to facilitate the conservation of a listed species or ecological community.

Table 4-6 outlines the recovery plans and conservation advices relevant to those species identified as potentially occurring within or having habitat in the Operational Area and EMBA. The table summarises the key threats to those species, as described in relevant recovery plans and conservation advices, that are relevant to the gas export pipeline installation campaign. Species highlighted in red are those identified as potentially occurring in both the Operational Area and EMBA, while those in blue were identified as potentially occurring within only the EMBA.

The *Recovery Plan for Marine Turtles in Australia* (2017-2027) identifies habitat critical to the survival of a species for marine turtles based on the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DoE, 2013). Areas considered 'habitat critical to the survival of a species' for two marine turtle species (flatback turtles and olive ridley turtles) were identified as overlapping the Operational Area and EMBA (Commonwealth of Australia, 2017a) (**Figure 4-29**). Habitat critical to the survival of olive ridley and flatback turtles around the Tiwi Islands overlap the southern section of the Operational Area, as identified in the *Recovery Plan for Marine Turtles in Australia* (2017-2027).

The identified habitat critical to the survival of a species overlapping the EMBA and Operational Area are broadly similar to established BIAs for these species. These are discussed under the relevant species sections below and presented in **Figure 4-29**.

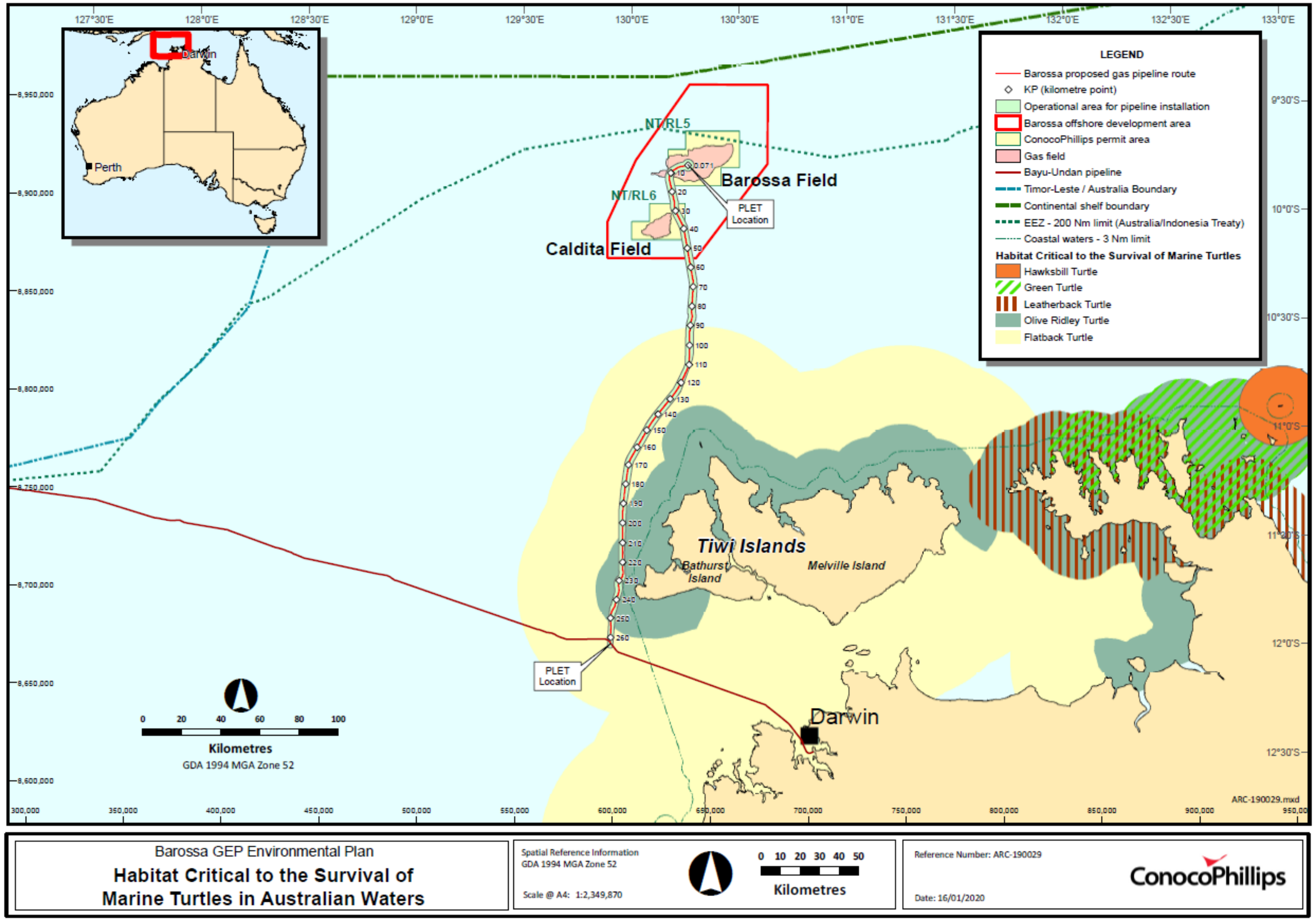


Figure 4-29: Habitat Critical to the Survival of Marine Turtles

Table 4-6: Summary of EPBC recovery plans relevant to the gas export pipeline installation campaign

Species	EPBC Recovery plan/conservation advice (date issued)	Key threats identified in the recovery plan/conservation advice	EP risk assessment section
Mammals			
Sei whale	Conservation Advice for *Balaenoptera borealis* (sei whale) (October 2015)	Noise interference	**Section 5.2.3**
		Vessel disturbance (i.e. vessel presence or collision)	**Section 5.3.3**
Blue whale	Conservation Management Plan for the Blue Whale (October 2015)	Noise interference	**Section 5.2.3**
		Vessel disturbance	**Section 5.3.3**
Fin whale	Conservation Advice for *Balaenoptera physalus* (fin whale) (October 2015)	Noise interference	**Section 5.2.3**
		Vessel disturbance	**Section 5.3.3**
Humpback whale	Conservation Advice for *Megaptera novaeangliae* (humpback whale) (October 2015)	Noise interference	**Section 5.2.3**
		Vessel disturbance	**Section 5.3.3**
Reptiles			
Leatherback turtle	Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (January 2009)	Vessel disturbance	**Section 5.3.3**
Loggerhead turtle, green turtle, hawksbill turtle, flatback turtle, olive ridley turtle	Recovery Plan for Marine Turtles in Australia 2017 - 2027 (June 2017)	Vessel disturbance	**Section 5.3.3**
		Light pollution	**Section 5.2.4**
		Acute chemical discharge	**Sections 5.2.7**, **5.3.4**, **5.3.5**, **5.3.7**, 5.3.8
		Noise interference	**Section 5.2.3**
		Habitat modification	**Section 5.2.2**
Fishes			
Whale shark	Conservation advice for *Rhincodon typus* (whale shark) (October 2015)	Vessel disturbance	**Section 5.3.3**
Great white shark*	Recovery Plan for the Great White Shark (*Carcharodon carcharias*) (August 2013) Threat Abatement Plan: for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018)	No relevant threats identified (ex. marine debris)	**Section 5.3.6**
		Marine debris (potential threat)	**Section 5.3.6**

<table>
<tr><th>Species</th><th>EPBC Recovery plan/conservation advice (date issued)</th><th>Key threats identified in the recovery plan/conservation advice</th><th>EP risk assessment section</th></tr>
<tr><td>Dwarf sawfish, green sawfish, freshwater sawfish, narrow sawfish, northern river shark, speartooth shark</td><td>Sawfish and River Sharks Multispecies Recovery Plan (November 2015)
Conservation Advice: for dwarf sawfish (October 2009), green sawfish (2008), Pristis pristis (freshwater sawfish) (April 2014), speartooth shark (April 2014), and northern river shark (April 2014)
Threat Abatement Plan: for the impacts of marine debris on the vertebrate wildlife of Australia’s coasts and oceans (2018)</td><td>Habitat degradation and modification</td><td>Section 5.2.2</td></tr>
<tr><td colspan="4">Seabirds and Shorebirds</td></tr>
<tr><td>Red knot</td><td>Conservation Advice for Calidris canutus (red knot) (May 2016)</td><td rowspan="6">Habitat degradation / modification (oil pollution)</td><td rowspan="6">Section 5.3.7</td></tr>
<tr><td>Curlew sandpiper</td><td>Conservation Advice for Calidris ferruginea (curlew sandpiper) (May 2015)</td></tr>
<tr><td>Eastern curlew</td><td>Conservation Advice for Numenius madagascariensis (eastern curlew) (May 2015)</td></tr>
<tr><td>Western Alaskan bar-tailed godwit</td><td>Conservation Advice for Limosa lapponica baueri (bar-tailed godwit - western Alaskan) (May 2016)</td></tr>
<tr><td>Northern siberian bar-tailed godwit</td><td>Conservation Advice Limosa lapponica menzbieri (bar-tailed godwit - northern Siberian) (May 2016)</td></tr>
<tr><td>Sharp-tailed sandpiper, pectoral sandpiper, common sandpiper, red knot, oriental plover, oriental pratincole, bar-tailed godwit</td><td>Wildlife conservation plan for migratory shorebirds (January 2016)</td></tr>
</table>

* Although this species was identified in the EPBC PMST reports, they are highly unlikely to occur within the Operational Area or EMBA as they are located significantly outside the species range or preferred habitat.

Note – red shading = Operational Area; blue shading = EMBA

4.5.5.3 Biologically Important Areas

BIAs are defined by DoEE as “spatially defined areas where aggregations of individuals of a regionally significant species are known to display biologically important behaviours such as breeding, foraging, resting or migration”. A review of the National Conservation Values Atlas determined that there is one listed BIA overlapping the Operational Area (an internesting area for flatback turtles) and BIAs for four different species overlapping EMBA, which are summarised in **Table 4-7** and presented in (**Figure 4-31** and **Figure 4-32**). The identified BIAs are discussed under the relevant species sections below.

Table 4-7: Summary of BIAs overlapping the Operational Area and EMBA

Species	Relevance to the gas export pipeline installation campaign	Type	Location
Reptiles			
Green turtle	14 km south-east of the Operational Area	Internesting	North-west of Melville Island
Olive ridley turtle	5 km east of the Operational Area	Internesting	Bathurst Island/Melville Island - North-west
Flatback turtle	Overlapping the Operational Area	Internesting	Melville Island, Cobourg Peninsula
Seabirds and Shorebirds			
Crested Tern	5 km west of the Operational Area	Breeding (high numbers)	Seagull Island, off NW of Cap Van Diemen, Melville

Note – red shading = Operational Area; blue shading = EMBA

4.5.5.4 Seasonality

The presence of some of the identified fauna species is expected or known to be seasonal in nature. The key seasonal considerations of EPBC Act threatened and/or migratory species identified as potentially occurring within the Operational Area and EMBA is presented in **Table 4-8**.

Table 4-8: Seasonal presence of listed threatened and/or migratory species likely to be present within the Operational Area

Species	Month											
	J	*F*	*M*	*A*	*M*	*J*	*J*	*A*	*S*	*O*	*N*	*D*
Pygmy blue whales (northern migration - JASCO, 2016)												
Humpback whales (northern migration – Environment Australia 2002, Jenner et al. 2000)												
Bryde's whales (JASCO, 2016)												
Omura's whales (JASCO, 2016)												
Flatback turtles (presence, nesting/breeding – Commonwealth of Australia 2017)												
Olive ridley turtles (presence, nesting/breeding – Commonwealth of Australia 2017)												
Green turtles (presence, nesting/breeding – Commonwealth of Australia 2017)												
Hawksbill turtles (presence – Commonwealth of Australia 2017)												
Leatherback turtles (presence – Commonwealth of Australia 2017)												
Whale sharks (northern migration - DSEWPaC, 2012												
Streaked shearwater (DSEWPaC, 2012c)												
Migratory shorebirds (aggregation, breeding – Bamford et al. 2008)												

Legend	
	Peak presence/occurrence (presence of animals reliable and predictable each year)
	Species likely to be present in the region

4.5.5.5 Marine Mammals

The EPBC Act PMST reports identified 11 migratory mammal species (four of these are also listed as threatened) that may occur within the Operational Area (**Table 4-5**). An additional unlisted species, the Omura's whale, was also identified as occurring within the area during the Barossa acoustic monitoring program and is, therefore, also described here. The Operational Area is not known to include any critical habitat or BIAs (i.e. foraging, breeding/calving, resting or restricted migratory pathway) for any of the identified mammal species. Each mammal species identified is further described in the following subsections.

Sei whale

Sei whales have a worldwide oceanic distribution, but have only been infrequently recorded in Australian waters (Bannister et al., 1996). Sei whales undertake seasonal migrations between low latitude wintering areas and high latitude summer feeding grounds (Bannister et al., 1996; Prieto et al., 2012). The species has a preference for deep waters, further offshore than other species of large whales, and typically occurs in oceanic basins and continental slopes (Prieto et al., 2012). Records of the species occurring on the continental shelf (< 200 m water depth) are uncommon in all Australian waters (Bannister et al., 1996).

There are no known mating or calving areas, or other EPBC listed critical habitat or BIAs for sei whales in Australian waters. Given their known distribution and movements, it is considered possible that individual sei whales may be encountered in low numbers within the northern extents of the Operational Area and EMBA.

Pygmy blue whales

In the Southern Hemisphere, the blue whale has two distinct sub-species, the southern (or 'true') blue whale and the pygmy blue whale (DoEE, 2015). As southern blue whales are thought to only occur in waters south of 60 °S and pygmy blue whales distributed north of 55 °S, nearly all blue whales recorded in the NMR are likely to be pygmy blue whales.

Pygmy blue whales generally follow the continental shelf breaks during their migration, which are often characterised by increased productivity (McCauley, 2011; McCauley, RD, 2009). The species undertakes their northerly annual migration to potential breeding grounds in Indonesian waters from April to August, with a peak period past Exmouth and the Montebello Islands between May and June, and return south between October and January (peak period between late November to early December) (Double et al., 2014; McCauley and Duncan, 2011). During their northern migration pygmy blue whales follow the deep continental slope and offshore waters (500 to over 1,000 m) (DEWHA, 2008a). Once whales pass the shelf break off Exmouth they move north beyond the WA coastline in waters which can exceed 4,000 m, travelling past the Montebello Islands and Scott Reef (outside the EMBA) (Double et al., 2014).

A noise monitoring study conducted by ConocoPhillips as part of their Barossa marine studies program (see **Section 4.2**) recorded pygmy blue whales moving in a northward direction in August 2014 and between late-May to early July 2015 (JASCO Applied Sciences, 2016a; McPherson, Craig et al., 2015). It was estimated that the whales were anywhere from 5 to 80 km from the Operational Area (based on the J2 station). The detections were recorded over 400 km north-east of the migration BIA for the species. No detections of the species were made during the period of their southward migration.

Pygmy blue whales are likely to carry out opportunistic feeding on ephemeral krill aggregations during their migrations (DEWHA, 2008a). Steep gradient features, such as Browse Island and Scott Reef (outside the EMBA), are likely to represent potential aggregation/foraging habitat as these features tend to stimulate upwelling and therefore, increased productivity (seasonally variable) (Jenner, KCS et al., 2009). The species appears to feed regularly along their migration route (i.e. at least once per week or more frequently).

No BIAs or other EPBC listed critical habitat exists for pygmy blue whales within the NMR. Given the known distribution, preferred feeding habitats and migration pathways of pygmy blue whales, and observation from the Barossa noise monitoring program, it is considered possible that individuals may be encountered in low numbers within the Operational Area, most likely within the northern most offshore section of the Operational Area, however there are no significant upwelling or benthic habitat features within the area. Pygmy blue whales are expected to occur within the wider EMBA.

Fin whales

The fin whale is distributed across all ocean basins between 20 and 75 °S (DoEE, 2019). Fin whales undertake annual migrations between high latitude summer feeding grounds and lower latitude over-wintering areas (Bannister et al., 1996). In Australian waters there are few records of fin whales and their distribution is mainly known from stranding events and whaling records (DoEE, 2019).

Fin whales are thought to follow oceanic migration paths and are uncommonly encountered in coastal or continental shelf waters. The Australian Antarctic waters are important feeding grounds for fin whales but there are no known mating or calving areas, or other BIA or EPBC listed critical habitat, in Australian waters (Morrice et al., 2004). There are no confirmed records of fin whales within the NMR (DoEE, 2019), however, given their known distribution and movements, it is considered possible that individual fin whales may pass through the Operational Area in low numbers, most likely within the northern region of the Operational Area. Fin whales are expected to occur within the wider EMBA.

Humpback whales

Humpback whales have a wide distribution, with recordings throughout Australian Antarctic waters and offshore from all Australian states/territories (Bannister et al., 1996). They occur throughout Australian waters, as two genetically distinct, east and west populations. Both populations' distributions are influenced by migratory pathways and aggregation areas for resting, breeding and calving. In the west, humpback whales migrate north to breeding grounds in Camden Sound of the west Kimberley between May and November, with a peak period between late July and early August, after feeding in Antarctic waters during the summer months (Jenner et al., 2001). Calving typically occurs between June and early September, within nearer shelf waters of the Camden Sound (outside the EMBA) (DoEE, 2019). The whales' southern migration runs between August and November, with females and calves being the last to leave the breeding grounds.

No BIAs or other EPBC listed critical habitat exist for humpback whales within the NMR and relatively few humpback whales have been known to travel north of their calving grounds in Camden Sound (Jenner et al., 2001). No humpback whales were recorded during the 12 months of noise monitoring undertaken as part of the Barossa marine studies program (JASCO Applied Sciences, 2016a; McPherson, Craig et al., 2015). Given this, the species is considered unlikely to occur within the Operational Area but may infrequently occur in small numbers within the south-western portion of the EMBA.

Bryde's whales

Bryde's whales occur in temperate to tropical waters, between 40 °S and 40 °N year round (Bannister et al., 1996; DoEE, 2019). The population of Bryde's whales appears to be split into coastal and offshore subpopulations. The offshore form is found in water depths between 500 and 1,000 m, while the coastal form appears to remain within the 200 m depth isobar where individuals move along the coast based on the availability of suitable prey (Best et al., 1984). Little is known about the population abundance of Bryde's whale and there are no estimates of the exact breeding and calving grounds (DoEE, 2019).

There are no listed BIAs or other EPBC listed critical habitat for this species in Australian waters. Historical records have suggested the inshore form of the Bryde's whale are resident in regions where there is year-round suitable prey, while the offshore form may migrate between subtropical and tropical waters during winter months (Best, 1977).

A few individuals of Bryde's whale were detected in the Barossa marine studies program from January to early October (JASCO Applied Sciences, 2015; McPherson, Craig et al., 2015). McPherson et al. (2015) commented that the presence of Bryde's whales would be expected based on the findings of several studies which noted the species' occurrence in the Timor Sea and surrounding waters. As the Barossa study area is in water depths between 120 and 350 m, it is likely these records were from the inshore form of the species. As such, it is possible the coastal form of Bryde's whales may also occasionally transit through the EMBA and Operational Area; however, they are not expected to be present in significant numbers.

Omura's whales

Omura's whales were only described as a new species basal to the Bryde's whale group in 2003 (Wada, et al., 2003) and remain poorly understood in terms of their spatial-temporal distribution. While distantly related to Bryde's whales (Cerchio, et al., 2015), the two species share some life history traits such as remaining in tropical waters, as opposed to undertaking large-scale seasonal migrations characteristic of other baleen whales (JASCO). Omura's whales are not listed under the EPBC Act but as listed on the IUCN Red List as Data Deficient (IUCN, 2017).

A scientific study undertaken by Cerchio et al. (2015), which assessed the ecology and behaviour of Omura's whales off the north-west Madagascar, has provided some valuable insight into the species. Omura's whales, when present in the Madagascar region (October to November), appears to be distributed solely on the shallow continental shelf habitat, within approximately 10 – 15 km of the shelf break and predominately in water depths of 10 – 25 m (however, they were observed in depths of up to 202 m) (Cerchio, et al., 2015). Cerchio et al. (2015) noted that other studies have suggested that the species also inhabits deeper waters, with observations made only off the Cocos Islands and eastern Indian Ocean from research whaling data. Feeding in the shelf habitat was frequency observed and was thought to be related to patchy food resources that were most likely zooplankton (Cerchio, et al., 2015).

Omura's whales were recorded by the Barossa noise monitoring program during the autumn and winter months. The greatest call rate was recorded at the deepest station (J2), adjacent to the Operational Area, suggests Omura's whales find some benefit in the deeper waters (McPherson et al., 2016), Therefore, it is likely that Omura's whales may transit the Operational Area, mostly within the northern offshore section, and are expected to occur within the EMBA.

Killer whale (or orca)

The killer whale or orca is found in all the world's oceans and has been recorded in waters of all Australian states/territories; however, recordings are more frequent in lower latitudes and there have been few recordings in the northern region of Australia (DoEE, 2019). Killer whales are found in diverse habitat, but are most often found along the continental slope and shelf, particularly near prey seal colonies (DoEE, 2019). The nearest significant seal colony is located at the Abrolhos Islands (approximately 2,500 km south-west of the EMBA – straight-line distance). While killer whales are known to undertake seasonal migrations and follow regular migratory routes, little is known about these movements (DoEE, 2019).

No BIAs, EPBC listed critical habitat or verified migration routes have been identified for this species within the NMR (DoEE, 2019). Given the rare occurrence of sightings in northern Australia and the absence of pinnipeds within the EMBA, killer whales are unlikely to occur within the Operational Area, however, it is possible they may occur within the EMBA.

Sperm Whale

Sperm whales are found worldwide in deep waters (> 200 m) off continental shelves and shelf edges (Bannister et al., 1996). Sperm whale sightings have been recorded from all Australian states/territories. There are no BIAs for sperm whales within the NMR, however, in WA sperm whales have two BIAs recognised for foraging activities, located well outside the EMBA.

The species is known to migrate northwards in winter and southwards in summer but detailed information on the distribution and migration patterns of sperm whales. The Operational Area and EMBA are unlikely to represent important habitat for this species, and therefore, expected that only very low numbers of individuals may be present in the EMBA and Operational Area.

Dugongs

Dugongs are large herbivorous marine mammals, which generally inhabit coastal areas. Dugong distribution is correlated with seagrass habitats which dugong feed on, although water temperature has also been correlated with dugong movements and distribution (Preen, 2004; Preen et al., 1997). Dugong feeding aggregations tend to occur in large seagrass meadows within wide shallow protected bays, shallow mangrove channels and in the lee of large inshore islands. Dugongs spend most of their time in the neritic zone within shallow tidal and subtidal seagrass meadows, and generally remain within an area of tens of kilometres (DEWHA, 2008b); however, dugongs are known to migrate between seagrass habitats (hundreds of kilometres) (Sheppard et al., 2006) and have been observed in water depths of up to 37 m (DEWHA, 2008b).

An aerial survey of northern Australian coastal waters was undertaken in 2015 to assess the distribution and abundance of dugongs in NT coastal waters. While survey effort was affected by poor visibility (due to high turbidity), 151 dugong groups consisting of 229 individuals were identified (Groom et al., 2017). Dugong density in the waters surrounding Tiwi Islands were reported as 0.11/km^2 with small group sizes (observed to be on average 1.29 – 1.36 individuals). Based on the survey results the dugong population in NT coastal waters was estimated at 8,176 individuals (Groom et al., 2017).

The north coast of the Tiwi Islands (located within the EMBA) is recognised as a key site for the conservation of dugongs. A well-known major dugong aggregation of approximately 4,400 individuals occurs in waters seaward (within approximately 50 km) of the Tiwi Islands and ranks in the top eight of dugong populations in Australia.

Dugongs have been tracked moving long distances of up to 300 km between the Australia mainland and the Tiwi Islands (Whiting et al., 2009). Satellite-tracking data from dugongs tagged as part of the INPEX Ichthys Project baseline surveys observed that dugongs around the Vernon Islands, south of Melville Island, spent time in Darwin Harbour and around the Tiwi Islands (INPEX, 2010). Routine sightings occur in various locations along the NT coastline, including within Darwin Harbour, to the south of Melville Island, within Shoal Bay to the north of Darwin Harbour (highest frequency of sightings) and within the vicinity of Grose Islands, Dum In Mirrie Island and Indian Island (south-west of Darwin Harbour) (Cardno, 2013).

Dugongs in the NT coastal waters have been observed foraging on intertidal rocky reef flats supporting sponges and algae as seagrass habitat is thought to be rare in the NMR bioregion (INPEX, 2010; Whiting et al., 2009). However, seagrass communities are known along the north coast of the Tiwi Islands.

There are no BIAs for dugongs within the NMR. As dugong's dietary preference is seagrass, dugongs will occur within shallow or nearshore waters of the EMBA. Dugongs may transit through the shallow, southern section of the pipeline route.

Australian humpback dolphin (a subspecies of the Indo-Pacific Humpback Dolphin)

The Indo-Pacific humpback dolphin's taxonomy was recently revised with evidence that there are multiple species under the *Sousa* genus which are distinguished by their morphology, genetics and biogeography (Jefferson and Rosenbaum, 2014). The species present in Australian waters is considered a newly described species, the Australian humpback dolphin. This species is defined mainly by a large distributional gap which corresponds with a long standing boundary between faunal regions in Australia and much of Asia, also known as the Wallace Line (Jefferson and Rosenbaum, 2014).

The Australian humpback dolphin is distributed across the Sahul Shelf, from northern Australia to southern New Guinea (Jefferson and Rosenbaum, 2014). Distribution of the humpback dolphin in Australia is linked to the warm eastern boundary current with resident groups within Ningaloo Reef (Bannister et al., 1996). Humpback dolphins inhabit shallow coastal, estuarine habitats in tropical and subtropical regions generally in depths of less than 20 m (Corkeron et al., 1997; Jefferson, 2000; Jefferson and Rosenbaum, 2014).

This species of dolphin is known to have resident groups that forage, feed, breed and calve in coastal waters outside the EMBA. Within Darwin Harbour and Shoal Bay surveys have recorded 284 individuals from 88 schools; however, formal population estimates have not been developed (INPEX, 2010, and references therein). There are several BIAs listed for Australian humpback dolphins in the NMR, including a breeding/calving/foraging BIA in Darwin Harbour and surrounding waters and two breeding/foraging BIAs within the Van Diemen Gulf (both outside the EMBA). Given their preference for shallow coastal habitats, the species is expected to only occasionally transit the southernmost section of the Operational Area (in proximity to the Tiwi Islands).

Indo-Pacific Bottlenose Dolphin (also referred to as Spotted Bottlenose Dolphin)

There are four known subpopulations of Indo-Pacific bottlenose dolphins, of which the Arafura/Timor Seas population was identified as potentially occurring within the Operational Area and EMBA. The species occurs in open NT coastal waters, primarily within the continental shelf, and around oceanic islands. The species forages in a wider range of habitats and within deeper waters than most dolphin species, but is generally restricted to water depths of less than 200 m (DSEWPaC, 2012). The Arafura/Timor Sea Indo-Pacific bottlenose population is considered migratory; however, their movement patterns are considered highly variable, with some individuals displaying year-round residency to a small area and others undertaking long-range movements and migrations (DoEE, 2019).

There are several BIAs listed for the Indo-Pacific bottlenose dolphin within the NMR, including a breeding/calving BIA in Darwin Harbour (outside the EMBA) during the dry season (approximately April to September) (**Figure 4-30**). Given the species' utilisation of relatively deeper waters and the potential for long-range migratory movements, it is likely this species will occasionally transit the Operational Area and offshore sections of the EMBA.

Australian Snubfin Dolphin (also referred to as Irrawaddy Dolphin)

The Australian snubfin dolphin is known to occur within tropical NT coastal waters off northern Australia, extending north from Broome in Western Australia to the Brisbane River in QLD (DoEE, 2019). Surveys have indicated that the species is typically found in protected shallow nearshore waters, generally less than 20 m deep, adjacent to river and creek mouths and close to seagrass beds (DoEE, 2019). The majority of recordings are from river and creek mouths, and occasionally upstream tidal rivers, in waters of less than 10 m depth (DEWHA, 2008a, and references therein). Data also suggests this species occurs in small, localised populations (DSEWPaC, 2012).

There are a number of BIAs listed for the Australian snubfin dolphin within the NMR, including a foraging/feeding/breeding BIA in Darwin Harbour and two breeding/foraging BIAs within the Van Diemen Gulf (both outside the EMBA) where they are observed in small numbers year round (DSEWPaC, 2012). Given this species' preference for nearshore waters and apparent high site fidelity, individuals are likely to only rarely transit the Operational Area and offshore southernmost section of the EMBA; however, they are expected to be residents within the coastal waters of the NT.

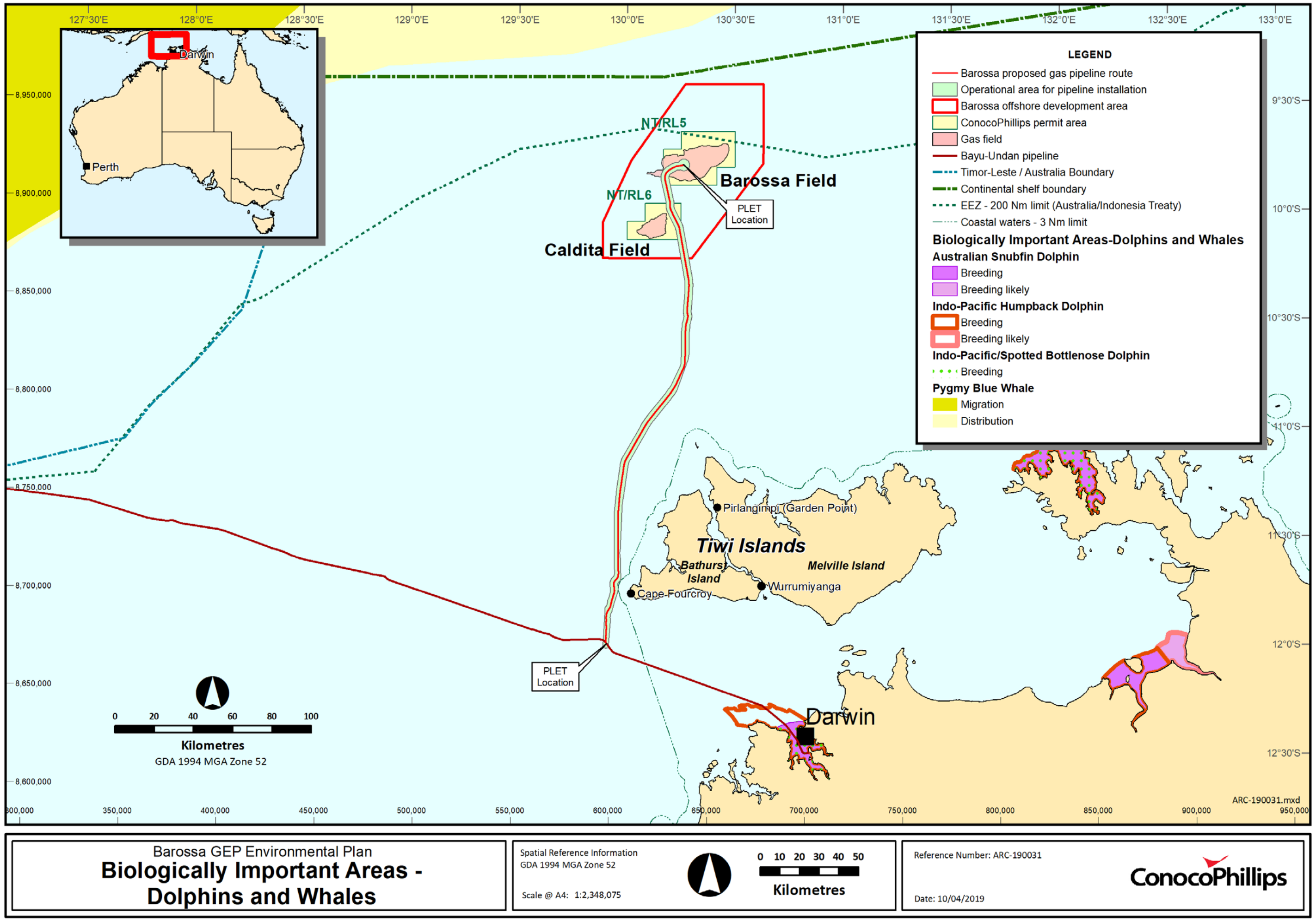


Figure 4-30: Biologically Important Areas – Dolphins and Whales

4.5.5.6 Marine Reptiles

Marine turtles

The EPBC Act PMST reports identify six species of marine turtle that may occur within both the Operational Area and EMBA. Marine turtles are highly migratory and use widely dispersed terrestrial and marine habitats throughout their lifecycles (Commonwealth of Australia, 2017a). Marine turtles also show high levels of natal philopatry, where adults return to their birthplace to nest when reaching sexual maturity.

The NMR coastal region is considered particularly significant for marine turtle breeding, feeding and nesting aggregations. The sandy beaches of the Tiwi Islands, specifically the west coast of Bathurst Island and the north coast of Melville Island are nationally and internationally recognised important nesting areas (outside of the Operational Area) (Chatto and Baker, 2008a). The nesting season for marine turtles is species-dependent and varies within the NMR in response to the different seasonal conditions (Commonwealth of Australia, 2017a). Female turtles also generally exhibit an internesting phase where they spend 2-3 months in the vicinity of their nesting (Guinea, 2013a). During this time the turtles typically remain in shallow waters.

Marine turtles forage predominately on shallow benthic habitats, either nearshore or at offshore reefs (generally in waters up to approximately 50 m deep and including coral and rocky reefs), containing seagrass and/or algae, and inshore seagrass beds. Benthic habitats at shoals and banks near the Operational Area, which are present at water depths ranging from 10 – 30 m (at the top of the shoal/bank), represent important foraging grounds for marine turtles. Flatback turtles are primarily carnivorous and feed predominately on soft-bodied invertebrates, while green turtles are primarily herbivorous and forage on shallow benthic habitats (in depths <120 m) containing seagrass and/or algae, including coral and rocky reefs, and inshore seagrass beds. Loggerhead turtles are carnivorous and mainly feed on benthic invertebrates in habitats ranging from nearshore to 55 m in depth, olive ridley turtles have been known to feed in water depths between 15 – 200 m. Leatherback turtles feed on plankton and jellyfish in oceanic waters around Australia (DoEE, 2017).

Aggregation, Nesting and Feeding

There are several key aggregation/nesting/feeding areas and migration pathways for marine turtles within NMR. BIAs and habitat critical to the survival of marine turtle species overlapping the EMBA include internesting and foraging areas, as shown in **Figure 4-29** and **Figure 4-31**, and are summarised in **Section 4.5.5.3**. Key aggregation, nesting and feeding areas within the EMBA and overlapping the Operational Area can be summarised as:

- The sandy beaches on the Tiwi Islands, specifically the west coast of Bathurst Island and the north coast of Melville Island are important areas for marine turtles with nesting dominated by flatback and olive ridley turtles (peak nesting in March to May) (Chatto and Baker, 2008a). While in this area, marine turtles feed in both benthic and pelagic habitats, from depths of several metres to over 100 m.
- Green turtles have not been recorded nesting in the Bonaparte or Van Diemen Gulf bioregions, with the exception of two significant nesting sites; Black/Smith Point and Lawson Island, which are east of the Tiwi Islands and in the vicinity of Cobourg Peninsula, both outside of the EMBA (Chatto and Baker, 2008a). Some nesting has been recorded on the west coast of Bathurst Island (pers. Comm. M. Guinea, CDU, 2015). The nesting period varies along the NT coast. However, the Cobourg Peninsula genetic stock of green turtles, which is the closest to the Tiwi Islands, nesting between October and April with the peak nesting period occurring between December and January. Biologically important areas for green turtles occur on the north coast of the Tiwi Islands and in the vicinity of Cobourg Peninsula. An internesting buffer of 20 km from the Tiwi Islands has been defined for green turtles with internesting occurring between October and April (DoEE, 2017).
- The NT sub-population of the hawksbill turtle is one of the few very large nesting populations remaining in the world, breeding year-round (Chatto and Baker, 2008a). However, there are no recorded nesting sites along the western NT coast.

- Flatback turtles are the most widespread nesting turtle species in the NMR. Flatback turtles nesting within the NT are all from the Arafura Sea breeding stock (genetic stock). The long-term trend of this stock is unknown (Commonwealth of Australia, 2017a). Nesting has been recorded on the Tiwi Islands, with greatest proportion of activity occurring on the west coast of Bathurst Island (Chatto and Baker, 2008a). The numbers of nesting females (approximately 11-100 females per year (Figure 6 of Commonwealth of Australia, 2017a)) is comparable to, or smaller than, other nesting sites of the Arafura Sea genetic stock. Nesting and internesting occurs year round with a peak during June and August, and hatchling emergence peaking between July and September (Commonwealth of Australia, 2017a). Internesting habitat critical to the survival of flatback turtles encompasses a large area of nearshore waters between approximately Daly River to the west and Endyalgout Island/west coast of Cobourg Peninsula to the east and surround the entire Tiwi Island coastline (Commonwealth of Australia, 2017a). The Recovery Plan for Marine Turtles in Australia defines the internesting buffer around the Tiwi Islands as 60 km (Commonwealth of Australia, 2017a). However, it has been demonstrated via an extensive study tracking 47 internesting flatback turtles from five different mainland and island rookeries over 1,289 tracking days that flatback turtles remained in water depths of <44 m, favouring a mean depth of <10 m (Whittock et al., 2016). Whittock et al. (2016) defined suitable internesting habitat as water 0 – 16 m deep and within 5 – 10 km of the coastline, and unsuitable internesting habitat was defined as water >25 m deep and > 27 km from the coastline. There is no evidence to date to indicate flatback turtles swim out into deep offshore waters during the internesting period (Pendoley, 2019). The seabed characteristics off Cape Fourcroy at the south-western tip of Bathurst Island (i.e. narrow continental shelf, steep seabed slope and relatively high current speeds) are not typical of the internesting habitat used by flatback turtles and consequently they are unlikely to internest in the Operational Area. Further to the north where the continental shelf is wider and slopes more gently offshore, the 10 m deep internesting groups are located approximately 10 – 20 km inshore of the pipeline corridor. Based on the outcomes of these studies, most of the nesting females in the area are not expected to internest within the Operational Area, however, it is possible some individuals will use waters extending into the Operational Area and EMBA.
- Olive ridley turtles of the NT genetic stock nest along the northern coast of the Tiwi Islands (Melville Island in particular), and in low density on the beaches of the west and south-west costs of the Tiwi Islands (Bathurst Island) (Chatto and Baker, 2008a). The long-term trend of the NT genetic stock is currently unknown (Commonwealth of Australia, 2017a). The numbers of females nesting here is considered significant at the genetic stock, national and international level. Due to the effects of nest predation and entanglement with ghost nets in the Arafura Sea and the Gulf of Carpentaria, both olive ridley genetic stocks are considered a priority for management action (Commonwealth of Australia, 2017a). Nesting of the NT genetic stock can occur year round with a peak between April and June, with hatchling emergence peaking between June and August Commonwealth of Australia, 2017a). Internesting habitat critical to the survival of olive ridley turtles (NT stock) encompasses nearshore waters along the north, west and east coasts of the Tiwi Islands. The Recovery Plan for Marine Turtles in Australia defines the internesting buffer around the Tiwi Islands as 20 km which overlaps the Operational Area and EMBA (Commonwealth of Australia, 2017a) (**Figure 4-31**). Internesting olive ridley turtles remain relatively close to nesting beaches during the nesting period (in comparison to post-nesting movements); tagged turtles remained within 48 km of the nesting beach in waters typically < 30 m water depth, although the turtles moved considerable distances within this radius (up to 200 km) (Hamel et al., 2008).
- Leatherback turtles feed in NT coastal waters around northern Australia. However, nesting has only been confirmed at a single site, between the Cobourg Peninsula and Cape Arnhem, and only in small numbers (Chatto and Baker, 2008a). Within this area nesting occurs between December and January (Commonwealth of Australia, 2017a). There are potentially three genetic stocks foraging and nesting within Australian waters, although genetic linkages or distinctions are unclear (Commonwealth of Australia, 2017a).

- Loggerhead turtles are found in the NMR and are known to forage in the Oceanic Shoals Marine Park, the Arafura Sea and the Gulf of Carpentaria; however, they have not been observed breeding in the region (DEWHA, 2008b). Loggerheads found within the EMBA are most likely to come from the Western Australian Population, which nest in the areas of Dirk Hartog Island, Murion Islands, Gnaraloo Bay, and the Ningaloo coast in November – May (outside the EMBA) (Commonwealth of Australia, 2017a).

Migratory Pathways

Most species of turtles are known to migrate large distances between foraging and nesting areas. Key migratory pathways have been identified for the identified marine turtle species and include (Commonwealth of Australia, 2017a):

- olive ridley turtles and green turtles are known to migrate up to 1,130 km and 2,600 km respectively, between their nesting and foraging grounds (DSEWPaC, 2012)
- flatback turtles that nest within the Pilbara region migrate to their foraging grounds in the Kimberley along the continental shelf at the end of the nesting season
- surveys of green turtle movements after nesting in the Kimberley region show many turtles traveling north to the Tiwi Islands south coast (RPS 2009, cited in URS, 2010), in April/May (pers. comm. M. Guinea, CDU, 2015), and
- hawksbill turtles migrate along the Dampier Archipelago and between Scott Reef and the Joseph Bonaparte Gulf.

Aside from the aforementioned BIAs and habitat critical to the survival of marine turtles (as defined in the Recovery Plan for Marine Turtles), a number of shallow features (i.e. shoals/banks) within the EMBA may be of importance for marine turtle foraging. Given this, the six marine turtle species identified are likely to be present within the EMBA year-round while foraging or moving between nesting beaches and foraging areas. A small number of individual turtles, including flatback, olive ridley and hawksbill (juvenile) turtles, were also opportunistically observed during the Barossa marine studies program in both open waters and in close proximity to shoal/banks and Bathurst Island. Given the Operational Area does not contain any emergent land or shallow features that may be of importance to nesting turtles, they are unlikely to be present in the area in significant numbers. However, marine turtles are likely to transit the area as they move between nesting beaches and offshore areas and may be present in higher numbers within the areas around Tiwi Islands (i.e. within areas defined as BIAs and or habitat critical to marine turtle species).

The Recovery Plan for Marine Turtles lists conservation advice for relevant key threats identified in **Table 4-5**. Conservation actions are listed for threats rated as high or very high. **Table 4-9** outlines relevant conservation advice for all marine turtles and their threat priority as assessed in the Recovery Plan (Commonwealth of Australia, 2017a).

Table 4-9: Relevant Conservation Advice for Key Threats to Marine Turtles identified in the Recovery Plan for Marine Turtles in Australia 2017 - 2027 (Commonwealth of Australia, 2017a)

Action Areas	Threat Priority	Relevant Conservation Advice to the gas export pipeline Installation Campaign
Legal and management protection (see **Sections 5.2.2, 5.2.3, 5.2.4, 5.2.7, 5.3.3, 5.3.4, 5.3.6, 5.3.7** and **5.3.8)**	Not applicable	• Maintain, implement and improve efficacy of existing management arrangements as listed at Sections 2 and 4.3 (of the Recovery Plan for Marine Turtles in Australia 2017 – 2027). • Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival as per section 3.3 Table 6 (of the Recovery Plan for Marine Turtles in Australia 2017 – 2027). • Manage anthropogenic activities in Biologically Important Areas to ensure that biologically important behaviour can continue.

Action Areas	Threat Priority	Relevant Conservation Advice to the gas export pipeline Installation Campaign
Habitat modification – infrastructure (see **Section 5.2.2)**	Low - Moderate	• Manage infrastructure, coastal development, dredging and trawling to ensure ongoing biologically important behaviours for marine turtle stocks continues. • Use up-to-date information regarding nesting, internesting and foraging habitat to inform future development proposals and approval decisions.
Vessel disturbance (see **Section 5.3.3)**	Low - Moderate	No relevant conservation advice listed
Light pollution (see **Section 5.2.4)**	Low - Moderate	• Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats. • Develop and implement best practice light management guidelines for existing and future developments adjacent to marine turtle nesting beaches. • Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.
Noise interference – acute (see **Section 5.2.3)**	Low - Moderate	Understand the impacts of anthropogenic noise on marine turtle behaviour and biology.
Chemical discharge – acute (see **Sections 5.2.7**, **5.3.4**, **5.3.5, 5.3.7** and, **5.3.8)**	Low - High	• Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs. • Quantify the impacts of decreased water quality on stock viability. • Quantify the accumulation and effects of anthropogenic toxins in marine turtles, their foraging habitats and subsequent stock viability.
Marine debris - entanglement/ingestion (See **Section 5.3.6**)	Moderate – Very High	• Maintain and expand international and domestic partnership arrangements for the source reduction, collection and management of marine debris. • Compare marine debris hotspots with important foraging areas, post hatchling dispersal and adult migratory pathways to identify high priority areas for mitigation to reduce turtle/debris interactions. • Describe and quantify the impact of ingestion of debris on marine turtles, particularly those life phases using the open ocean. • Support the implementation of the EPBC Act Threat Abatement Plan for the impacts of marine debris on vertebrate marine life.

Saltwater Crocodile

The saltwater crocodile is primarily found in inland water ways, tidal creeks, coastal floodplains and channels, billabongs and swamps across northern Australia (DoEE, 2019). The species' recognised distribution extends from Rockhampton in QLD to King Sound WA (DoEE, 2019). There are no identified BIAs or EPBC listed critical habitat within the NMR for salt-water crocodiles. In the NT, most breeding sites are found on river banks or floating rafts of vegetation.

Within the NMR, the saltwater crocodile's distribution is suggested to have expanded since its protection in the early 1970s, with individuals occurring up to 150 km inland, further than any historical records or knowledge (DEWHA, 2008b). Although the species is considered recovered and no longer threatened, it is recognised that strict regulation is required to avoid the population becoming depleted again (DoEE, 2019). Nesting occurs within freshwater swamps which experience little tidal movement, between December and March, with a peak period between January and February (DEWHA, 2008b). Given crocodiles preferred habitat, they are likely to be encountered within the EMBA, mainly within inshore/coastal areas, but unlikely to occur within the Operational Area.

Sea snakes

All sea snakes in Australia are listed as marine protected species under the EPBC Act. PMST reports identified 19 species of sea snake within the EMBA, with 18 species listed as potentially occurring within the Operational Area. None of the sea snake species occurring within the Operational Area and EMBA are listed threatened species.

There are a number of recognised key aggregation/feeding areas for sea snakes including:

- Sea snakes are typically distributed in shallow inshore regions and islands, which provide suitable seabed habitat and clear waters. However, they are also found at nearby islands and further offshore at atolls, including the shoals/banks in the Timor Sea (Guinea, 2013b).
- The majority of sea snakes are observed in water depths ranging between 10 and 50 m (RPS, 2010) and generally have shallow, benthic feeding patterns. Some species are known to dive deeper than this, however, non-pelagic species seldom, if ever, diver deeper than 100 m (Heatwole, 1975). Very few species are known to inhabit deep pelagic environments, such as the environments occurring in the Operational Area, as they are air-breathing (Guinea, M.L., 2006).
- Distribution and movements of sea snakes are largely species-dependent with some species, such as the pelagic yellow-bellied sea snake, known to travel large distances, while others, such as the olive sea snake, are usually resident in a particular area.
- Sea snake species residing on reefs do not actively disperse or migrate between reefs. Sea snakes are found to be present year-round at most reefs on the Sahul Shelf (Guinea and Whiting, 2005).
- For those sea snake species that do migrate between reefs, within their broader home range, migration is thought to be influenced by ocean current. However, there have been no studies undertaken to date on the migrations of open water sea snake species to determine their home ranges. Reef dwelling sea snakes appear to have very small home ranges (Guinea, 2013).
- Research trawls indicate that sea snakes move to the southern shallow regions of the Gulf of Carpentaria in the summer month and into deeper waters at other time of the year (Redfield et al. 1978, cited in DSEWPaC, 2012a)).
- Sea snakes are known to breed in shallow embayments along the NT coastline around December to February, with the exception of the spine-bellied sea snake which breeds during June to August (DSEWPaC, 2012a).

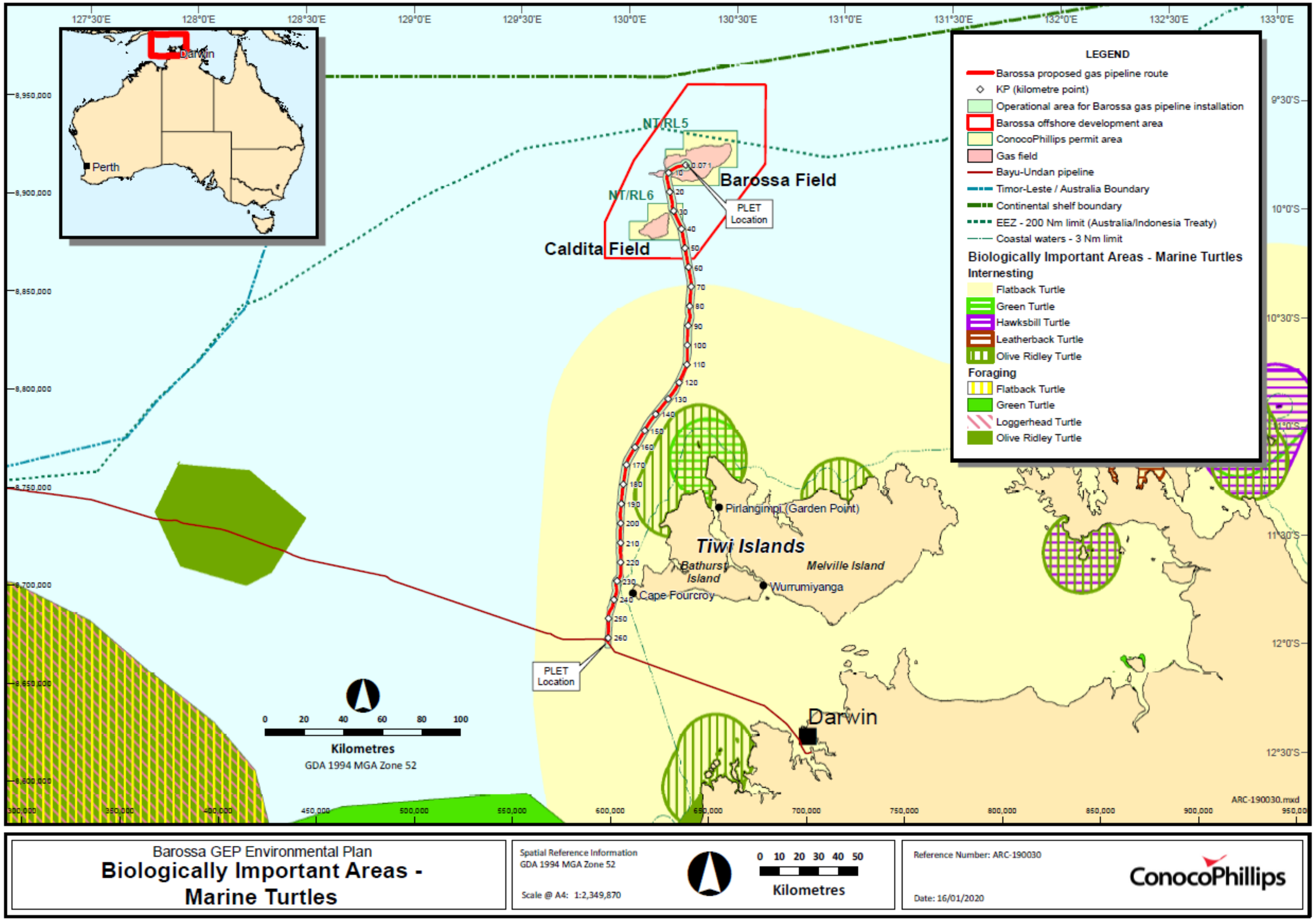


Figure 4-31: Biologically Important Areas – Marine Turtles

Recent surveys undertaken for the Barossa marine studies program observed several species of sea snake individuals at Evans Shoal, Tassie Shoal, Lynedoch Bank and a seamount to the north-west of the Operational Area. A number of opportunistic sightings (species unknown) were also made in open offshore waters in the Timor Sea. The individuals that could be identified were the olive sea snake and turtle-headed sea snake (Heywood et al., 2015; Jacobs 2016c). A study undertaken at Tassie Shoal and five surrounding shoals identified these same two species of sea snake at the surface and foraging on the seabed. Based on the known distribution, habitat preference and sightings during the Barossa marine studies program, sea snakes are considered likely to transit the Operational Area and EMBA.

4.5.5.7 Fish

Fish communities occupy a range of habitats and play an important ecological role with many species being of conservation value and importance for commercial and recreational fishing. The current state of knowledge of fishing activities in a socio-economic and traditional use context is discussed further in **Section 4.6.7** and **4.6.8**.

The EPBC Act PMST reports identified 12 listed species, including six threatened or migratory shark, four sawfish and two ray species that may occur in, or have habitat, in the Operational Area (**Table 4-5**). An additional 34 species of fish which are not listed as threatened/migratory were also identified within the reports as occurring within the EMBA, with a subset of 30 species occurring within the Operational Area. These species are all ray-finned fish of the family Syngnathidae (i.e. pipefish or seahorses). These species may pass through the offshore waters of the Operational Area and EMBA, however, are more likely to be associated with the shallow waters around the nearby shoals/banks (**Section 4.5.6.3**) and close to the NT coastline where benthic communities provide suitable shelter and foraging habitats.

Whale Shark

The whale shark is known to occur in both tropical and temperate waters and has a wide distribution in Australian waters (DSEWPaC, 2012). A seasonal aggregation of whale sharks occurs in waters off the Ningaloo coast (outside of the EMBA) each year between late March and November, with the highest frequency of sightings occurring in April and May (DSEWPaC, 2012; DEH, 2005). Whale sharks are highly migratory and generally depart Ningaloo Reef between May and June, travelling northeast along the continental shelf and then moving offshore into the north-eastern Indian Ocean (DEH, 2005). The timing of this aggregation has been reported to coincide with high levels of productivity associated with annual coral spawning, resulting in an increased planktonic biomass and a more active food chain in the waters adjacent to the Ningaloo Reef (Taylor, 1996).

Seasonal aggregation areas are also known off Christmas Island (outside the EMBA) between December and January and in the QLD Coral Sea (between November and December) (DEH, 2005). Aside from these aggregation periods, the distribution of whale sharks is largely unknown. Multiple surveys of whale sharks leaving the Ningaloo area suggest the group disperses widely and may follow three migration routes, moving either north-west into the Indian Ocean, directly north towards Sumatra and Java, or north-east travelling along the shelf break and continental slope (Meekan and Radford, 2010; Wilson et al., 2006).

Relevant conservation advice for the whale shark states requirements to minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with whale shark aggregations (Ningaloo Reef, Christmas Island and the Coral Sea) and along the northward migration route that follows the northern WA coastline along the 200 m isobath (Threatened Species Scientific Committee, 2015a). The closest foraging BIA for whale sharks is approximately 440 km west of the Operational Area and outside the EMBA. Given this and whale sharks' widespread distribution, occurrence of whale sharks within the EMBA is likely to be minimal, restricted to few individuals leaving Ningaloo, which are travelling towards the Coral Sea along the shelf break and will be restricted to only the north-western offshore section of the EMBA. It is possibly that very low numbers of whale sharks may occur within the northern extent of the Operational Area.

Great White Shark

Great white sharks are distributed widely in Australian waters; however, aggregations are focused in temperate waters around seal and sea lion colonies (DoEE, 2019). Their preferred habitat is inshore reefs and shallow coastal bays (up to the 100 m depth contour) (Bruce, 2008; Bruce et al., 2006), but individuals are known to make open ocean excursions of several hundred kilometres and can cross entire ocean basins (e.g. from South Africa to WA) (Weng et al., 2007). There are no BIAs or EPBC listed critical habitats for great white sharks within the NMR and there have been no confirmed sightings of great whites within the NT (DoEE, 2019). Given this, great white sharks are unlikely to occur within either the Operational Area, however, individuals may infrequently transit the broader EMBA.

Sawfish

Three EPBC threatened and migratory, and one EPBC migratory sawfish species were identified as potentially occurring within the Operational Area and EMBA.

Dwarf sawfish are found in coastal waters of the NMR extending north from Cairns around the Cape York Peninsula in QLD to the Pilbara coast (DoEE, 2019). Dwarf sawfish typically inhabit shallow (2 to 3 m) silty coastal and estuarine habitats, occupying relatively restricted areas and moving only small distances (Stevens et al., 2008). Juvenile dwarf sawfish utilise estuarine habitats in north-western WA as nursery areas (Thorburn et al., 2008), and migrate to deeper waters as adults (DoEE, 2019). The majority of capture locations for the species in WA waters have occurred within King Sound and the lower reaches of the major rivers that enter the sound, including the Fitzroy, Mary and Robinson rivers (Morgan et al., 2010). King Sound lies in the Kimberley region, west of the EMBA. Individuals are also occasionally taken as bycatch from considerably deeper water from trawl fishing (Morgan et al., 2010).

Green sawfish are also widely distributed in Australian waters and have been recorded in inshore marine waters, estuaries, river mouths, embankments and along sandy and muddy beaches (DoEE, 2019). While the species has predominantly been recorded in inshore coastal areas, it has been recorded hundreds of kilometres offshore in relatively deep waters (up to 70 m) (Stevens et al., 2005). Short-term tracking of movement patterns has shown that green sawfish appear to have limited movements that are tidally influenced, and it is likely to occupy a restricted range of only a few square kilometres in the coastal fringe, with a strong association with mangroves and adjacent mudflats (Stevens et al., 2008).

The freshwater, or largetooth sawfish, occurs in fresh or weakly saline waters, mainly within rivers and estuaries (Thorburn et al., 2007; Threatened Species Scientific Committee, 2014). Large mature adults have been recorded within coastal or offshore waters, up to 25 m depth (DoEE, 2019; Stevens et al., 2005); however, records are few. Riverine habitats are particularly important as pupping habitats.

The narrow sawfish occurs from the northern Arabian Gulf to Australia and north to Japan. The species inhabits inshore and estuarine waters and offshore waters up to depths of 100 m (Morgan et al., 2010), and are most commonly found in sheltered bays with sandy bottoms. They are not currently listed as threatened under the EPBC Act.

Based on the habitat preferences of sawfish within northern Australia, fishery data and information provided by stakeholders, these species are likely to occur within the EMBA and within the southern section of the proposed gas export pipeline.

Northern River Shark and Speartooth Shark

Within Australia, northern river and speartooth sharks have predominantly been recorded in tidal rivers and estuaries in north and north-western Australia (DSEWPaC, 2012b). The northern river shark's known distribution within the NT includes the Adelaide River, South and East Alligator rivers and the Wessel Islands. The northern river shark appears to favour habitats that experience large tides, have fine muddy/silty substrates and high turbidity. The speartooth shark is currently distributed in two main regions including the Van Diemen Gulf drainage in the NT and Port Musgrave in QLD (both east of the EMBA), with historical populations in eastern Cape York Peninsula (DSEWPaC, 2012b). Only adults of both species have been sighted in offshore waters as either bycatch in offshore net fisheries (northern river shark) or unconfirmed sightings (speartooth shark) (DSEWPaC, 2012b).

Based on the habitat preferences of these species, the northern river shark and speartooth shark may occur within the EMBA, particularly within coastal waters. There is potential for these species to also occur within the Operational Area, however, only few individuals (adults) are expected and likely only within the southern extent of the area.

Longfin and Shortfin Mako Sharks

Mako sharks are globally distributed pelagic species that undertake large-scale movements which can exceed 2,000 km (Bruce, 2013). Both species are often caught as bycatch or targeted by commercial fisheries. Commercial catch data in Australia show the majority of captures are focused on the eastern coast (Bruce, 2013).

Longfin mako sharks are uncommon in Australian waters relative to shortfin makos, but have been found in northern Australian waters, from Geraldton in WA to at least Port Stephens in New South Wales (Bruce, 2013; DEWHA, 2008). A study from southern California, documented juvenile longfin mako sharks remaining near surface waters, while larger adults were frequently observed at greater maximum depths of about 200 m (Sepulveda et al., 2004). Tagging studies on shortfin makos indicate this species spends most of its time in water less than 50 m deep, with occasional dives up to 880 m (Abascal et al., 2011; Stevens et al., 2010).

There is very little information about these sharks in Australia, with no available population estimates or distribution trends. Given information available on shortfin and longfin mako sharks, the species presence is likely to be infrequent and restricted to individuals transiting through mainly the southern section of the EMBA and Operational Area.

Giant and Reef Manta Rays

The reef manta ray is commonly sighted in or along productive near-shore environments, such as island groups, atolls or continental coastlines (IUCN, 2015); however, the species has also been recorded around offshore coral reefs, rocky reefs and seamounts. Long term sighting records suggest that this species is mostly resident to tropical and subtropical waters (IUCN, 2015). Individuals have been documented making seasonal migrations of several hundred kilometres between well-established aggregation sites (IUCN, 2015).

The giant manta ray is common in tropical waters of Australia and primarily inhabits near-shore environments along productive coastlines with regular upwelling. However, they do appear to be seasonal visitors to coastal or offshore areas (e.g. islands, pinnacles and seamounts) (IUCN, 2015). The Ningaloo Reef, over 1,400 km south-west of the EMBA, is an important area for giant manta rays between March and August (Environment Australia, 2002; Preen et al., 1997); however, there are no spatially defined BIAs for either species within Australia or known aggregations within the NMR.

Given giant and reef manta rays apparent habitat preferences and information provided by stakeholders, it is possible they will occur within the Operational Area and EMBA, particularly near shoals/banks which support coral communities and along the south coast of Bathurst Island, but are not expected to be present in large numbers.

Grey nurse shark

The grey nurse shark was not identified in the EPBC Act PMST reports, however, was recorded at a seamount (38 km west of the Operational Area) during the Barossa marine studies program (Jacobs, 2016), within the EMBA. The species is believed to be uncommon in the region, however individuals have been recorded in northern Australia on a number of occasions (Last and Stevens 1994; Momigliano and Jaiteh, 2015). During recent studies undertaken (**Table 4-2**), BRUVS were used to identify fish communities at shoals and banks, however no grey nurse sharks were sighted (Radford et al 2019).

Grey nurse sharks are typically found aggregating near the seabed in rocky caves around inshore rocky reefs and islands or in the mid-water column adjacent or above pinnacles (Otway et al., 2003; DoE, 2014). Research on the east coast of Australia has found that individual sharks may stay in these aggregation areas on average for 11 days (DoE, 2014). When not in residence at aggregation sites grey nurse sharks are known to migrate. Research on the movements of grey nurse sharks along the east coast of Australia has also shown a strong migratory pattern associated with seasons and linked to level of maturity and sex (DoE, 2014).

Based on the finding of the Barossa marine studies program, discussions with NT Department of Primary Industry and Resources (DPIR) (Fisheries) during the development of the Barossa Area Development OPP and the species' habitat preference, it is considered possible that individuals may swim through the EMBA.

4.5.5.8 Seabirds and Migratory Shorebirds

Eighteen EPBC listed seabird and migratory shorebird species were identified as potentially occurring within the EMBA, of which a subset of 11 species may occur within the Operational Area (**Table 4-5**). Through consultation with recognised technical experts, it is noted that an additional 15 species are also likely to transit the Operational Area on an annual basis, these being the wedge-tailed shearwater, Bulwer's petrel, Matsudaira's storm-petrel, Swinehoe's storm-petrel, Wilson's storm-petrel, red-tailed tropicbird, white-winged black tern, bridled tern, common tern, roseate tern, lesser crested tern, little tern, masked booby, brown booby, and red-footed booby. The crested tern also has a defined BIA which overlaps the EMBA (see **Section 4.5.5.3** and **Figure 4-32**).

It is also understood that, based on current published information and advice from Dr Rohan Clarke (Monash University) an undescribed shearwater species ('Timor Sea shearwater, *Puffinus* sp.) may potentially occur or have habitat within the Operational Area and EMBA. The species was first detected in 2010 in the Timor Sea north-west of Darwin and West Papua (Menkhorst et al., 2017). Subsequent surveys have positively identified its occurrence, including near Adele Island and near Indonesia (Rohan Clarke, pers. comm.). The majority of sightings have been in proximity to shoals/banks and shorelines as the species is likely to forage in inshore waters as well as aggregate as flocks that rest on the sea surface in these areas (Rohan Clarke, pers. comm.). The species is more likely to breed in Indonesian waters based on observations to date, however, this remains inconclusive (Rohan Clarke, pers. comm.).

Conservation advice for the EPBC species identified lists the following conservation and management actions relevant to key threats identified in **Table 4-6** (Threatened Species Scientific Committee, 2016a, 2016b, 2016c, 2016d, 2016e, 2015b, 2015c):

- work with governments along the East Asian – Australasian Flyway to prevent destruction of key migratory staging sites;
- protect important habitat in Australia;
- support initiatives to protect, improve and manage habitat at key sites; and
- maintain and improve protection of roosting and feeding sites in Australia.

An additional relevant action outlined for migratory shorebirds is to develop guidelines for wetland rehabilitation and the creation of artificial wetlands to support populations of migratory shorebirds (Commonwealth of Australia, 2015b).

Seabirds

Internationally significant populations of seabirds, particularly tern species, nest on offshore islands within the NMR and use waters within the region for foraging (DSEWPaC, 2012c). Few seabird species breed within the western portion of the NMR, with most species utilising the area for foraging.

Seabirds are bird species which forage predominantly in marine waters, either by flying or swimming. Some seabird species spend significant time resting on the ocean surface while others, such as the greater and lesser frigatebird, spend the majority of their time in the air or roosting on available land features (DoEE, 2019). Some seabirds plunge or dive through the ocean surface to catch their prey, such as the streaked shearwater which has been recorded diving up to 5 m, while others such as the lesser and great frigate bird scoop their prey just off the surface of the water (DSEWPaC, 2012c).

The distance seabirds travel from land also varies across species. The common noddy disperses up to 50 km into the pelagic zone to forage and is often found using buoys and ships to rest, while the little tern is generally found within 1 km of their sandy coastal and mangrove-mudflat resting areas (DSEWPaC, 2012c). The streaked shearwater is a migratory seabird that breeds on islands in the north-west Pacific Ocean near Japan. The bird migrates from this region into the tropical west Pacific during the non-breeding season. In Australia, the streaked shearwater has been recorded from Broome to the Timor Sea, and from Barrow Island to the Houtman Abrolhos Islands (outside the EMBA) (DSEWPaC, 2012c).

Many offshore islands in northern Australia are breeding areas for various seabird species. The great frigatebird breeds on islands across such as Adele Island and Ashmore Reef (outside the EMBA), and forages within 100 – 200 km during breeding season (mainly between March and November) (DSEWPaC, 2012a). Breeding seasons within northern Australia vary significantly for seabirds, with some species nesting year-round (e.g. brown booby), while others having specific breeding seasons (e.g. lesser frigatebird, great frigatebird, streaked shearwater, and crested terns) (DSEWPaC, 2012c).

Seabirds are expected to forage in low numbers across the Operational Area and EMBA throughout the year, particularly near coastal regions and the Tiwi Islands as they may be used as resting areas. Seabirds may be present in higher numbers near offshore areas supporting higher abundances of fish species (i.e. shoals/banks) or areas of upwelling (Pinnacles of Bonaparte KEF outside the EMBA).

Migratory shorebirds

The International Convention on Migratory Species considers shorebirds as migratory if “the entire population or any geographically separate part of the population cyclically and predictably crosses one or more national jurisdictional boundaries.” In Australia, migratory shorebirds mainly utilise the East Asian – Australian Flyway, breeding in the northern hemisphere and migrating into the southern hemisphere during non-breeding periods (Bamford et al., 2008). Most migratory shorebirds rely on wetland habitats; however, some also use habitats such as dry grassland (Bamford et al., 2008).

Within the NMR, extensive mangroves and coastal wetlands provide essential nesting, feeding and staging areas for migratory shorebird species (Rochester et al., 2007). The east coast of the NMR, particularly the Gulf of Carpentaria, supports some of the largest breeding colonies of shorebirds in Australia (east of the EMBA) (Rochester et al., 2007). Additionally, an area between Roebuck Bay and Eighty Mile Beach is considered an internationally important site for migratory shorebirds which use the East Asian – Australasian Flyway (INPEX Browse, 2010) (over 600 km south-west of the EMBA). Overall, the NMR supports 41 species of migratory birds, including threatened and non-threatened species (DSEWPaC, 2012b).

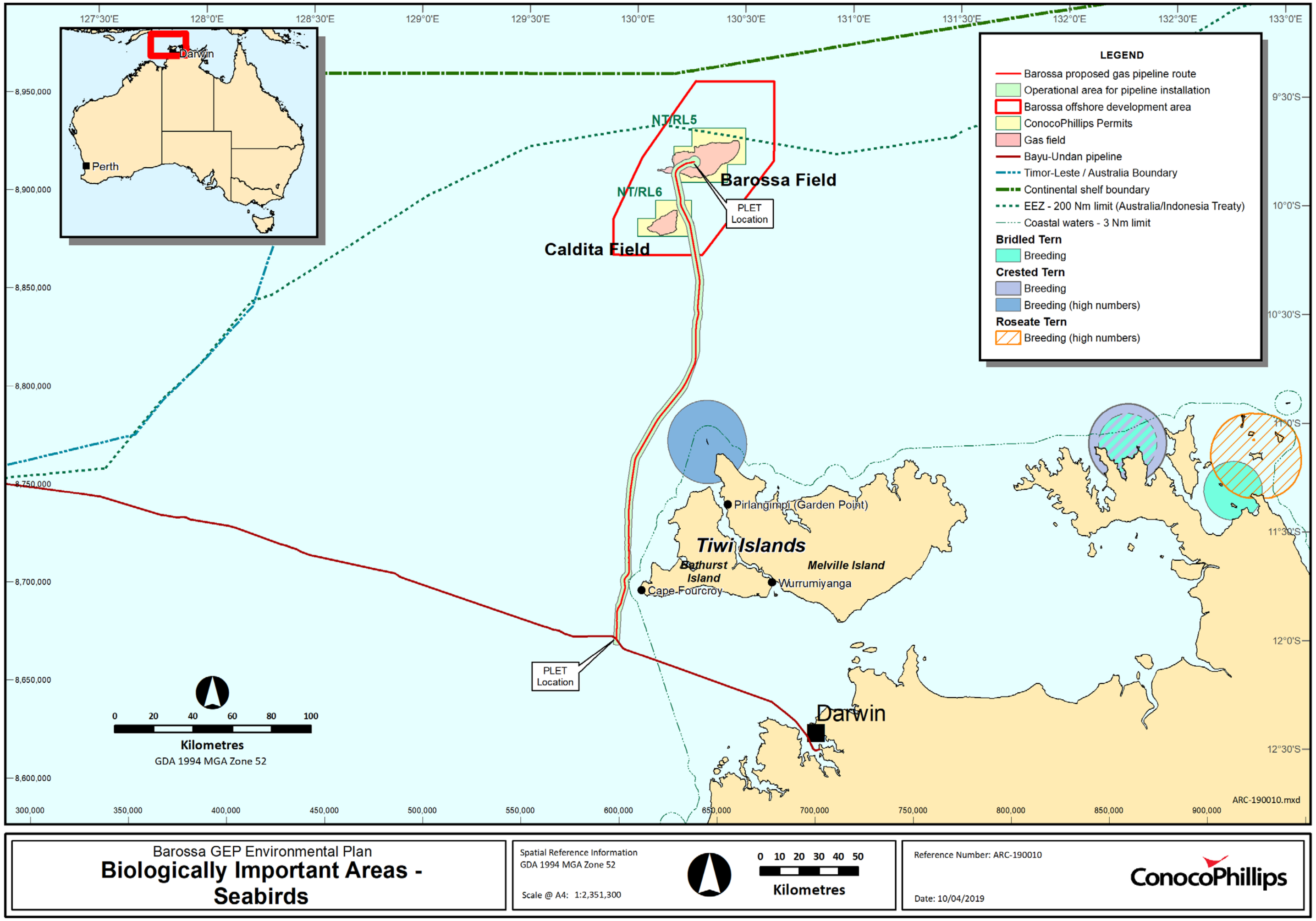


Figure 4-32: Biologically Important Areas – Seabirds

Most species which migrate using the East Asian – Australasian Flyway arrive in Australia during their southern migration between August and November, with some birds remaining in the region to December or February, following the breeding season (Bamford et al., 2008). Exact migration routes and resting areas vary across species (INPEX Browse, 2010), and in some cases, species do not fit the pattern at all such as with the Australian pratincole which is one of two species which breed only within the southern hemisphere (Bamford et al., 2008).

In some cases, a portion of the population will not migrate and instead remain in non-breeding areas throughout during the breeding season, or complete partial migrations to suitable habitat (Bamford et al., 2008). This is particularly the case with young birds which may have not reached sexual maturity. The red knot is a shorebird which undertakes long distance migrations from breeding grounds in high northern latitudes, where it breeds during the boreal summer, to the southern hemisphere during the austral summer. Despite this, Australia and New Zealand both also host significant numbers of red knots during their non-breeding season (Bamford et al., 2008).

Within offshore waters of the Operational Area and EMBA, most shorebird activity will be restricted to birds flying over the area, particularly during annual migrations (northern migration between August and November, and southern migration between March and May). Within coastal waters, there are no recognised breeding areas within the Operational Area, however, species are expected to utilise shoreline and nearshore habitat within areas of the EMBA for resting and foraging throughout the year, with higher numbers during the general non-breeding period between December and February (Bamford et al., 2008).

4.5.6 Other Values and Sensitivities

4.5.6.1 Key ecological features

KEFs are of regional importance for either the marine region's biodiversity or ecosystem function and integrity. A search was conducted of the DoEE Conservation Values Atlas to identify the KEFs that occur within the Operational Area and EMBA (**Figure 4-33**). The Operational Area and EMBA overlap two KEFs, as described in **Table 4-10**.

Based on the habitat modelling and mapping undertaken by AIMS (Radford et al., 2019 and detailed in **Section 4.5.3** above), the species identified as part of the KEF, i.e. sponges, soft corals and other sessile filter feeders, had only limited presence in the Operational Area. The habitats present in the section of the Operational Area that overlapped the KEF are Abiotic (95%), Burrowers/Crinoids (3.9%) with the combined presence of filter feeders (including sponges), soft corals and Gorgonians present in less than 1% of the area. As can be seen from **Figure 4-34**, the species identified as part of the KEF are well represented beyond the Operational Area.

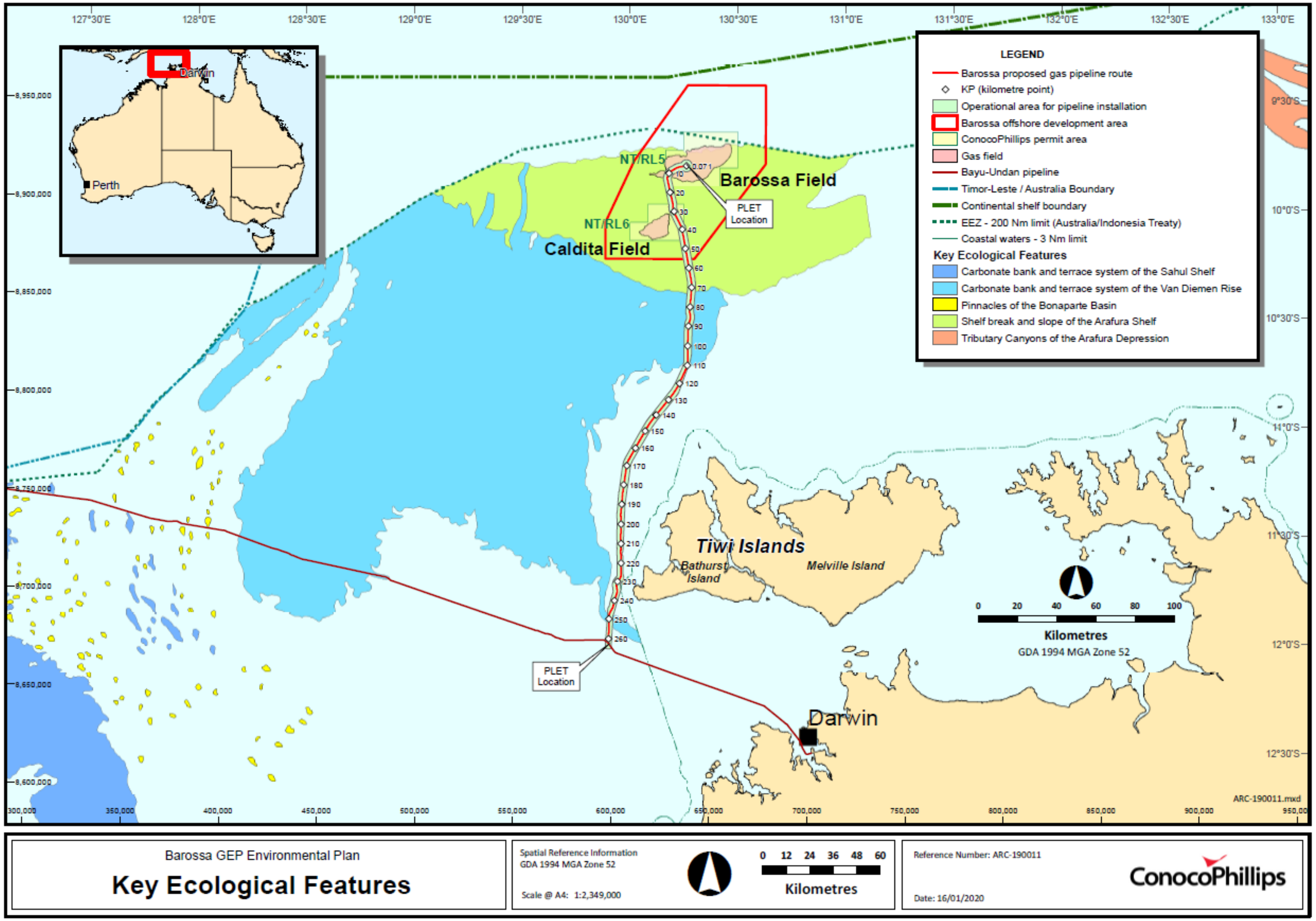


Figure 4-33: Key Ecological Features

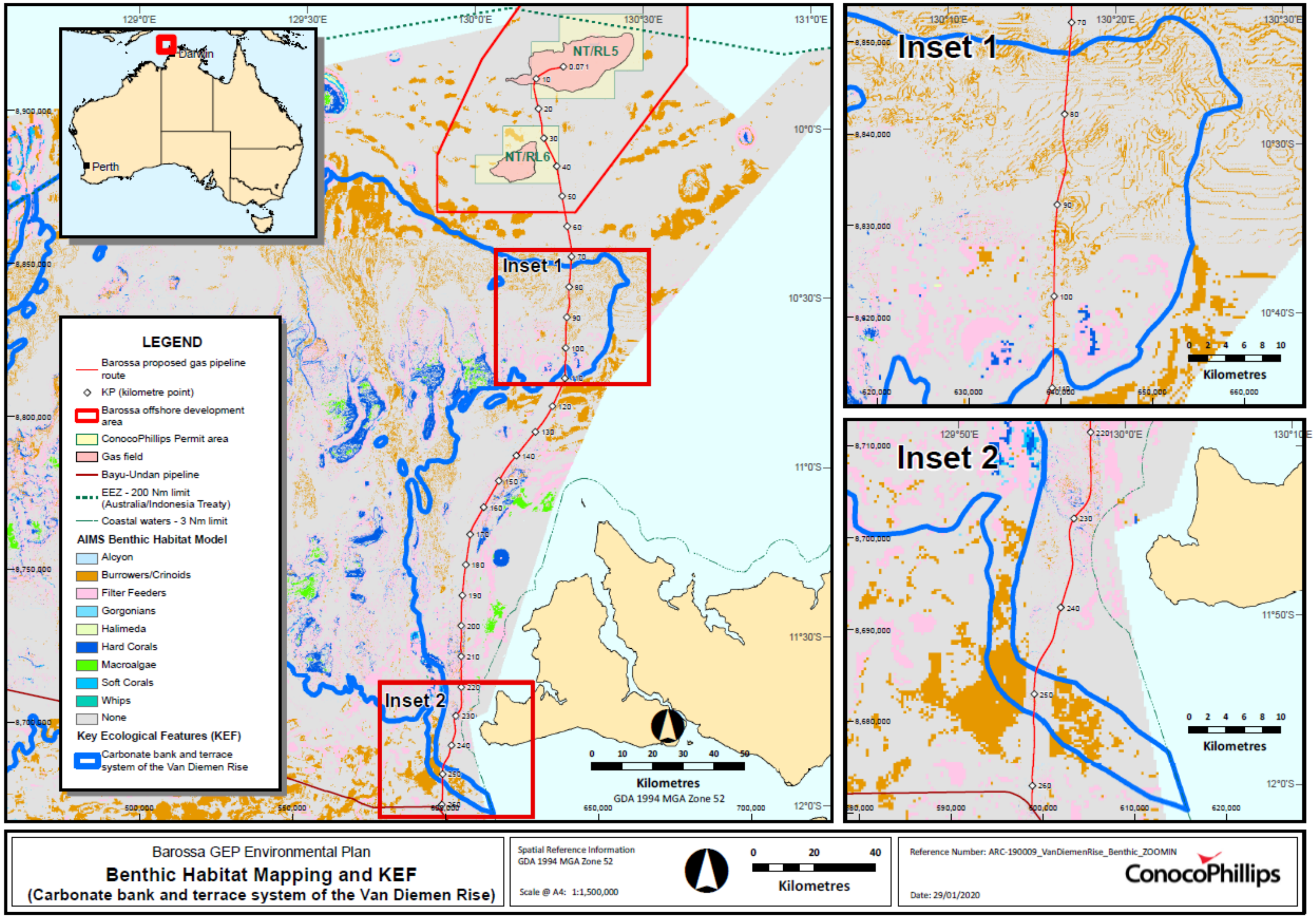


Figure 4-34 Benthic habitats present in the section of the Operational Area that overlaps the Key Ecological Features (only northern part of KEFs shown)

Table 4-10: KEFs overlapping the Operational Area and EMBA

KEF	Description including Area (km^2) and Percent of KEF overlapped by Operational Area, where relevant
Carbonate bank and terrace system of the Van Diemen Rise	The value of this KEF is "Unique seafloor feature with ecological properties of regional significance" (DSEWPaC, 2012a)) and it is considered important for its role in enhancing biodiversity and local productivity relative to its surrounds and for supporting relatively high species diversity . The bank and terrace system of the Van Diemen Rise covers approximately 31,278 km2 and forms part of the larger system associated with the Sahul Banks to the north and Londonderry Rise to the east. The feature is characterised by terrace, banks, channels and valleys (DSEWPaC, 2012a). The banks, ridges and terraces of the Van Diemen rise are raised geomorphic features with relatively high proportions of hard substrate which support sponge and octocoral gardens. These, in turn, provide habitat to other epifauna, by providing structure in an otherwise flat environment (Przeslawski et al. 2011). Plains and valleys are characterised by scattered epifauna and infauna that include polychaetes and ascidians. These epibenthic communities support higher order species such as olive ridley turtles, sea snakes and sharks (DSEWPaC, 2012a and DoEE, 2019) The pipeline passes through the KEF twice, approximately 40 km to the north and 10 km in the south. This equates to a footprint of 3.3 hectares (0.033 km2) or 0.0001% of the total area of the KEF.
Shelf break and slope of the Arafura Shelf	The value of this KEF is "Unique seafloor feature with ecological properties of regional significance" (DSEWPaC, 2012a) and it is considered important due to its ecological significance associated with productivity emanating from the slope. The shelf break and slope of the Arafura Shelf covers approximately 10,844 km2 and is characterised by continental slope and patch reefs and hard substrate pinnacles (DSEWPaC, 2012a). Upwelling associated with the topography of the shelf break lifts nutrient rich deep ocean water onto the edge of the shelf and into the euphotic zone, leading to enhanced biological productivity and attracting aggregations of pelagic organisms in the vicinity of the shelf break (at water depths of approximately 120m) (DSEWPaC, 2012a). A number of submerged reefs extend up into the euphotic zone from the shelf slope, providing structural habitat and focal points for diversity (DSEWPaC, 2012a). Approximately, 70 km of the pipeline passes through this KEF, equating to a footprint of 6.4 hectares (0.064 km2) which represents less than 0.001% of the total area of the KEF. While the Operational Area occurs within the bounds of this KEF, the seafloor features associated with this KEF (i.e. the shelf break and patch reefs, hard substrate pinnacles and submerged reefs on the shelf slope) were not observed during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple seismic surveys undertaken across this area (**Section 4.4**)

Commonwealth marine environment report cards for the NMR have analysed and prioritised anthropogenic pressures on KEFs overlapping the Operational Area and EMBA (DSEWPaC, 2012d, 2012e). Relevant pressures identified in these reports for the KEFs overlapping the Operational Area are outlined in **Table 4-11**. Note no pressures identified were above the rating 'of less concern' as outlined in the reports (DSEWPaC, 2012d, 2012e).

Table 4-11: Relevant Pressures to KEFs overlapping the Operational Area and EMBA

Key Pressures identified in Commonwealth marine report card	Overlapping the Operational Area and the EMBA		EP Risk Assessment Section
	Shelf break and slope of the Arafura Shelf	*Carbonate bank and terrace system of the Van Diemen Rise*	
Chemical pollution/contaminants – vessels and offshore mining operations	Not of concern		**Sections 5.2.7**, **5.3.4**, **5.3.5**, **5.3.7**, **5.3.8**
Marine debris – vessels	Less concern		**Section 5.3.3**
Noise pollution – vessels and offshore construction	Not of concern		**Section 5.2.3**
Light pollution – vessels and offshore mining operations	Not of concern		**Section 5.2.4**
Physical habitat modification – offshore construction and installation of infrastructure	Less concern		**Section 5.2.2**
Oil pollution – oil rigs	Potential concern	Not of concern	**Section 5.3.7**
Invasive species – vessels	Less concern		**Section 5.3.2**

4.5.6.2 Nationally important wetlands

No Nationally Important Wetlands overlap the Operational Area and EMBA.

4.5.6.3 Shoals and Banks

No shoals or banks overlap the Operational Area; however, a number of these features overlap the EMBA (**Figure 4-8; Table 4-12**). Historically, relatively few studies have been undertaken of these features with the majority of the understanding derived from the Big Bank Shoals study (Heyward et al., 1997) and PTTEP surveys initiated in response to the Montara incident (Heyward et al., 2012, 2010). The regional shoal survey effort undertaken by AIMS for the Barossa marine studies program has contributed significantly to the understanding of these shoals/banks (Heyward et al., 2016).

Within the NMR, shoals/banks share a tropical marine biota consistent with that found on emergent reef systems of the Indo West Pacific region such as Ashmore Reef, Cartier Island, Seringapatam Reef and Scott Reef (Heyward et al., 2016). There is a high level of connectivity between the shoals and banks within the NMR based on larval development rates of many of the species inhabiting the various shoals and banks, current speeds (commonly 20 – 30 km/day in mild weather) and the distance between shoals, banks and reefs (Heyward et al., 2016). The distribution of over 150 shoal/bank features across the Sahul Shelf, with individual shoals/banks separated by 5 – 20 km, suggest an extensive series of 'stepping stone' habitats are available to recruit larvae and connect these ecosystems at ecological time scales (Heyward et al., 2016). This region also sits within the strong Indonesian throughflow, providing a source of larva from tropical benthic habitats within the region.

An analysis, undertaken by AIMS, of benthic communities surveyed in the Barossa marine studies program showed that neighbouring shoals and banks (i.e. within hundreds of kms) frequently share approximately >80% of benthic community composition (Heyward et al., 2016). The most influential determinants of the benthic community composition observed to date include depth and light intensity, substrate type and complexity, hydrodynamic environment and position on the continental shelf (Heyward et al., 2016). In addition, cycles of natural disturbance and subsequent founder effects may also explain some of the variability between shoals (Heyward et al., 2016). Therefore, each of the shoals/banks are likely to have the potential to support the same types of benthic habitats, dependent on extent of these underlying variables with variability driven by variation in the dominance of key habitats and species (Heyward et al., 2016). Some shoal/banks may be notable for the abundance of particular biota (in terms of abundance and relative contribution key taxa make to the benthic community), but that status can be dynamic with a larger number of common species being shared in common across the region (Heyward et al., 2016). While temporal datasets for the region's shoals and banks are limited, observed changes from year to year are consistent with responses to natural disturbances such as thermal stress events, storms and cyclones.

Therefore, at the regional scale, the shoals and banks all support comparable levels of biodiversity but may vary in the abundance and diversity of dominant benthic species, with subsets of species featuring more prominently on some than others (Heyward et al., 2016). Similarly, the associated fish fauna is highly diverse but variable between shoals and banks, being influenced by depth, substrate and exposure to prevailing weather, though with all shoals/banks sharing many species (Heyward et al., 2016).

The submerged features within the area are characterised by abrupt bathymetry, rising steeply from the surrounding outer continental shelf at depths of 100– 200 m. The shoals and banks tend to flatten at depths of 40 – 50 m, with horizontal plateau areas of several square kilometres generally present at 20 – 30 m depths (Heyward et al., 2010). The shoals/banks support a diverse and varied range of benthic communities, including algae, reef-building soft corals, hard corals and filter-feeders (Heyward et al., 2011, 1997). The plateau areas were dominated by benthic primary producer habitat, with interspersed areas of sand and rubble patches (Heyward et al., 2011).

Heyward et al. (2016) reported that bare sand and consolidate reef, often supporting turfing algae, are major features of all shoals in the Timor Sea. It was also noted that hard corals and macroalgae, while ubiquitous, were variable in abundance with soft corals and sponges often forming key components of the benthos (Heyward et al., 2016). The plateau areas are generally dominated by benthic primary producers, with intersperse areas of sand and rubble paths (Heyward et al., 2011).

Shoals and banks that occur within the EMBA have been grouped into broad groups based on their geographical location. The broad shoal/bank groupings are summarised in **Table 4-12**. The nearest shoals/banks to the Operational Area include Mesquite Shoal, Goodrich Bank, Marie Shoal and Shepparton Shoal. Goodrich bank is 0.3 km from the Operational Area and the others are all located between 1 and 3 km from the boundary of the Operational Area (**Figure 4-8**).

Survey results from an AIMS seabed biodiversity survey in 2015 at two mid-shelf seabed locations adjacent to Goodrich Bank and Cape Helvetius (Heyward et al., 2016) can be used to provide some insight into the potential types of benthic habitats that may occur at the shoals/banks closest to the Operational Area. The benthic habitat surrounding Goodrich Bank supported sparse to moderate density filter feeders (dominated by small sponges) on areas of bare rock or sand covered pavement, with larger organisms observed on outcropping low relief reef or rocks. Hard corals were rare in the water surrounding Goodrich Bank and were only encountered at depths less than 30 m. The extended benthic habitat map produced by AIMS suggest that benthic communities at Goodrich Bank are dominated by filter feeders, with areas of hard corals, gorgonians, burrower/crinoids and alcyons.

A survey was undertaken in 2010 by Geoscience Australia and AIMS to map the seabed environments of the Van Diemen Rise (Anderson et al., 2011). The survey involved towed-video transects at 77 sites to characterise the benthic habitats and epibenthos in the four geomorphic environments (banks, terraces, valleys and plains) within the Van Diemen Rise survey area 784 km^2. The shallow banks sampled within the contained complex benthic features with diverse and often dense epibenthic assemblages. A total of 175 video characterisations were recorded from 13 bank sampling sites in the study area and sample from depths of 10.5 – 54.3 m (mean depth of 34 m). The sites were characterised by mostly low-lying rock outcrops that supported hard corals (18% occurrence) and octocorals (99% occurrence) along with smaller colonies of bryozoa and ascidians (Anderson et al., 2011). The rocky outcrops were interspersed by small areas of coarse-grained soft sediments that were relatively barren and supported few organisms (Anderson et al., 2011).

The AIMS extended benthic habitat map shows that burrowers/crinoids and filter feeder communities are expected at Marie and Shepparton Shoals (**Figure 4-28**). Given the expected connectivity between shoal features, it is anticipated that the ecological characteristics of the shoals in proximity to the Operational Area are broadly consistent with the above description.

Table 4-12: Shoals and Banks within the EMBA

Grouping	Name of shoal/bank (distance from Operational Area)
Timor Sea – Commonwealth waters	• Mesquite Shoal (2.1 km) • Marie Shoal (2.3 km) • Goodrich Bank (0.3 km) • Moss Shoal (7.8 km) • Lynedoch Bank (58.2 km) • Parry Shoal (24.7 km) • Flat Top Shoal (40.5 km) • Mermaid Shoal (14.6 km) • Evans Shoal (61 km)

Grouping	Name of shoal/bank (distance from Operational Area)
Timor Sea – Beagle Gulf (NT coastal waters)	• Afghan Shoal (10 km) • Shepparton Shoal (0.9 km)

4.6 Socio – Economic and Cultural Environment

4.6.1 Heritage

World Heritage Properties

No World Heritage Properties fall within the boundaries of either the Operational Area and EMBA. The closest World Heritage Property is the Kakadu World Heritage place, approximately 280 km south-east of the Operational Area and outside the EMBA.

National Heritage Places

No Commonwealth Heritage Places fall within the boundaries of the Operational Area or EMBA.

Commonwealth Heritage Places

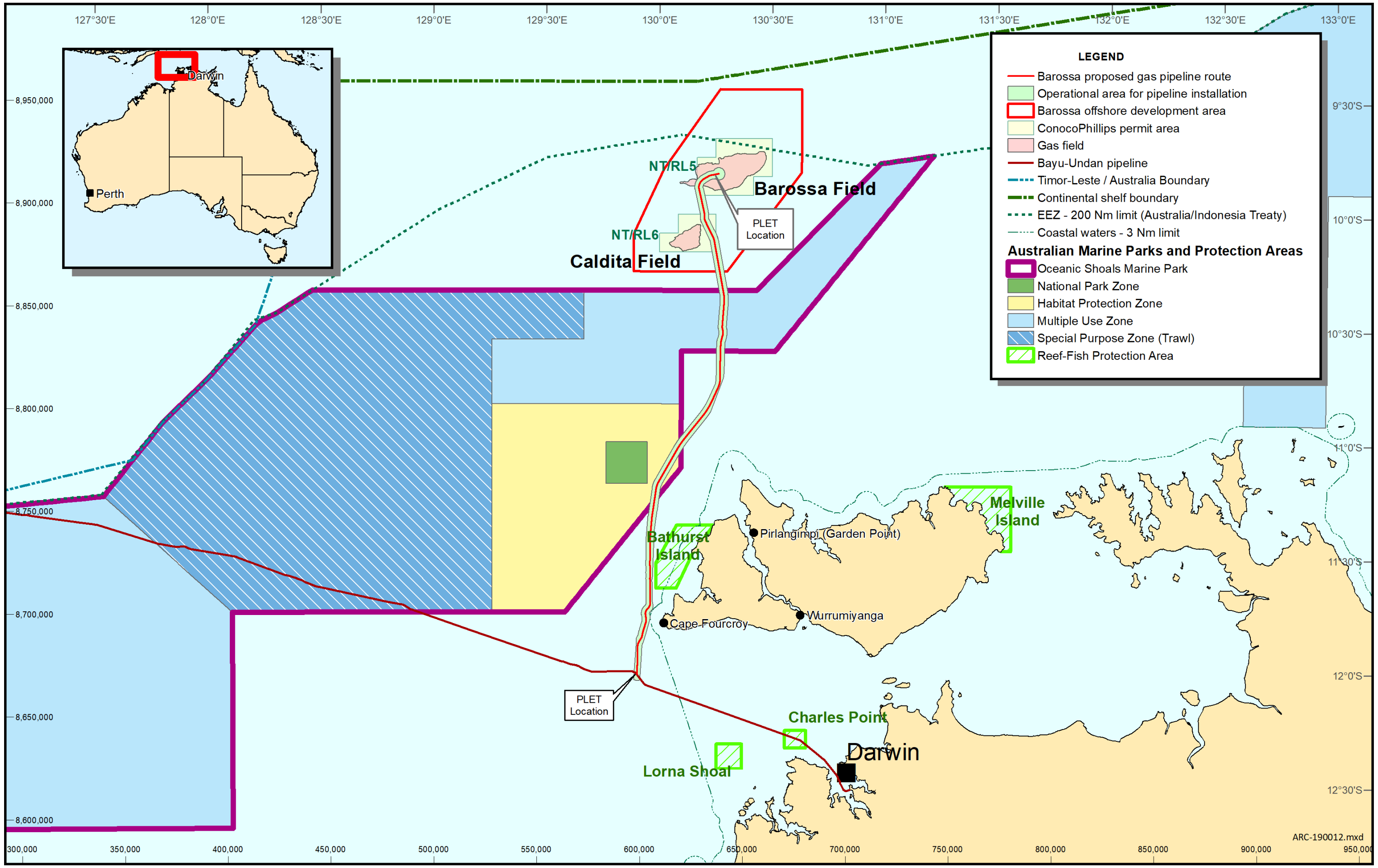
No Commonwealth Heritage Places fall within the boundaries of the Operational Area of EMBA.

4.6.2 Commonwealth Marine Area

The Operational Area and EMBA are located within the Commonwealth marine area, which includes any part of the sea, including the waters, seabed and airspace, within Australia's EEZ and/or over the continental shelf of Australia, that is not State or NT waters. The Commonwealth marine area stretches from three to 200 nautical miles (nm) from the coast.

4.6.3 Australian Marine Parks

The Operational Area passes through the Oceanic Shoals Marine Park and therefore the EMBA also overlaps this marine park (**Figure 4-35).** Australian Marine Parks are recognised under the EPBC Act for protecting and maintaining biological diversity and contributing to a national representative network of marine protected areas. Management plans for marine park networks came into force 1 July 2018. Under these plans Australian Marine Parks are allocated conservation objectives (IUCN Protected Area Category) based on the Australian IUCN reserve management principles in Schedule 8 of the EPBC Regulations. These principles determine what activities are acceptable within a protected area under the EPBC Act.



Barossa GEP Environmental Plan

Australian Marine Parks and Protection Areas

Spatial Reference Information
GDA 1994 MGA Zone 52
Scale @ A4: 1:2,349,870

0 12 24 36 48 60
Kilometres

Reference Number: ARC-190012
Date: 10/04/2019

ConocoPhillips

Figure 4-35: Australian Marine Parks and Protection Areas

4.6.3.1 Oceanic Shoals Marine Park

The Oceanic Shoals Marine Park covers an area of 8,597 km^2 and is comprised of a Multiple Use Zone (VI), Special Purpose Zone (Trawl) (VI), National Park Zone (II) and Habitat Protection Zone (IV). The Operational Area overlaps Multiple Use (approximately 30 km) and Habitat Protection (approximately 31.5 km) Zones; however, the EMBA overlaps all zones comprising the Oceanic Shoals Marine Park.

Category VI (Multiple Use Zone – Managed resource protected area) are *managed to allow ecologically sustainable use while conserving ecosystems, habitats and native species. The zone allows for a range of sustainable uses, including commercial fishing and mining where they are consistent with park values* (Director of National Parks, 2018).

Category IV (Habitat Protection Zone – Habitat/species management area) are *managed to allow activities that do not harm or cause destruction to seafloor habitats while conserving ecosystems, habitats and native species in as natural a state as possible* (Director of National Parks, 2018).

The Oceanic Shoals Marine Park is considered significant given it represents habitats, species and communities associated with the Northwest Shelf Transition Province, and includes four separate KEFs (see **Section 4.5.6.1**) (Director of National Parks, 2018). The Oceanic Shoals Marine Park is the largest Australian Marine Park within the North Marine Parks Network. The values of the Oceanic Shoals Marine Park (Director of National Parks, 2018) include:

- Four KEFs which comprise features such as terraces, banks, channels, valleys and pinnacles which support benthic assemblages of sponges, soft coral, polychaetes, ascidians, sessile filter feeders, as well as diverse demersal fish species, turtles, snakes and sharks. These features also provide areas where local upwellings attract aggregations of fish, seabirds and turtles
- Threated and migratory marine species
- BIAs for foraging and internesting marine turtles
- Indigenous values for cultural identity health and wellbeing, and
- Commercial fishing and mining.

Benthic habitat modelling (Heyward et al., 2017; Radford et al., 2019) and field surveys (Radford et al., 2019) undertaken by AIMS within the Oceanic Shoals Marine Park identify benthic communities within the Oceanic Shoals Marine Park were broadly similar to benthic communities within the region **(Section 4.5.3**). Unconsolidated sediments were the most common benthic habitat type within the Oceanic Shoals Marine Park, with sparse filter feeding assemblages being the second most common habitat type (Radford et al., 2019). Benthic primary producers, such as corals, *Halimeda* spp. and macroalgae were restricted to relatively shallow areas (<30 m) within the marine park and comprised a small portion of overall benthic habitats. Sparse to moderate density filter feeders, dominated by small sponges, were observed on areas of bare or sand covered pavement, with larger organisms observed on outcropping low-relief reef or rocks where the seabed slope changed around the edge of deeper channels. In general, epibenthic biota was sparse and initial observations suggest the dominant species present are consistent with what has been observed during other surveys of similarly turbid waters in the region, e.g. Kelly & Prezlawski (2012).

AIMS also compared the proportion and diversity of habitats along the proposed pipeline route and broader pipeline corridor against the habitats in the Oceanic Shoals Marine Park (**Figure 4-36,** Radford et al., 2019). Statistical analysis revealed no significant difference between the proportion of habitats along the pipeline route (plus a 250 m buffer either side of the route) inside and outside the park. Generally, the habitats on the pipeline route were a proportional subset of the habitats found in the marine park and thus, any habitat present along the pipeline route in the marine park, including the HPZ, is well represented elsewhere in the marine park.

Given the low presence of habitat types found along the proposed pipeline route, and as the pipeline route and the Operational Area (route plus 250 m buffer) is very narrow (i.e. limited data for analyses) analysis of diversity was undertaken using the pipeline corridor data (vs the pipeline route data) using a 10 sq km moving window Kernel (hotspot analysis). This analysis is considered conservative as the pipeline corridor includes a much larger area and has a greater habitat diversity compared to that of the proposed pipeline route making it more similar to the wider marine park. Despite this, the analysis showed that the marine park had a higher diversity of habitats than the pipeline corridor (suspected to largely be driven by water depth and topography characteristics, Heyward et al., 2017. While univariate statistical analysis suggested the difference in habitat diversity was not significant, Monte Carlo simulation (based on a random subset of data) suggests a 93% probability of significant difference between the habitat diversity in the marine park (higher diversity) and the pipeline corridor (lower diversity) (**Figure 4-37**). According to AIMS, Monte Carlo random subset data are likely to be more representative of the true nature of diversity because it is less biased to the distribution of habitat types within each area and bias due to the two areas being quite different in size (Radford et al., 2019).

It is worth noting that those areas within the pipeline corridor that have higher habitat diversity are located outside the marine park, e.g. at Goodrich Bank and Cape Helvetius (both of which AIMS had previously surveyed and reported on in Heyward et. al., 2017). Therefore, based on the targeted survey work and analyses undertaken by AIMS, the habitats present under both the proposed pipeline route and the wider pipeline corridor are well represented in both the HPZ and the wider marine park.

Fish diversity within the Oceanic Shoals is relatively low compared to other locations sampled in the Timor Sea (Radford et al., 2019). This is likely to reflect the absence of complex or rugose benthic habitats, which have been shown to support higher species richness (Radford et al., 2019). Analysis of baited remove underwater video systems (BRUVS) recordings within the Oceanic Shoals Marine Park highlighted the strong linage between benthic habitats and fish assemblage characteristics. The unconsolidated sediments hosted pelagic or mobile demersal species that were not closely associated with benthic habitats, such as sharks and trevallies. While relatively uncommon, commercially important demersal fishes such as snappers (Lutjanidae) and cod (Serranidae) were observed in filter feeder benthic habitats (Radford et al., 2019).

Indigenous values are discussed in Section 4.6.6.

4.6.4 Reef Protection Areas

A number of Reef Protection Areas have been established in the NMR following stock analyses which identified the downward trend of golden snapper and jewfish (Northern Territory Government, 2014). Two Reef Protection Areas overlap the EMBA, these being the Bathurst Island and Lorna Shoal Reef Protection Areas (**Figure 4-35**). Bathurst Island and Lorna Shoal Reef Protection Areas are intended to protect fish stocks from overfishing (Northern Territory Government, 2014), and do not have conservation objectives relevant to activities outlined in this EP.

4.6.5 European Heritage

A search of the Australian National Shipwreck Database (DoEE, n.d.) identified that there no listed historic shipwreck protection zones overlapping the Operational Area. Three listed shipwrecks exist within the EMBA, these being the I-124 submarine, SS Florence D and Don Isidro USAT. The SS Florence D is located approximately 9 km east of the Operational Area near the Tiwi Islands. The Don Isidro USAT is in shallow waters off the west coast of Bathurst Island and the I-124 submarine is south of Bathurst Island. No other areas of European heritage value were identified as occurring within or overlapping the Operational Area or EMBA.

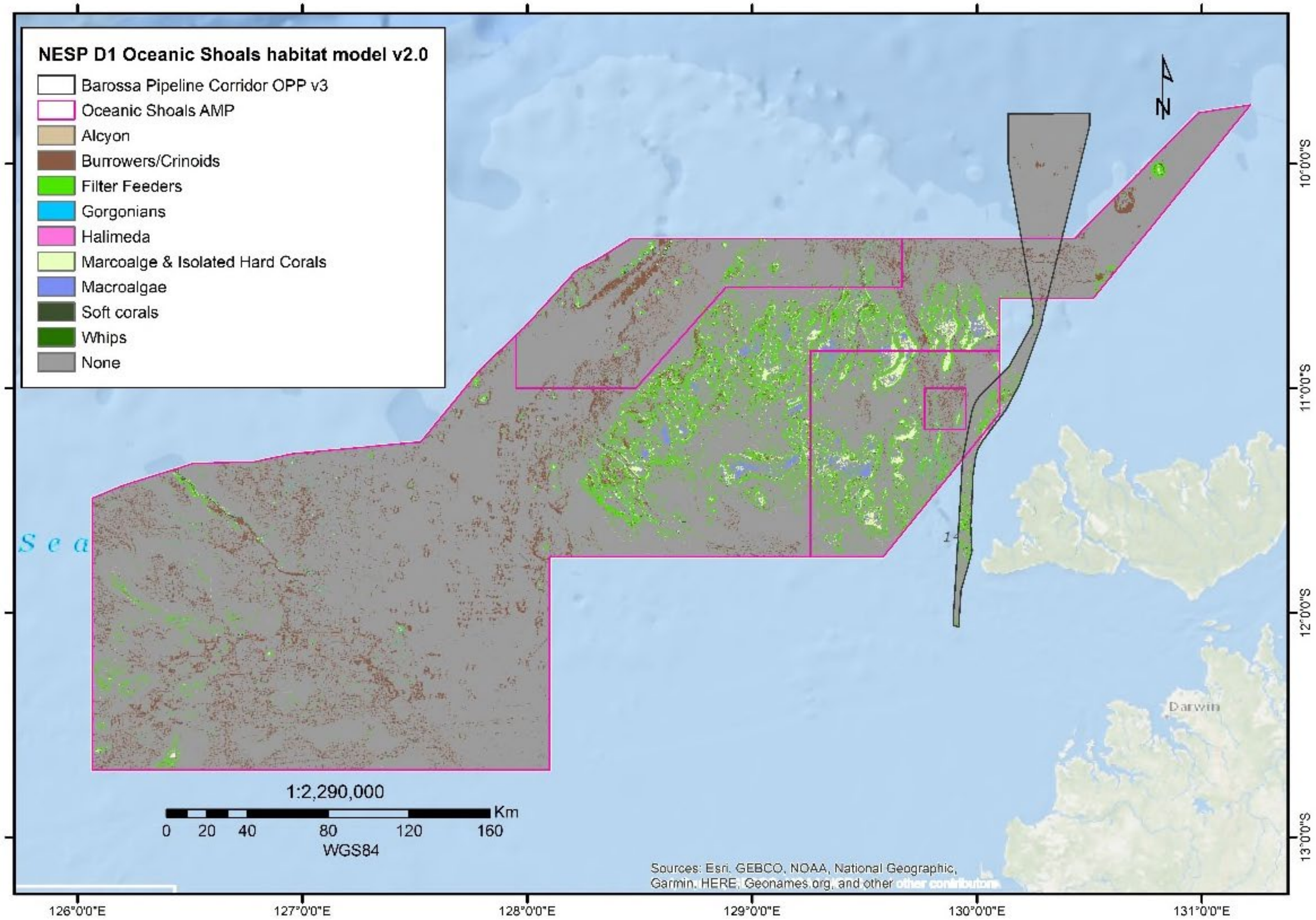


Figure 4-36: Map showing the habitat types found in the Oceanic Shoals Marine Park and the Barossa pipeline corridor (revised from Radford et al., 2019). The pipeline corridor was used for the analysis given the low presence of habitat types along the pipeline route and as the pipeline route and the Operational Area is very narrow

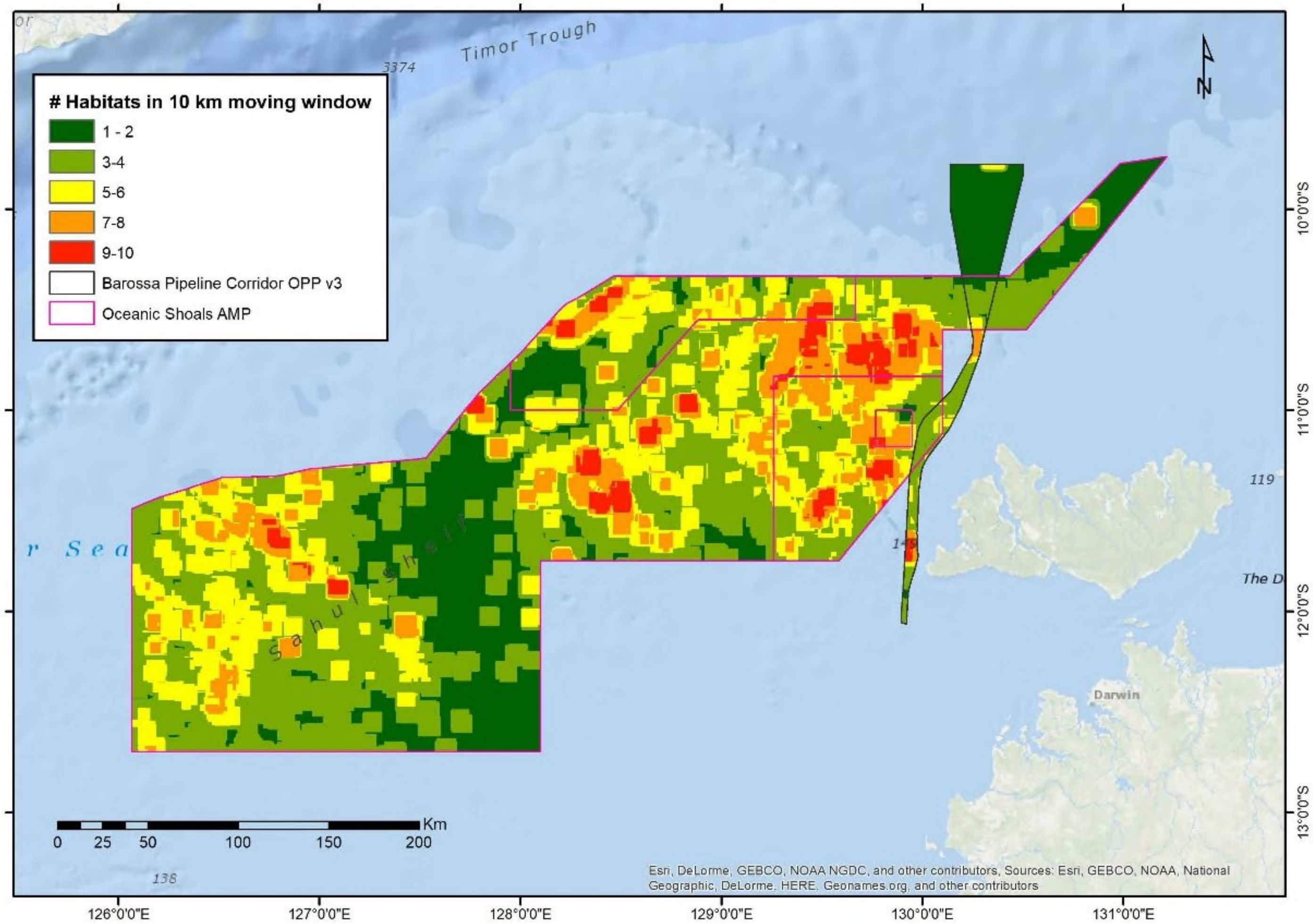


Figure 4-37: Comparison of habitat diversity between the Oceanic Shoals Marine Park and the Barossa pipeline corridor. Map shows the number of habitats found in a 10 sq km moving window (presented in Radford et al., 2019). The pipeline corridor was used for the analysis given the low presence of habitat types along the pipeline route and as the pipeline route and the Operational Area is very narrow.

4.6.6 Aboriginal Heritage

There are no recorded Indigenous heritage sites within the Operational Area. The Tiwi Islands are a declared Aboriginal reserve and comprise a number of protected sacred sites under the Northern Territory *Aboriginal Sacred Sites Act*. Traditional practices (including fishing, which is addressed in **Section 4.6.8**) continue to take place on the islands. Most traditional fishing occurs within 3 nm of the shoreline.

ConocoPhillips undertook a mapping exercise with the Tiwi Island Land Council to identify environmental and socioeconomic values along the Tiwi Islands coastline (ConocoPhillips, 2019). The mapping exercise focussed on the northern, western and southern coastlines of the Tiwi Islands (within the EMBA). It included an initial desktop exercise to identify publicly available environmental, social, cultural and economic data sets. Preliminary maps were developed based on these datasets, and these maps were used during stakeholder engagement workshops held with Tiwi Islanders.

Two workshops were held, the objectives of which were to verify the preliminary maps and to gain a more thorough understanding of the environmental, social, cultural and economic sensitivities of the coastlines. Final maps were then developed and presented to the Tiwi Island Land Council.

The sensitivity mapping identified Aboriginal heritage sites along the northern, western and southern coastlines of the Tiwi Islands, including areas used for food collection, sacred sites, camping sites and a dreaming site. These coastlines are within the EMBA but outside the Operational Area.

4.6.7 Commercial Fisheries

The Timor and Arafura Seas support a variety of shark, pelagic finfish and crustacean species of commercial importance. The Operational Area and EMBA overlap one Commonwealth and five NT managed fisheries areas which are listed below and described in **Table 4-13, Figure 4-38** and **Figure 4-39**. The following three Commonwealth fisheries were excluded from assessment given the fishery is either inactive or does not operate within or in close proximity to the Operational Area and EMBA: the Western tuna and billfish fishery, the Western skipjack fishery and the Southern bluefin tuna fishery.

- Commonwealth managed fisheries:
  - Northern Prawn Fishery
- NT managed fisheries:
  - Demersal Fishery
  - Coastal Line Fishery
  - Offshore Net and Line Fishery
  - Spanish Mackerel Fishery
  - Timor Reef Fishery

Consultation with the Australian Fisheries Management Association (AFMA), NT Department of Primary Industry and Resource (Fisheries) and appropriate fisheries associations and license holders are discussed in **Section 8**. Records of consultations are provided in **Appendix E**.

Table 4-13: Commercial fisheries overlapping the Operational Area and EMBA

Commercial Fishery	Description
Commonwealth Managed	
Northern Prawn Fishery	The Northern Prawn Fishery management area extends over the Australia's northern coast, between Cape York in QLD and Cape Londonderry in WA, from the low water mark to the outer edge of the Australian Fishing Zone (AFZ) (Patterson et al., 2016). The majority of the fishing effort within the Northern Prawn Fishery occurs in the area of the Gulf of Carpentaria, Joseph Bonaparte Gulf and along the Arnhem Land coast (Patterson et al., 2016). The highest catches come from areas adjacent to mangrove forests and coastal seagrass beds, which are juvenile nursery areas for target species of the fishery. The key target species are banana prawns, tiger prawns and endeavour prawns. Fishing is conducted using bottom trawl nets and is managed through a number of standard fishery controls (Patterson et al., 2016). All vessels use electronic navigational aids including echo sounders and GPS systems and are required to have a vessel monitoring system installed (Laird, 2018). There are two fishing seasons, with the season end date dependent on catch rates (Laird, 2018): • Season 1 (mainly banana prawns caught): 1 April – 15 June • Season 2 (mainly tiger prawns caught): 1 August – 1 December. The total NPF prawn catch for 2018 was 6,763 tonnes compared to 6,545 tonnes in 2017 (Laird, 2019). Catch and effort is partitioned into 15 statistical areas. The Barossa Operational Area lies within the defined Melville catch and effort area (Laird, 2019). Catch in this area for 2018 decreased from 2017 levels for banana prawns (509 to 287 tonnes) and increased for tiger and endeavour prawns (11 to 79 tonnes and 10 to 80 tonnes, respectively) (Laird, 2019). Effort for banana prawns decreased (408 to 288 days) while the combined effort for tiger and endeavour prawns increased from 66 to 262 days (Laird, 2019). The fishery is expected to be active around the Operational Area and wider EMBA during the permitted fishing seasons.
NT Managed	
Demersal Fishery	The Demersal Fishery boundary extends 15 nm from the NT coastal waters mark to the outer limit of the AFZ, excluding the area of the Timor Reef Fishery. The fishery employs trawl, hand and drop lines, and trap fishing methods. The main target species of the fishery are red snapper, goldband snapper, saddletail snapper, and crimson snapper. There are currently 18 licences issued for the fishery and it is managed through a number of standard fishery controls (Northern Territory Government, 2017a). Within the fishery the majority of the effort occurs in deep offshore water, beyond the limit of most recreational fishers (Northern Territory Government, 2017b); the majority of effort occurs along the eastern boundary of the Timor Reef fishery in water depths of 80-100 m, to the east of the Operational Area (DEH, 2004). As such there is only a low potential for fishing to occur within the Operational Area but is expected to occur within the EMBA.
Coastal Line Fishery	The Coastal Line fishery extends 15 nm from the low water mark and covers the entire NT coastline. The fishery is divided into two zones, which divide the coastline at Vashon Head on the Cobourg Peninsula (Northern Territory Government, 2017a). The majority of fishing effort is focused around rocky reefs within 150 km of Darwin where Black Jewfish are targeted using mainly hook and line gear (Northern Territory Government, 2017a). Fish traps and droplines are also permitted beyond 2 nm from the coastline in the Eastern Zone of the fishery, and gillnets with a maximum drop of 5 m are also permitted (Northern Territory Government, 2017b). Catch from droplines and traps account for less than 7% of the total reported catch (Northern Territory Government, 2017a).

Commercial Fishery	Description
	Given activity within the Coastal Line Fishery is concentrated in nearshore water, there is only low potential for fishing to occur within the Operational Area (within the southern extent of the area) but will take place within areas of the EMBA.
Offshore Net and Line Fishery	The Offshore Net and Line Fishery covers an area of over 522,000 km^2 and extends from the NT high water mark to the boundary of the AFZ (Northern Territory Government, 2017b). New management arrangements were implemented in 17 December 2018 to improve sustainability of the fishery (Department of Primary Industry and Resources, 2018). The fishery permits both pelagic gillnets and longline gear and targets Australian and common blacktip sharks, spot tail sharks and grey mackerel; however longlines have not been used since 2013 due to a drop in shark fin price (Northern Territory Government, 2017a). The majority of the fishing effort is in the coastal zone (within 12 nm of the coast) and immediately offshore in the Gulf of Carpentaria (Northern Territory Government, 2018). Limited effort is undertaken in the outer offshore area of the fishery. The number of licences for the fishery is restricted to 17 and generally 11 licences are active in any given year (Northern Territory Government, 2017b). In 2015 there were 588 boat-days of fishing recorded, a significant decrease from 861 boat-days in 2012 and the peak of 1,538 in 2003 (i.e. prior to the introduction of precautionary fishing measures) (Northern Territory Government, 2017a). It is likely fishing will occur within the EMBA; however, the majority of the fishing effort is outside of the Operational Area. Stakeholder consultation identified one licence holder that may fish off the south-west end of the Tiwi Islands for small pelagic fish.
Spanish Mackerel Fishery	The Spanish Mackerel Fishery extends from the NT waters seaward off the coast and river mouths to the outer limit of the AFZ (Northern Territory Government, 2017a). The fishery employs troll lines, floating handlines and rods. The majority of the fishing effort occurs in the vicinity of reefs, headlands and shoals and includes waters near Bathurst Island, New Year Island, the Wessel Islands around to Groote Eylandt and the Sir Edward Pellew Group of islands (Northern Territory Government, 2017a). The target species of the fishery is the narrow-barred Spanish mackerel, however a small number of other mackerels are also taken. In 2012, there were 16 fishery licences of which 12 were actively operating. The 2012 fishing effort was 719 boat-days; a decrease from 813 boat-days in 2011 but an increase from the 672 boat-days in 2010. Currently the fishery is restricted to 15 licences (Northern Territory Government, 2017a), and boat-days and spatial fishing intensity data have not been reported for recent years. Stakeholders have advised that there is the potential for fishing to occur within this area (**Section 8**; mainly within the southern extent of the Operational Area near banks/shoals), however fishing is likely to occur within the EMBA, particularly in waters off Bathurst Island.
Timor Reef Fishery	The Timor Reef Fishery operates in remote offshore waters in the Timor Sea in a defined area approximately 370 km north-west of Darwin. The fishery extends north-west of Darwin to the WA-NT border and to the outer limit of the AFZ and covers an area of ~28,811 km^2 (Northern Territory Government, 2017b). The target species is goldband snapper, with other tropical snappers such as crimson snapper and saddletail snapper also consisting part of the catch. The majority of the fishing effort is undertaken using drop-lines and occurs primarily in the 100 – 200 m depth range. Data for the period 1995 – 2004 shows that the highest commercial productivity for drop-line catch is very localised and is predominately associated with the shelf geomorphic unit, in the 110 – 120 m depth range (Lloyd and Puig, 2009). The fishery overlaps the northern section of the Operational Area and EMBA. There is no closed season for the Timor Reef Fishery, but normally, it is most productive between October and May. There is less activity during the dry season months of June–August when strong northerly winds often prevent fishermen going to sea. There are currently 15 licences issued for the fishery (DPIF, 2015) and only two active fishers currently operate in the fishery.

Commercial Fishery	Description
	One fisher uses traps to target goldband snapper in water depths between 80 - 150 m (maximum of 250 m) along reef fronts and on sand flats located near pinnacles. The other active license holder is currently using trawl gear as part of a gear trial. Given the water depths where fishing takes place is consistent with sections of the Operational Area that overlaps the fishery, there is potential for fishing to occur within this area and within the EMBA.

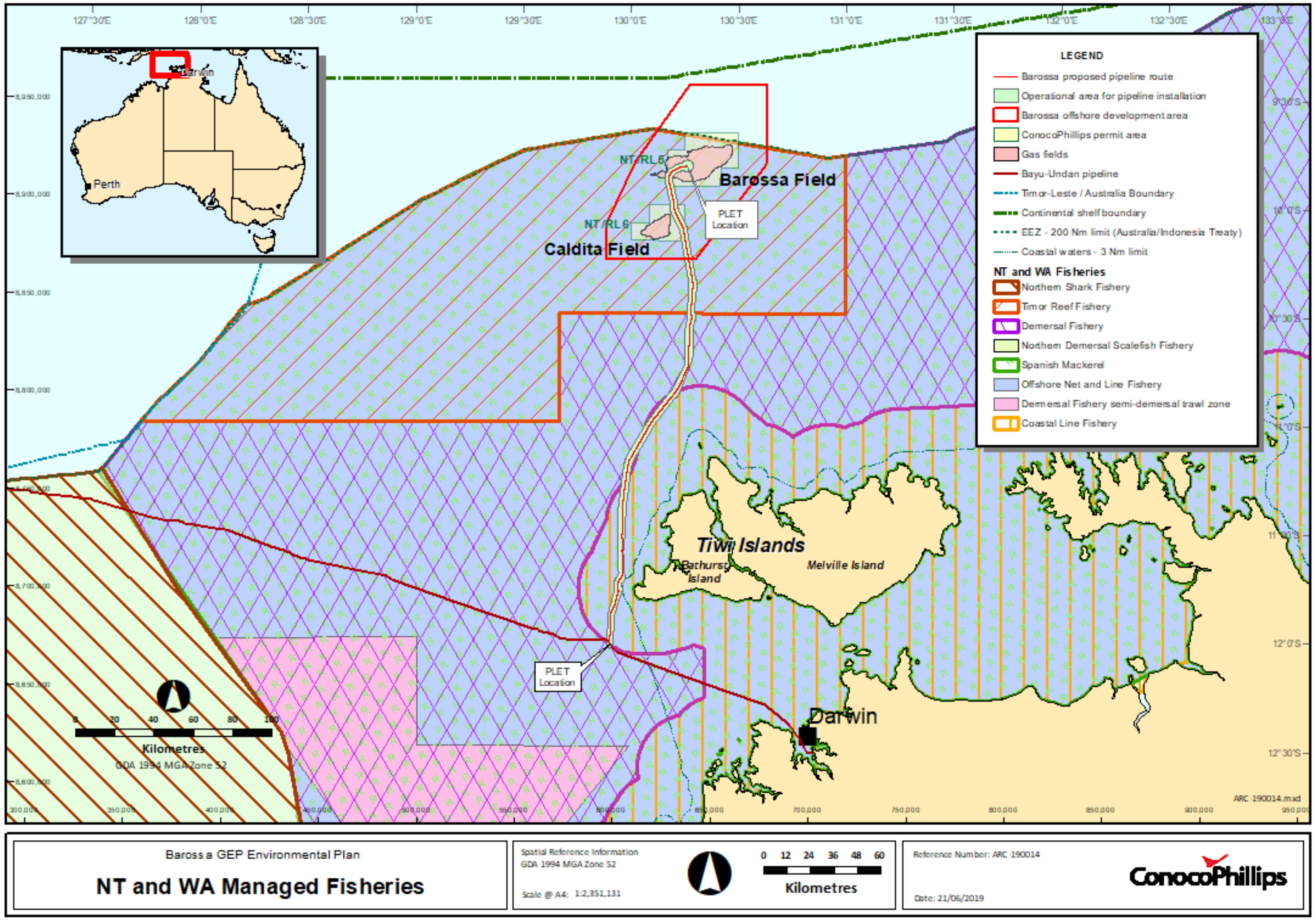


Figure 4-38: Northern Territory and Western Australian State Managed Fisheries

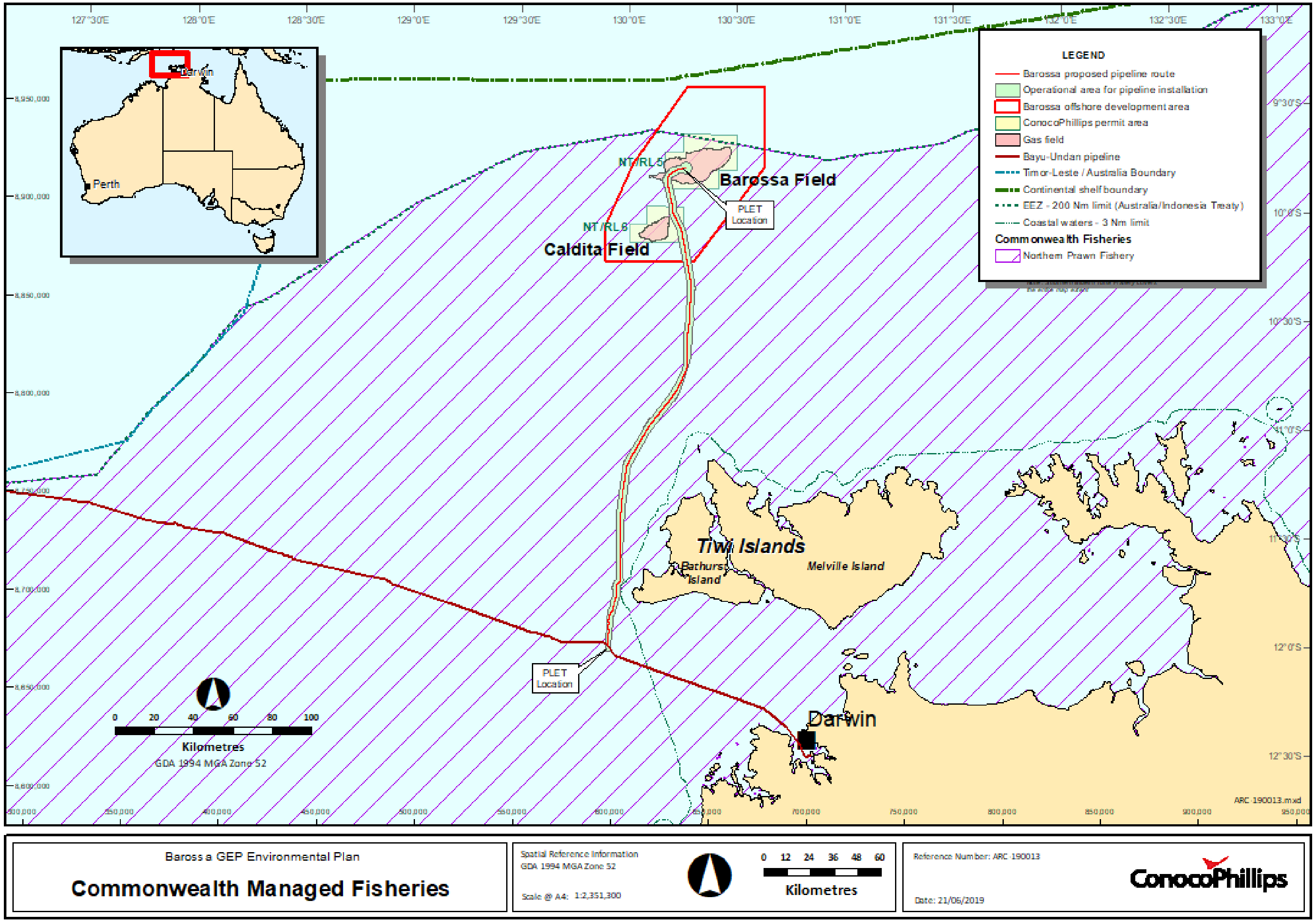


Figure 4-39: Commonwealth Managed Fisheries

4.6.8 Traditional Fishing

Traditional Aboriginal fishing in NT waters predominately occurs within inshore tidal waters. Approximately 85% of NT's inter-tidal zone is recognised as Aboriginal land under the *Aboriginal Land Rights (Northern Territory) Act* (Department of Primary Industries and Fisheries, n.d.). In the NT, there are three generally recognised Aboriginal fishery zones, which extend to 3, 15, and 200 nm from the coast. Almost all Aboriginal fishing effort is concentrated within the 3 nm NT coastal waters boundary (93%), with fishing spanning the entire coastline (Northern Territory Government, 2017a) and is mostly focused around the Tiwi Islands. Sensitivity mapping carried out with the Tiwi Islanders (ConocoPhillips, 2019) indicated that Aboriginal activities within the coastal area of the Tiwi Islands includes, fishing, hunting (turtles and dugongs) and gathering (e.g. turtle eggs).

Indonesian and East Timorese traditional fishermen generally fish in the Timor Sea, usually in the vicinity of the Hibernia Reef (more than 700 km west of the Operational Area) and further south. Fishing occurs from April to December, with most activity occurring in September and October. The Big Bank shoals lie in the Indonesian Exclusive Economic Zone and Indonesian commercial vessels may fish in and around the shoals (Heyward et al., 1997). Species that are likely to be targeted by Indonesian fishers are shark, tuna, mackerel and reef fish such as snapper.

4.6.9 Tourism and Recreational Activities

During the 2016-17 financial year, over 900,000 people visited the NT, with over 400,000 of those designated holiday visitors (Department of Tourism and Culture, 2017). Within the NT tourism and recreation are a primary industry, particularly recreational fishing. The amount spent by tourists and locals on recreational fishing in the NT is estimated at nearly $35 million per year (INPEX Browse, 2010). This number excludes fishing-tour operators and therefore is likely to be much higher. Eighty-one per cent of recreational fishing occurs in marine waters, with the majority taking place in estuaries (54%), followed by inshore (22%) and offshore regions (15%) (West et al., 2012). Recreational catch is predominately mud crabs, barramundi and saddletail/crimson snapper (West et al., 2012).

Scuba diving is also a significant tourist attraction in the NT, with operators visiting the numerous shipwrecks, coral reefs and artificial reefs and embarking on day or multiday trips out to offshore islands and shoals in the region (INPEX Browse, 2010). The Tiwi Islands are a popular tourist destination offering cruises, fishing, sailing and water tours among other cultural activities. It was identified, during stakeholder consultation, that both recreational fishers and tourism operators use the southern section of the pipeline route. Tourism and recreational activities are likely to be more concentrated within coastal waters of the EMBA, but activities such as deep-water fishing and diving around offshore shoals and reefs may potentially take place in offshore areas of the EMBA and within the Operational Area; however, these activities will be limited and infrequent.

4.6.10 Aquaculture

There are no known open-water aquaculture activities occurring within the Operational Area or EMBA; however, there are government initiatives to encourage the development of aquaculture, particularly within Aboriginal communities (Northern Territory Government, 2017c). Should these be developed they are likely to be located within NT coastal waters (outside the EMBA).

4.6.11 Ports and Commercial Shipping

Darwin Port is a major shipping port in Australia. In 2014/15, there were a total 1,565 vessel calls to port (Ports Australia, 2016).

Darwin Port is also a major port of call for vessels servicing operations offshore from north-west Australia. Darwin Port facilities form the main base for ConocoPhillips contracted supply vessels that support all its north west Australia offshore activities. The main preferred shipping routes that occur within the EMBA area are between Darwin and ports in South-East Asia. Average vessel displacements and speeds for shipping vessels transiting the EMBA and Operational Area include:

- bulk carriers averaging 55,300 tonnes with speeds of 14 knots;
- livestock carriers averaging 2,800 tonnes with speeds of 12 knots; and
- general cargo vessels averaging 4,900 tonnes with speeds of approximately 12 knots.

Although Darwin Port remains the primary active port in the region, there is small-scale port activity to the south and east of the Operational Area, at the Tiwi Islands (**Figure 4-40**). Port Melville is located on Melville Island (122 km north of Darwin) and is situated on the Apsley Strait, immediately south of Parlow Point and the community of Pirlangimpi. The wharf infrastructure at Port Melville was constructed in 2013. Total projected monthly vessel movements (excluding pilot vessels) in 2015 is 23, increasing to 28.5 in 2019, however this is subject to commercial arrangements in support of the plantation export and other future uses.

4.6.12 Offshore Petroleum Exploration and Operations

Offshore petroleum projects in operation within the NMR include the Northern Endeavour FPSO (operated by Northern Oil and Gas) and the Bayu-Undan process facility (operated by ConocoPhillips), both of which are outside the EMBA. No facilities are currently operating within the EMBA. There is considerable exploration activity within the NMR.

4.6.13 Defence Activities

The EMBA intersects a practice area of the North Australian Exercise Area (NAXA), a maritime military zone administered by the Department of Defence (**Figure 4-41**). The NAXA comprises practice and training areas and extends approximately 300 km north and west from just east of Darwin into the Arafura Sea. The area is used for offshore naval exercises and onshore weapon-firing training.

The Australian Border Force also undertake civil and maritime surveillance (and enforcement) in Australian offshore maritime waters, which includes the EEZ. During their surveillance, Australian Border Force vessels may transit the Operational Area and EMBA.

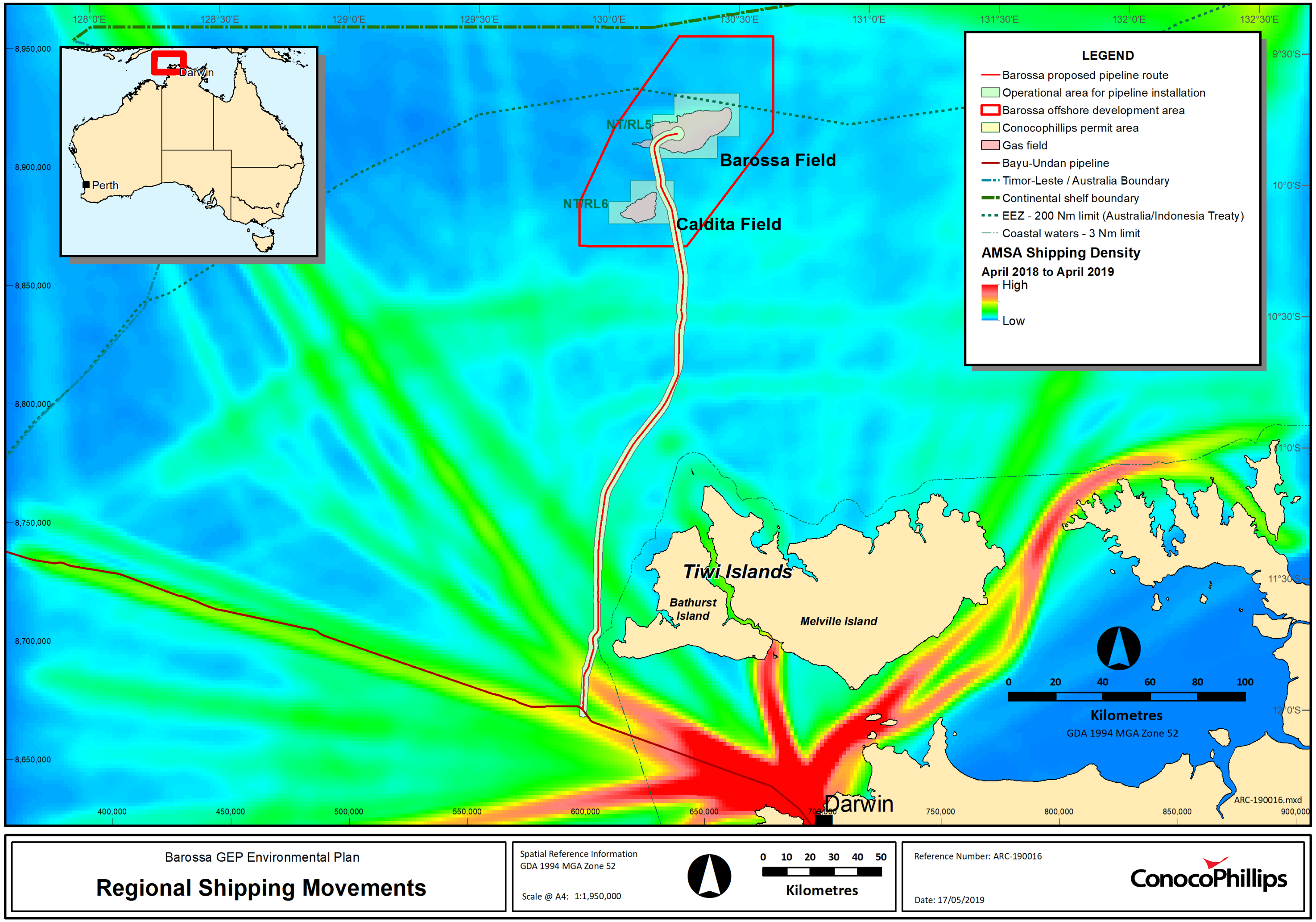


Figure 4-40: Regional shipping traffic near the Operational Area and EMBA.

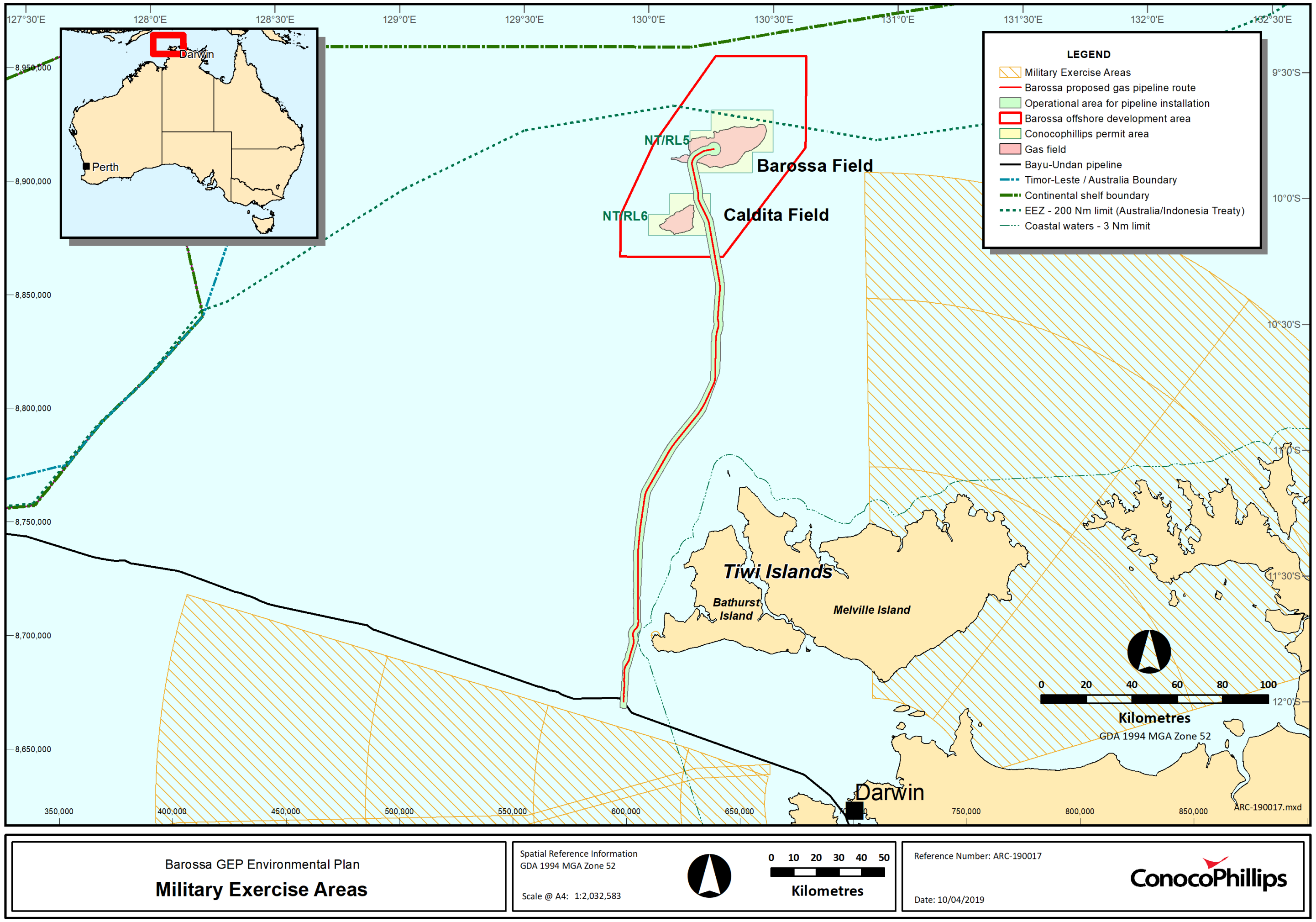


Figure 4-41: Military Exercise Areas

5 DESCRIPTION OF ENVIRONMENTAL RISKS AND IMPACTS

5.1 Risk Assessment Process

5.1.1 Overview

In accordance with Regulation 13(5) and 13(6) of the OPGGS (E) Regulations, this section describes the environmental risks and impacts associated with the activity (including potential emergency situations). The risk assessment process is based on the ConocoPhillips corporate risk assessment process, as outlined in the ABU-W Risk Management Procedure (ALL/HSE/PRO/040), which is consistent with: AS/NZS ISO 31000:2009: Risk Management – Principles and Guidelines; and Handbook (HB) 203:2006 Environmental risk management – Principles and process (Guide) (AS/NZS 2006).

Core steps are summarised in **Figure 5-1** with commonly used environmental risk assessment terminology given in **Table 5-1**.

Figure 5-1: ConocoPhillips environmental risk assessment process

Table 5-1: Risk assessment terminology and definitions

Term	Definition
Activity	Components or elements of work associated with installation of the Gas Export Pipeline.
ALARP	As low as reasonably practicable. ALARP is defined in ConocoPhillips' ABU-W Risk Management Procedure (ALL-HSE-PRO-040) as follows: "*ALARP is a level of risk that cannot be reduced further without the expenditure of effort or capital cost which is disproportionate to the benefit gained. In relation to HSE, determination of whether a risk reduction measure is practicable needs to consider the following key factors:* • *the severity of any injury, harm to health and/or impact to environmental/ecologically sustainable development that may occur from an event;* • *the likelihood of that injury, harm to health and/or impact to environmental/ecologically sustainable development occurring;* • *how much is known about the hazard and the ways of eliminating, reducing or controlling the hazard; and* • *the availability, suitability and cost of safeguards."*
Aspect	Elements of ConocoPhillips' activities or products or services that can interact with the environment. These include routine/non-routine planned and unplanned (including those associated with emergency conditions) activities.
Receptor	Relevant natural, socio-economic and cultural features of the environment
Potential impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from a proponent's environmental aspects
Event	An event is an occurrence of a particular set of circumstances. An event can be one or more occurrences and can have several causes.
Hazard	A hazard is defined as the ability of a substance, situation, process or activity to cause harm to the environment
Control	A control is a measure which mitigates risk through the reduction of the likelihood for a consequence to occur. Controls include 'existing controls' (i.e. industry standards) or 'additional controls' (i.e. key ConocoPhillips' management controls or additional measures identified during the risk assessment processes)
Consequence	A consequence is the outcome of an event. An event can lead to a range of consequences. A consequence can be certain or uncertain and can have positive or negative effects. Consequences can be expressed qualitatively or quantitatively. For risk assessment purposes, the consequence typically remains unchanged since it is determined without controls in place.
Likelihood	Description of probability or frequency of a consequence occurring.
Inherent risk	The level of risk (with existing controls in place) before application of additional risk controls arising from risk assessment processes
Residual risk	The level of risk remaining after risk treatment (i.e. application of additional controls) inclusive of unidentified risk

5.1.2 Hazard Identification

A review of the activity was completed to identify potential aspects of the gas export pipeline installation campaign activities that may result in environmental impacts or risks. These aspects were then assessed to determine which aspects constitute hazards (i.e. may credibly result in environmental impacts and / or risks). Each hazard was then assessed to identify the impact and risks to environmental receptors. Both planned and unplanned events that could occur during pipeline installation.

Identification of the aspects, receptors, and the potential impacts and / or risks was conducted through:

- review of the relevant pipeline installation activities and associated risks and impacts presented in the OPP;
- review of the activities to be undertaken and activity specific documentation (**Section 3**);
- knowledge developed by ConocoPhillips from extensive prior experience in pipeline installation;
- review of the existing environment (physical, biological, socio-economic and cultural) (**Section 4**), including information gained through stakeholder consultation (**Section 8**); and
- environmental hazard identification and risk assessment (ENVID) workshop.

The ENVID workshop was undertaken in October 2018 in accordance with the ABU-W Risk Management Procedure (ALL/HSE/PRO/040) to identify and assess the impacts and risks associated with the activity. The ENVID workshop was aligned with NOPSEMAs Hazard Identification and Risk Assessment Guidance Note (N-04600-GN1613) and attended by representatives from ConocoPhillips' Pipeline construction, marine operations, emergency response and environment teams. The workshop was informed by:

- a detailed understanding of the environmental and socio-economic setting of the activity, as described in **Section 4;**
- a review of aspects and associated hazards from pipeline installation; and
- the knowledge, training and experiences of workshop participants.

The ENVID outputs were reviewed in May 2019 to ensure previous outputs remained current based on updated project and environmental information. The outputs of the ENVID are incorporated into **Sections 5.2** and **5.3**.

A separate oil spill response assessment was undertaken to identify relevant spill response strategies and assess the potential impacts and ALARP considerations associated with the implementation of response strategies, with the outputs presented in **Appendix C.**

5.1.3 Risk Analysis

The environmental risk assessment process is a qualitative risk-screening tool for evaluating the environmental risk posed by installation of the pipeline. ConocoPhillips assess the risk in two key stages:

- inherent risk analysis – assessment of the potential environment, socio-economic and cultural consequences and the likelihood of that consequence occurring with the application of existing control measures (e.g. relevant legislation, ConocoPhillips and contractor procedures/standards etc.) for each credible risk source scenarios;
- residual risk analysis – reassessment of the inherent risk following the application of additional controls/mitigation measures. The residual risk is an indication of the significance of an environmental, socio-economic or cultural impact, considering the management approach expected to be applied throughout the activity to achieve acceptable outcomes.

Two key factors underpin the environmental risk assessment:

- the severity of the consequences if impact does occur; and
- the likelihood of receptors at risk being impacted.

Risk analysis frames the assessment of controls that could be applied during execution of activities that pose a potential hazard to receptors. It also provides a framework to identify the measures to mitigate the severity of the impact arising from either planned or unplanned events. The process provides essential input into the assessment of controls and mitigation measures that ensures that the level of risk posed by an activity to a sensitive receptor is reduced to ALARP and is acceptable.

ConocoPhillips applies the hierarchy of controls as part of the risk assessment process to identify any additional/alternative measures to reduce the risk to ALARP and to an acceptable level. The general hierarchy of control applied, in the order of priority, is as follows:

- elimination (of the hazard) - Note that elimination of a hazard precludes further risk analysis for the particular hazard; risks and impacts will no longer credibly occur once the hazard is eliminated. Where applicable, ConocoPhillips has documented where hazards have been eliminated during the risk management process to demonstrate the risk management process;
- substitution (e.g. using a less hazardous process);
- engineering (e.g. screens on cooling water intake);
- administrative (e.g. using procedures); and
- personal protective equipment (PPE). Use of PPE is always viewed as the last line of defence or as a supplement to other controls.

The level of risk is determined by establishing the potential consequence of an impact on an environmental, socio-economic or cultural receptor resulting from an aspect of the activities associated with installation of the pipeline. Following the determination of the level of consequence, the likelihood of the consequence occurring is then assigned. The assigned consequence and likelihood are mapped on the risk matrix to determine the level of risk, as illustrated in **Figure 5-2**.

5.1.3.1 Assessment of consequence of potential impacts

In evaluating the level of consequence of a planned activity or unplanned activity, the following factors have been considered:

- extent of impacts – whether the impact affects the local or wider regional environment;
- duration of the impact – how long it will interact with the receiving environment; and
- sensitivity of the receiving environment (including seasonal sensitivities) – nature, importance (local, national or international significance) and the sensitivity or resilience to change of the receptor that could be affected. This also considers any relevant laws, regulations or standards aimed at protecting the receiving environment, including the EPBC Act and *Territory Parks and Wildlife Conservation Act 1976* (NT).

The potential impacts which have been considered in relation to each of the aspects of the activity are shown in the aspect and receptor interaction matrix provided in **Table 5-5**. The interaction matrix was informed by detailed consideration of the nature and scale of the activity (**Section 3**) and comprehensive understanding of the existing environment (**Section 4**).

The consequence definitions in the ABU-W Risk Management Procedure (ALL/HSE/PRO/040) have been applied to this risk assessment, as shown in **Table 5-2**. While the risk assessment process was undertaken with a primarily environmental focus, other potential cultural and socio-economic were also considered in determining the consequence rating. The consequence rating is based on a consequence when no safeguards are in place. As a conservative approach, the consequence that results in the highest risk consequence rating by these definitions is carried through for each potential impact.

Risk Matrix					
Likelihood	*Consequence Severity*				
	Level 1 (Negligible)	Level 2 (Minor)	Level 3 (Moderate)	Level 4 (Significant)	Level 5 (Major)
Frequent (5)	RRII	RRII	RRIII	RRIV	RRIV
Probable (4)	RRI	RRII	RRIII	RRIII	RRIV
Rare (3)	RRI	RRII	RRII	RRIII	RRIII
Remote (2)	RRI	RRI	RRII	RRII	RRII
Improbable (1)	RRI	RRI	RRI	RRI	RRII

Risk Rating		
Risk score	***Risk rating***	***Description of risk level***
RRIV	High	Manage risk using additional or improved risk-reducing measures with priority. Inform appropriate management level with risk assessment detail and obtain appropriate approvals per the business unit's requirements.
RRIII	Significant	Manage risk using additional or improved risk-reducing measures with priority. Inform appropriate management level with risk assessment detail and obtain appropriate approvals per the business unit's requirements.
RRII	Medium	No additional risk-reducing measures required where controls can be verified as functional. Improvements based on lessons learned are encouraged.
RRI	Low	No additional risk-reducing measures required. Improvements based on lessons learned are encouraged.

Figure 5-2: ConocoPhillips ABU-W risk matrix

Table 5-2: Risk assessment consequence definitions

Consequence Severity Description		
Rating	***Biodiversity***	***Socio-cultural and economic***
5 High	• High, environmental impact very severe such as resulting from a catastrophic release. • Long term impacts to sensitive habitats and multiple ecosystems. • Impacts causing closure to drinking water supplies or fishing areas. • Significant offshore release with potential to impact shoreline	• Extended permanent loss of access (greater than 2 years) and loss of operations or planned activities. • Severe impact to/from key stakeholders requiring executive level involvement. • Damage is permanent.
4 Major	• Major environmental impact, requires significant mitigation measures that address ecological systems or sensitive habitats. • Off-site impacts realized from one to several miles or more. • Release affecting public infrastructure or roads which result in public evacuation or closure of transportation routes such as roads or waterways. • Widespread surface water or groundwater contamination.	• Permanent partial restriction on access (3 months to 2 years) and major impact to operations or planned activities • Major impact to/from key stakeholders. Mitigation requires senior level management involvement. • Issue will take a significant amount of time to resolve.
3 Moderate	• Moderate environmental impact, most likely requires emergency response but not always. Uncontained release with off-site environmental impacts realized greater than the surrounding area of the facility with observable off-site impacts to flora/fauna. • Multiple exceedances of regulatory limit during a prolonged incident or operational condition – regulatory enforcement likely (all media). • Off-site localized groundwater contamination.	• Temporary restriction on access (1 to 3 months) and moderate impact to operations or planned activities. • Moderate impact to/from key stakeholders. Mitigation requires focused efforts with various business unit groups. • Issue resolved in a moderate amount of time.
2 Minor	• Minor environmental impact, but with impacts being readily remediated or addressed by natural attenuation processes. • Onshore release impact limited to facility and adjacent surrounding area. • Minor offshore release to sea mitigated through natural attenuation. • Single to multiple exceedances of a permit or regulatory limit – regulatory enforcement likely (all media).	• Brief restriction on access (1 day to 1 month) and minor impact to operations or planned activities. • Minor impact to/from key stakeholders. Likely addressed by prompt mitigation by stakeholder engagement professionals. • Issue resolved in a minimum amount of time

Consequence Severity Description		
Rating	***Biodiversity***	***Socio-cultural and economic***
1 Negligible	• Negligible environmental impact. • Immediate or instantaneous duration, no remediation required. • Small contained release that stays on site. • No exceedance or single exceedance of a permit or regulatory limit – regulatory enforcement unlikely (all media).	• No restriction on access and no impact to operations • Negligible impact to/from key stakeholders • Issue resolved quickly

5.1.3.2 Likelihood of impact occurrence

The likelihood of a consequence occurring due to a planned or unplanned activity considers the effective implementation of industry standard safeguards.

Table 5-3 provides the likelihood descriptions that have been used for the risk review, which are based on the ConocoPhillips' ABU-W Risk Management Procedure (ALL/HSE/PRO/040). As outlined above, this process reflects the risk management process detailed within AS/NZS ISO 31000:2009 (AS/NZS 2009) and HB 203:2006 (AS/NZS 2006).

Table 5-3: Risk assessment likelihood definitions

Level	Descriptor	Description	Enhanced description
1	Improbable	Virtually improbable and unrealistic	Virtually unrealistic, never heard of in the oil and gas industry
2	Remote	Not expected nor anticipated to occur	Has occurred within the ConocoPhillips business unit once or more than one per year
3	Rare	Occurrence considered rare	Has occurred within ConocoPhillips or more than once per year within the oil and gas Industry
4	Probable	Expected to occur at least once in 10 years	Occurred of has been heard of within the oil and gas industry
5	Frequent	Likely to occur several times a year	Occurs multiple times per year in the ConocoPhillips business unit.

5.1.4 Risk Evaluation

The evaluation of the environmental risks was undertaken in the context of ALARP and acceptability, which are described in detail below.

5.1.4.1 Demonstration of ALARP

ConocoPhillips demonstrates risks are reduced to ALARP when the cost and effort required to further reduce risk is grossly disproportionate to the risk benefit gained. This demonstration shall include the following:

- compliance with relevant legislation, accepted industry codes and standards, including standard industry practice and guidelines;
- implementation of effective management system controls;

- incorporation of barriers/control measures commensurate with the potential impact and risk from the activity; and
- confirmation that the cost/benefit/sacrifice and effort of adding further barriers/control measures is grossly disproportionate to the potential reduction in risk. This is achieved through the identification and evaluation of further measures to determine those appropriate for implementation (i.e. practicable).

For inherently significant and high-risk activities, significant effort is made to assess and implement risk reduction opportunities such as quantitative studies and cost benefit analyses and undertaking detailed review of the risk in consultation with management. For inherently low or medium risk activities, further controls are assessed qualitatively/semi-quantitatively (as per ConocoPhillips' Risk Management Procedure (ALL/HSE/PRO/040)) based on the nature and scale of the risk and taking into consideration regulator expectations. All assessments shall be recorded for demonstration purposes.

5.1.4.2 Demonstration of acceptability

OPGGS(E) Sub-regulation 10A(c) requires that an Environment Plan demonstrate that the environmental impacts and risks of the activity will be of an acceptable level. An "acceptable level" is the level of impact or risk to the environment that may be considered broadly acceptable with regard to all relevant considerations including, but not limited to (National Offshore Petroleum Safety and Environmental Management Authority 2016):

- relevant principles of ecologically sustainable development;
- legislative and other requirements (including laws, policies, standards, conventions);
- internal context (consistent with titleholder policy, culture and company standards); and
- external context (the existing environment and stakeholder expectations).

As part of the impact and risk analysis process, ConocoPhillips set criteria for acceptable levels of each impact and risk identified. Following risk evaluation and treatment, the predicted impacts and risks were compared against the acceptable level criteria.

Defined significant impacts to various receptor groups are detailed in **Table 5-4**. Impacts associated with the installation of the GEP that fall below these are considered acceptable.

Table 5-4: Definition of significant impact

Receptor	Definition of Significant impact	Source
Water and air quality	Substantial change in water or air quality which may adversely impact biodiversity, ecological integrity, social amenity or human health	MNES Significant Impact Guidelines
Habitat	Substantial change that may modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results.	MNES Significant Impact Guidelines
Threatened and Migratory Marine Fauna	Substantial change that may: • lead to a long-term decrease in the size of a population • reduce the area of occupancy of the species • fragment an existing population into two or more populations • adversely affect habitat critical to the survival of a species • displace threatened and migratory marine fauna from habitat critical areas • disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas • disrupt the breeding cycle of a population	MNES Significant Impact Guidelines Recovery Plan for Marine Turtles Sawfish and River Shark Multispecies Recovery Plan Blue Whale Conservation Management Plan Sei and Fin whale conservation advice Humpback Whale Recovery Plan

	• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat • introduce disease that may cause the species to decline, or • interfere with the recovery of the species	
Oceanic Shoals Marine Park	Substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Oceanic Shoals Marine Park: • KEFs of the marine park • Threatened and migratory marine species • BIA's for foraging and internesting marine turtles • Commercial fishing and mining	North Marine Parks Network Management Plan MNES Significant Impact Guidelines
Key Ecological Features	Substantial change that may modify, destroy, fragment, isolate or disturb values of the Carbonate bank and terrace system of the Van Diemen Rise KEF: • sponges, soft corals and other sessile filter feeders associated with hard substrate sediments of the deep channels • Epifauna and infauna including polychaetes and ascidians • Olive ridley turtles, sea snakes and sharks Substantial change that may modify, destroy, fragment, isolate or disturb values of the Shelf break and slope of the Arafura Self KEF: • Continental slope, patch reefs and hard substrate pinnacles	Marine Bioregional Plan for the North Marine Region MNES Significant Impact Guidelines
Socio-economic	Substantial adverse effect on other marine users	Adapted from North Marine Park Management Plan

5.1.5 Presentation in the EP

A summary of the risk identification and analysis process is provided in **Table 5-5**. This provides a summary of:

- the sources of risk associated with routine/non-routine planned and unplanned activities that may have an impact or risk on the identified receptors;
- the identified environmental, socio-economic and cultural receptors; and
- the residual risk rating for interaction between the activities and the receptors as determined through the risk assessment process.

The aspect-receptor cross references given in **Table 5-5** link to each of the hazards discussed in **Sections 5.2** and **5.3**.

The outputs of the risk identification, analysis and evaluation (including evaluation of controls, statements of ALARP and acceptability) process are presented in a summarised tabular form in the following sections. An example table describing the purpose of the key components of the summary tables (i.e. italicised text), with reference to the relevant sections of this EP, is provided in **Table 5-6**. Further detailed impact assessment and risk evaluation discussion is provided below each of the summary tables.

Table 5-5: Activity aspect and receptor interaction matrix

Aspect and Sources of Risk		Environmental, Socio-economic or Cultural Receptor (subsections of 4.5)																			
		Physical Environment				Biological Environment									Other Values and Sensitivities			Socio-economic and Cultural Environment			
		Bathymetry and seabed features	Water quality	Sediment quality	Air quality	Intertidal primary producers	Benthic primary producers	Other benthic communities	Plankton	Pelagic and demersal fish communities	Marine mammals	Marine reptiles	Sharks and rays	Seabirds and migratory shorebirds	Key Ecological Features	Australian Marine Parks	Reef Protection Areas	Commercial fishing	Traditional fishing	Tourism and recreational activities	Ports and commercial shipping
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	T	U	V	W
Routine/Non-routine Planned Activities																					
Physical Presence																					
1	Interactions between Activity Vessels, the Gas Export Pipeline and Other Marine Users																	1T	1U	1V	1W
2	Disturbance to Seabed from Pipeline installation	2A	2B				2F	2G	2H			2K			2N	2O					
Underwater Noise Emissions																					
3	Noise from Vessels and Activities									3I	3J	3K	3L								
Light Emissions																					
4	Artificial Light on Vessels and ROVs									4I		4K	4L	4M							
Atmospheric Emissions																					
5	Exhaust from Combustion Engines and Incinerators				5D																
Discharges																					
6	Vessel Utility Discharges		6B						6H							6O					
7	Dewatering and Pre-commissioning Fluids		7B	7C				7G	7H	7I	7J	7K	7L								
Unplanned Activities																					
Physical Presence																					
8	Dropped Objects						8F	8G							8N	8o					
9	Introduction of Invasive Marine Species						9F	9G							9N	9O					9W
10	Collision with Marine Fauna										10J	10K	10L								
Discharges																					
11	Subsea release of treated seawater		11B	11C			11F	11G	11H	11I	11J	11K	11L		11N	11O					

Aspect and Sources of Risk		Environmental, Socio-economic or Cultural Receptor (subsections of 4.5)																			
		Physical Environment				Biological Environment									Other Values and Sensitivities			Socio-economic and Cultural Environment			
		Bathymetry and seabed features	Water quality	Sediment quality	Air quality	Intertidal primary producers	Benthic primary producers	Other benthic communities	Plankton	Pelagic and demersal fish communities	Marine mammals	Marine reptiles	Sharks and rays	Seabirds and migratory shorebirds	Key Ecological Features	Australian Marine Parks	Reef Protection Areas	Commercial fishing	Traditional fishing	Tourism and recreational activities	Ports and commercial shipping
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	T	U	V	W
12	Deck and Minor Subsea Spills		12 B																		
13	Loss of hazardous and Non-hazardous waste		13 B	13C							13J	13K	13L	13M							
14	Marine Diesel Release from Vessel Collision		14B			14E			14H	14I	14J	14K	14L	14M		14O	14P	14T	14U		
15	Marine Diesel Release from Bunkering Incident		15B						15H	15I	15J	15K	15L	15M		15O		15T			
17	Dry gas Release from Bayu-Undan Pipeline Loss of Containment				17D						17J	17K		1M				17T	17U	17V	17W
Oil Spill Response																					
16	Implementation of Spill Response		16B								16J	16K	16L	16M							

Key

(green)	Interaction reasonably possible – low residual risk
(yellow)	Interaction reasonably possible – medium residual risk
(orange)	Interaction reasonably possible – significant residual risk
(red)	Interaction reasonably possible – high residual risk
(white)	Interaction not reasonably expected

Table 5-6: Example risk assessment table

<table>
<tr><td>Risk</td><td colspan="4">Description of the risk (or source) that has the potential to result in impacts to the environment.</td></tr>
<tr><td>Aspect-receptor Reference (Table 5-5)</td><td colspan="4">Cross-reference to the interactions between environmental, socio-economic and cultural receptors and aspects of the seismic survey that are considered reasonably possible, as presented in Table 5-5.</td></tr>
<tr><td colspan="5">Description of the Source of Risk</td></tr>
<tr><td colspan="5">Brief description on the source of risk associated with a hazard (i.e. the activity), including context around the nature and scale of the risk to adequately inform potential impacts</td></tr>
<tr><td colspan="5">Levels of acceptable impact</td></tr>
<tr><td colspan="5">Levels of acceptable impact defined based on the EPBC Act significant impact guidelines, recovery plans and other statutory documentation</td></tr>
<tr><td colspan="5">Potential Impacts</td></tr>
<tr><td colspan="5">Brief description of the key potential impacts (i.e. focus on relevant values and sensitivities) that may occur because of the risk being realised, as informed by a detailed understanding of the existing environment (Section 4).
Note, a more detailed impact assessment and risk evaluation discussion is provided below each of the risk assessment summary tables.</td></tr>
<tr><td colspan="5">Risk Assessment
Presents the consequence, likelihood and overall risk ratings determined from the ConocoPhillips risk assessment process and ENVID workshop. As noted in Section 5.1.3, the inherent risk assumes existing standard controls are in place. The residual risk relates to the level of risk following risk treatment, such as the application of additional controls.</td></tr>
<tr><td colspan="2"></td><td>Consequence</td><td>Likelihood</td><td>Risk rating</td></tr>
<tr><td colspan="2">Inherent risk</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Residual risk</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Controls and Demonstration of ALARP
Identifies and details the appropriate existing management controls that will be implemented to reduce potential impacts and risks to ALARP and an acceptable level. Considers the effectiveness of the control in reducing the risk (i.e. by reducing likelihood). Provides an Environmental Performance Standard (EPS), which states the required level of performance of the control.</td></tr>
<tr><td colspan="5">Existing Controls</td></tr>
<tr><td>Control</td><td>Effectiveness</td><td>Reference (Table 6-1)</td><td colspan="2">Environmental Performance Standard</td></tr>
<tr><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="5">Assessment of additional controls
Identifies the additional management controls that were considered, indicates whether they will be implemented, and provides a justification if they are not going to be applied. The controls are grouped based on the hierarchy of controls. Where an additional control is selected to be implemented, an EPS is provided.</td></tr>
<tr><td>Additional control</td><td>Practicable?</td><td>Will it be applied?</td><td>Justification</td><td>Environmental Performance Standard</td></tr>
<tr><td colspan="5">Elimination</td></tr>
</table>

Substitution				
Engineering				
Administrative				
ALARP Statement				
Summary statement of whether the potential risks and impacts are considered ALARP. This statement is based on the outcomes of the environmental risk assessment, as outlined in ***Section 5.1.4.1*** *(Demonstration of ALARP).*				
Summary of alignment with EPBC Management Plans (where applicable)				
Relevant Receptor	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***	
EPOs (Table 6-1)				
A measurable level of environmental performance in relation to the environmental receptors that may be impacted / at risk. Verification of EPOs is used to confirm environmental impacts and risks are managed to a level that is ALARP and acceptable. EPOs, along with EPSs, set the level at which an incident becomes a "recordable incident' (i.e. a breach of an EPO is a recordable incident; refer to ***Section 7.8****).*				

5.2 Routine/Non-routine Planned Activities

5.2.1 Physical Presence: Interactions Between Activity Vessels, the Gas Export Pipeline and Other Marine Users

Risk	Interactions with/exclusion of other marine users	
Aspect-receptor Reference (Table 5-5)	1T – Commercial fishing	1U – Traditional fishing
	1V – Tourism and recreational activities	1W – Ports and commercial shipping
Description of Source of Risk		

The marine spread for pipelay includes:

- the pipelay vessel, which will be operating along the pipeline route 24/7 for a period of nominally three months;
- a construction vessel, which will undertake discrete tasks along the pipeline route; and
- up to six support vessels, which will transit to and from the pipelay and construction vessels daily.

A five hundred metre safety exclusion zones will be established around the pipelay and construction vessels to safeguard them while they are unable to manoeuvre.

During pipeline installation activities there is potential for the marine spread to interfere with other marine users, including:

- commercial fishers,
- shipping vessels,
- tourism operators (including fishing charters) and
- traditional fishing.

The gas export pipeline, PLETs and supporting infrastructure (lateral buckling initiation mattresses, mattresses at the fibre optic cable crossing and PLET foundations) installed on the seabed may also present an ongoing hazard for other marine users in the area.

Levels of acceptable impact

The impact caused by physical presence of the pipelay construction vessels and the pipeline once laid will be acceptable if there is no substantial adverse effect on other marine users.

Potential Impacts

Commercial Fishing

Six commercial fisheries overlap with the pipeline installation Operational Area (**Section 4.6.7**):

- Northern Prawn Fishery
- Demersal Fishery
- Coastal Line Fishery
- Offshore Net and Line Fishery
- Spanish Mackerel Fishery
- Timor Reef Fishery

The likely presence of commercial fishing vessels, within the Operational Area, was assessed based on fishing method and gear type, historical fishing effort, a fishing impact study and stakeholder consultation. The assessment identified that only three commercial fisheries (the Northern Prawn, the Offshore Line and Net, the Timor Reef and the Spanish Mackerel fisheries) may potentially occur within the Operational Area.

A review of vessel traffic from April 2017 to March 2018 identified a low level of fishing effort within 10 nm of the proposed pipeline route. The study identified a total of 154 fishing vessel days and 816 hours of fishing activity resulting in a fishing intensity of <0.01 days / km^2 (Intecsea, 2018). Based on vessel speed (<3.8 knots) it was determined that a number of these vessels were trawling and therefore likely to be trawling for prawns as part of the Northern Prawn Fishery. During stakeholder consultation for this EP, the Northern Prawn Fishery outlined that fishing effort occurs within the proposed pipeline route and expressed concern about displacement from this area.

Consultation with each of the fisheries identified that only the Northern Prawn, the Offshore Net and Line, and the Spanish Mackerel fisheries were active within the Operational Area. The primary efforts of the Timor Reef Fishery is over 50 km to the southwest. Both the Northern Prawn Fishery and the Spanish Mackerel Fishery raised concerns regarding exclusion from, or access to, fishing grounds whilst the Offshore Net and Line did not raise any concerns. Further the Northern Prawn Fishery requested that pipeline installation activity be undertaken outside of their fishing seasons (periods of sensitivities). The fishery is currently closed from 16th June to 31st July and from 1st December to 1st April each year.

We considered the request from NPF for undertaking the activities outside fishing seasons, however, concluded that the proposed pipelay activities would not pose an unreasonable risk to – or burden on – fishers being excluded or accessing fishing grounds.

- Fishing grounds are large, however, exclusion to any particular area will be limited to the 500 m diameter safety zones imposed around the pipelay and the construction vessels.
- The pipelay vessel operates in a linear fashion moving slowly along the pipeline route (nominally three km /day) as it lays the pipe.
- The construction vessel will work at a number of locations along the pipeline route installing the PLETs and carrying out span rectifications. The time it will work at any one location will be no longer than a few days with the exception of pipeline hydrotesting activities (FCGT), which could take up to 14 days to complete (see **Section 5.2.7**).
- Supply vessels will transit to and from the pipelay and construction vessel. Whilst servicing the pipelay and construction vessel, they will be within the 500 m exclusion zone; whilst in transit will be subject to standard maritime rules.

Given the above and the controls that will be in place to inform marine users of our day-to-day location, the consequence of adverse impact with commercial fishers is considered negligible.

Should timing of the activity be scheduled to avoid fishing periods, as requested by the Northern Prawn Fishery, then this will extend the overall duration of the activity and increase the cost of pipelay substantially. It also elevates the risk of simultaneous operations (SIMOPS), where the pipelay vessel ends up interacting with other Barossa construction activities (spool installations, drilling or FPSO mooring installation). SIMOPS is highly undesirable mode of operation as it means vessels either being stood down for a period of time or operating in close proximity to one another. Apart from the additional cost, this could lead to increased collision risk and/or enhanced cumulative environmental impact for aspects such as light and noise.

The sequence of pre-lay activities, pipelay and post-lay activities shall be scheduled to occur in a single campaign in order to avoid the requirement to perform multiple mobilisations/demobilisations of the construction vessel(s). Performing the work in a single continuous campaign also enables pre-lay and post-lay activities to be performed in parallel with pipelay where practicable to further reduce the schedule and optimise the offshore campaign. Furthermore, once the pipeline is laid, spans must be rectified as soon as possible to avoid overstressing of the pipeline. If the campaign extends over two periods there is a risk that spans are left unrectified potentially resulting in the need install additional span supports to ensure pipeline integrity is maintained over the operational design life. Given the likely burden imposed on fishers, adjusting the timing of the activity was discounted.

On an ongoing basis, the subsea infrastructure may present a hazard to marine users due to the potential for snagging on subsea infrastructure. The risk of snagging was assessed during a fishing interactions survey undertaken for the gas export pipeline (Intecsea, 2018). Based on the frequency of trawling vessels crossing the pipeline and location of snagging hazards (e.g. pipeline spanning structures and Bayu-Undan PLET) it was concluded that there is very low likelihood of trawling equipment becoming snagged on the gas export pipeline. To further reduce the risk, the Bayu-Undan PLET will be installed with anti-snag protection.

Tourism (including Recreational fishing) and Traditional Fishing

Recreational and traditional fishing (see **Sections 4.6.9** and **4.6.8**) may occur near a small number of shoals located near the Operational Area (e.g. Goodrich Bank, Marie Shoal, Moss Shoal, Mesquite Shoal and Shepparton Shoal – see **Section 4.5.6.3**). For the same reasons given above, any interactions with recreational fishing, fishing tours or traditional fishers are expected to be restricted to temporary avoidance of activity vessels while transiting through the area.

Ports and Commercial Shipping

The presence of activity vessels has the potential to cause temporary disruption to commercial shipping. Given all shipping vessels and activity vessels are required to comply with the COLREGS and associated Marine Orders, it is expected navigational and communicative aids are sufficient to preventing any negative interactions beyond basic avoidance during gas export pipeline installation activities.

Acceptability summary

No adverse effect on other marine users is predicted; impact and risks are therefore deemed acceptable.

Whilst there may be some minor impacts to where fishing activity can occur, no substantial adverse effects are considered likely given the small area and temporary nature of exclusion, especially when compared to the wider fishing area. The impact and risks are therefore deemed acceptable.

<table>
<tr><th colspan="4">Risk Assessment</th></tr>
<tr><td></td><td>Consequence</td><td>Likelihood</td><td>Risk Rating</td></tr>
<tr><td>Inherent impact</td><td>2 – Minor</td><td>3 – Rare</td><td>RRII – Medium</td></tr>
<tr><td>Residual impact</td><td>2 – Minor</td><td>2 – Remote</td><td>RRI – Low</td></tr>
<tr><th colspan="4">Controls and Demonstration of ALARP</th></tr>
<tr><th colspan="4">Existing controls</th></tr>
<tr><td>Control</td><td>Effectiveness</td><td>Reference (Table 6-1)</td><td>Environmental Performance Standard</td></tr>
<tr><td>Activity vessels equipped and crewed in accordance with Australian maritime requirements</td><td>This control is effective in avoiding unplanned interactions with other marine users. Crew qualifications and experience, along with communication and navigation equipment, allows activity vessels to detect, communicate with, and avoid interaction with other marine users.</td><td>C 1.1</td><td>EPS 1.1.1
Vessels will be equipped and crewed in accordance with the Navigation Act 2012 (as applicable for vessel size, type and class), including implementing:
• Marine Order 21 (Safety and emergency arrangements) including:
– Safety measures such as manning and watchkeeping
• Marine Order 27 (Safety of navigation and radio equipment) including:
– Radio equipment and communications,
– navigation safety measures and equipment
– danger, urgency and distress signals and messages.
• Marine Order 30 (Prevention of Collisions) including:
– Lights and signals as applicable to vessel class per COLREGS requirements
• Marine Order 71 (Masters and Deck Officers) including:
– All master, mate and watchkeeper officer duties undertaken by crew certified as applicable to vessel class per STWC requirements.</td></tr>
<tr><td rowspan="3">Undertake consultation with relevant persons (including applicable notifications) to support the gas export pipeline installation campaign</td><td rowspan="3">This control is effective in avoiding unplanned interactions with other vessels. Consultation with relevant persons allows all parties to be aware of activities associated with the gas export pipeline and its location. This allows ConocoPhillips and other users to undertake activities in such a way as to minimise the potential for adverse interactions.</td><td rowspan="3">C 1.2</td><td>EPS 1.2.1
Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan.</td></tr>
<tr><td>EPS 1.2.2
Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities.</td></tr>
<tr><td>EPS 1.2.3
Subsea infrastructure and the gas export pipeline will be clearly marked on Australian nautical charts published by the AHO.</td></tr>
</table>

Pipeline installation activities undertaken in accordance with ConocoPhillips's HSE Management and Marine Vessel vetting processes.	This control is effective in ensuring the safety of the activities and avoiding adverse interactions with other marine users.	**C.1.7**	**EPS1.7.1** Pipeline installed in accordance with ConocoPhillips's HSE Management and Marine Vessel Vetting process, including the establishment of a 500 m exclusion zone.

Assessment of Additional Controls

Additional Control	***Practicable ?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
Divide the pipeline installation scope into multiple campaigns to minimise work performed during the Northern Prawn Fishery season periods of sensitivity (2 April to 15 June and 1 August to 31 November).	No	No	See justification below	NA

Justification

Should timing of pipeline installation and associated activities be scheduled to avoid identified sensitivities including the Northern Prawn Fishery season and the peak internesting turtle periods this will impose impractically tight restrictions on the window for starting operations in order to ensure the activities can be completed outside of the various seasons, without the risk of the activities having to be split over multiple seasons. The start date for the pipelay operations is driven by the limited availability of pipelay vessels in region, prior commitments of pipelay vessels and the availability of associated equipment such as linepipe materials and PLET structures to support the activities. Due to the uncertainty on these elements it is standard practice to negotiate a large window for commencement of pipelay operations with a mechanism to reduce the window as the project progresses and the factors detailed above become more certain. The call down window is initially under the control of ConocoPhillips before passing to the pipelay vessel operator in order that they can manage their prior vessel commitments. As a result of the call down mechanism for the pipelay vessel and the uncertainty on the pipelay start date it is impractical to guarantee that pipelay activities could be fully completed in a given season.

If seasonal exclusions are imposed and activities cannot be completed in a single season, then this will require the activities to be split over multiple seasons. This will result in an overall extension in the duration of the activity, additional vessel mobilisations and demobilisations and will considerably increase the cost of pipelay.

If the campaign extends over two seasons there is a risk that spans are left unrectified in the intervening period which may markedly increase the number of span corrections required or could result in unacceptable fatigue damage to the pipeline resulting in the need to replace a section of pipeline. It may also be counterproductive as multiple vessel mobilisations could increase the overall environmental impact.

It may also raise the risk of simultaneous operations (SIMOPS), where the pipelay vessel ends up interacting with other Barossa construction activities (spool installations, drilling or FPSO mooring installation). SIMOPS is highly undesirable mode of operation as it means vessels either being stood down for a period of time or operating in close proximity to one another. Apart from the additional cost, this could increase collision risk and result in enhanced cumulative environmental impact for aspects such as light and noise.

No obvious additional potential environmental benefits were identified when considering the NPF season and the peak turtle internesting seasons (April through to September) together. Impacts to each are independent and have both been demonstrated to be acceptable. The costs in terms of financial, safety and pipeline integrity discussed above remain

ConocoPhillips has also assessed if certain activities associated with the pipelay operations, such as pre-lay and post-lay span correction, can be performed outside of fishing and peak turtle internesting seasons. However, the construction vessels used to support pipelay operations are also required throughout the full

pipelay campaign and as such the sequence of pre-lay activities, pipelay and post-lay activities is more effectively performed in a single campaign in order to avoid the requirement to perform multiple mobilisations/demobilisations of the construction vessel(s). As highlighted above it is also necessary to ensure spans are corrected as soon as practicable and as such post-lay work cannot practically be separated from the pipelay activity. Performing the work in a single continuous campaign also enables pre-lay and post-lay activities to be performed in parallel with pipelay where practicable to further reduce the schedule, optimise the offshore campaign and minimise the extent of span correction required thus reducing the seabed footprint and environmental impact. This control was discounted, as the costs of implementing seasonal control for parts or the whole activity were considered disproportionate to any environmental benefits gained. For fisheries, the identified impacts can be managed through ongoing consultation with the fishers. **Impacts to turtles are assessed further in Section 5.2.2.**				
Substitution				
No additional controls identified				
Engineering				
PLET at the Bayu-Undan tie-in location has been designed with anti-snag protection.	Yes	Yes **C 1.3**	Once the gas export pipeline installation campaign is completed, anti-snag protection on the PLET located at the Bayu-Undan tie-in location will provide additional protection for fishers operating within proximity to the gas export pipeline.	**EPS 1.3.1** PLET at the Bayu-Undan tie-in Location is designed with anti-snag protection
PLET at FPSO location designed with anti-snag protection	Yes	No	It is not expected that trawling will occur at the FPSO PLET location as water depths are greater than 200 m and trawling does not typically occur at these depths. In addition, the PLET will be included within the 500 m Petroleum Safety Zone of the FPSO (once the overall Barossa Project is operational).	**NA**
Anti-snag protection for mechanical support structures	Yes	Yes **C 1.6**	Should mechanical support structures be used, anti-snag protection will provide protection for fishers operating in the proximity of the pipeline.	**EPS 1.6.1** Anti-snag protection for any mechanical support structures installed shall be considered in detailed engineering and snagging potential mitigated accordingly.
Administrative				
One vessel will act as a surveillance vessel within the Operational Area during gas export pipeline installation.	Yes	Yes **C 1.4**	A vessel will be in the immediate vicinity of the pipelay vessel at all times to act as a surveillance and intervention vessel. The vessel will mitigate potential interactions between the pipelay vessel and other marine users	**EPS 1.4.1** An activity vessel will act as a surveillance vessel within the Operational Area during gas export pipeline installation.

Communications plan will be implemented for engagement with marine users.	Yes	Yes **C 1.5**	Communications plan will improve awareness of the gas export pipeline installation campaign, encourage engagement with stakeholders, and provide up-to-date information regarding key activities.	**EPS 1.5.1** Communications plan will be implemented for engagement with marine users.

ALARP Statement
Relevant legislative requirements and standard industry practices have been applied to control the risk. The controls selected for implementation are effective in reducing the risk of interactions between activity vessels and the gas export pipeline, and other marine users. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts. Based on the outcomes of the risk assessment, the implementation of controls throughout the activity, and considerations outlined in **Section 5.1.4.1.** ConocoPhillips considers that the impacts and risks to other marine users due to the physical presence of activity vessels and the gas export pipeline are reduced to ALARP.

Summary of alignment with EPBC Management Plans			
Relevant Receptor	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Not applicable			

Environmental Performance Outcomes (Table 6-1)
EPO 1 No substantial adverse effect on other marine users.

5.2.2 Physical Presence: Seabed Disturbance

Risk	Disturbance to the seabed from the installation of the gas export pipeline, PLETs and supporting structures	
Aspect-receptor Reference (Table 5-5)	2A – Bathymetry and seabed features	2B – Water quality
	2F – Benthic primary producers	2G – Other benthic communities
	2H – Pelagic and demersal fish communities	2K – Marine reptiles
	2O – Australian Marine Parks	2N – Key Ecological Features

Description of the Source of Risk

A range of gas export pipeline installation activities may result in disturbance to the seabed. These activities include:

- installation of underwater acoustic positioning transponders (**Section 3.5.2**);
- installation of supporting structures (**Section 3.5.3**);
- span rectification (**Section 3.5.4**):
    - concrete mattresses (**Section 3.5.4.1**);
    - grout bags (**Section 3.5.4.2**);
    - mass flow excavation (**Section 3.5.4.3**);
    - mechanical support structures (**Section 3.5.4.5**);
- gas export pipeline initiation structure deployment (**Section 3.5.5**);
- gas export pipeline installation (**Section 3.5.6**); and
- PLET installation at either end of the pipeline (**Section 3.5.7**).

Direct Impacts

The pipeline and associated structures (including mattresses and grout bags for span rectification) are lowered onto the seabed in a controlled manner with minimal disturbance to sediment. Habitat directly below structures will most likely be lost, however, over time the structures themselves will become colonised. In total, it is estimated that installation of the pipeline and associated structures (including span rectification) will result in direct impact to up to 28.7 ha of seabed (**Table 3-6**).

Indirect Impacts

Mass flow excavation (**Section 3.5.4.3**) may be used to facilitate burial of the pipeline in unconsolidated sediment (e.g sand waves). The device works by drawing in seawater from side pipes then jetting it out through a vertical down pipe liberating sediment into the water column (**Figure 3-6**), which is then relocated. Locations where mass flow excavation might be required are shown in **Figure 3-3 (c)**. Sediment at these locations is unconsolidated consisting mainly of sand but also contains a proportion of finer silt and clay size particles (**Figure 5-4**). Sands and gravels will redeposit rapidly (within hours), however, finer silts and clay size particles can remain in suspension for long periods under turbulent current flow.

Factors affecting the disturbance are:

- productivity rate, volume of soil requiring removal and duration of operation;
- soil type; and
- prevailing currents at the time of operation (neap/spring tide)

Based on case studies provided by the manufacturer of mass flow excavation equipment (James Fischer, 2018) productivity rate for mass flow excavation ranges between 229 and 2,182 m^3/hr. Volumes of soil requiring excavating from the span locations identified range from 55 to 1,025 m^3. Larger volumes are associated with the sandwave and megaripple fields towards the south of the pipeline (between KP245 to KP250).

To predict the impact, sediment modelling was undertaken using a three-dimensional particle tracking advection-dispersion model (ConocoPhillips, 2019(b)). Hydrodynamics for the model were derived from a finite element tidal model of the Timor Sea. Dispersal in the direction of flow was provided by the shear action of an assumed logarithmic velocity profile whilst turbulent dispersion was modelled using a random walk method. The area of interest was discretised using a 25 m x 25 m rectilinear grid with vertical layers 1 m depth over which concentrations were calculated. Large numbers of particles were released each time step representing sediment discharged from the mass flow excavation operation. Each particle was assigned a mass and a grain size in accordance with the sediment discharge rate and particle size distribution (**Figure 5-4**). Stokes Equation was used to calculate the fall velocity for each particle size.

Table 5-7 summarises model inputs. The model was set up to simulate worst case conditions. Location KP249.7 was modelled as geophysical data showed that this location potentially had the maximum volume of sediment requiring excavation (**Figure 5-3**). It was assumed that this volume could be removed in one hour giving a release rate of 1,025 m^3/hr. The release was therefore a batch discharge of one hour in duration. Two scenarios were undertaken, a low water and high water release both on a neap tide. This is considered worst case as suspended sediment builds up in during slack water and is then advected in a small, high concentration plume for the full tidal excursion. Density was set at 2,650 kg/m^3, which is conservative as it does not account for voids between particles and shell content of sediment.

Table 5-7: Summary of model parameters used in the mass flow excavation modelling

Parameter	Value/design
Discharge location	KP249.7 (**Figure 5-3**)
Particle size distribution	see **Figure 5-4**
Discharge loading rate	1,025 m^3/hr
Discharge volume	1,025 m^3
Discharge duration	1 hr batch discharges
Model run duration	48 hrs
Discharge depth	Seabed discharge with initial plume 0 - 10 m above the seabed
Sediment density	2,650 kg/m^3 (density of quartz)

<u>Presentation of results</u>

Results are presented as:

- Plan views showing the depth of sediment deposition around the discharge point.
- Plan views of maximum instantaneous suspended sediment concentration recorded within the plume for the duration of the model simulation. This figure plots the peak values attained at each grid point in the model over the course of the simulation. It is presented to illustrate the footprint of the plume down to 10 mg/L.
- Plan views of suspended sediment concentrations at distinct points in time throughout the simulation. These illustrate the actual behaviour of the plume.
- Time series of suspended sediment concentrations at 200 m from the discharge to show the ephemeral nature of plume at fixed points such as might be experienced by sessile organisms.

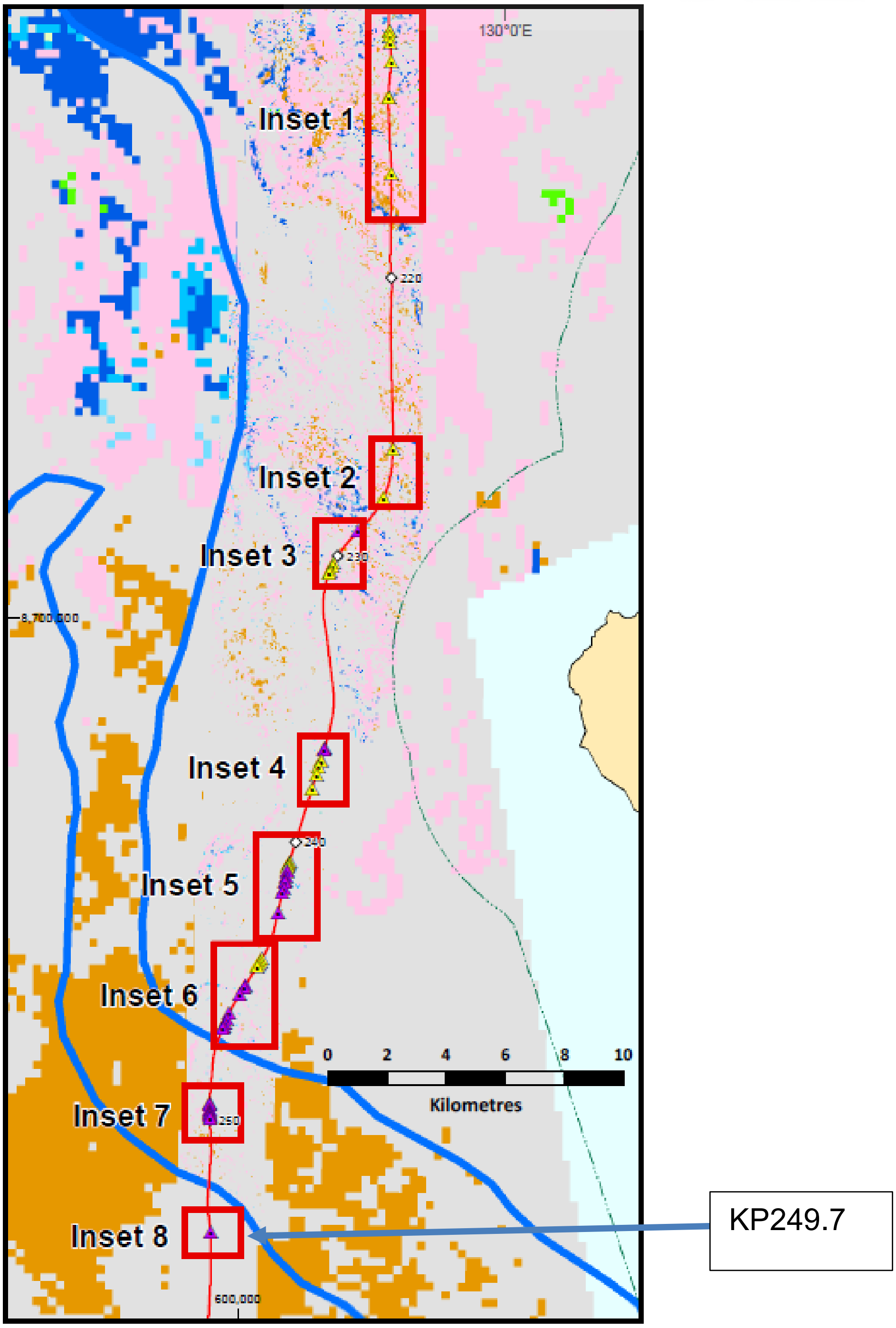


Figure 5-3: Location of modelled release at KP249.7 (see Figure 3-3 for insets)

Figure 5-5 shows the predicted depth of sediment deposition for flood and ebb tide discharges on a spring tide. As expected, the courser sediment settles rapidly (minutes) within a short distance from the disturbance (tens of metres). Finer sands take longer to settle (up to 2 hours) and tail off up to 400 m in either direction from the zone of disturbance. Deposition in the near vicinity of the discharge is estimated at 5,000 mg/cm^2/hr reducing to 250 mg/cm^2/hr at 100 m from the discharge.

Silts and clay particles remain in suspension for longer and are carried by ambient currents away from the zone of disturbance. **Figure 5-6** shows the maximum instantaneous suspended sediment concentrations for a low water sediment discharge (i.e. mass flow excavation occurring at low water). Tidal currents adjacent to Bathurst Island are strong with the plume travelling around 9 km towards the southeast on the flood tide.

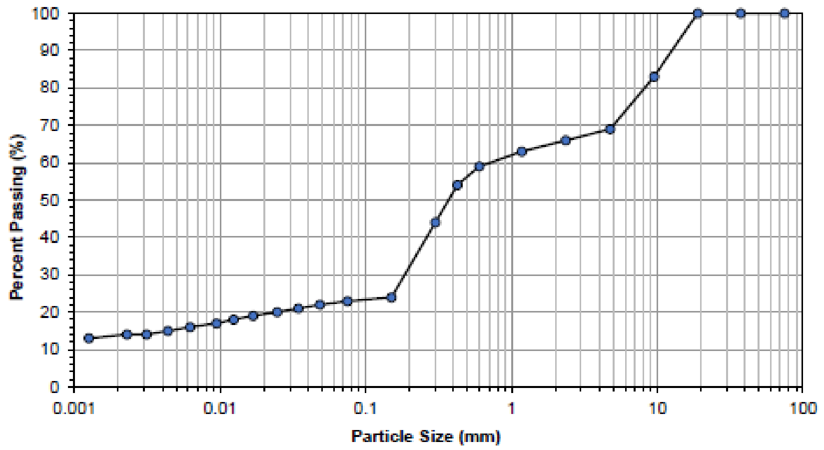
Within 200 m from the discharge, plume concentrations are up to 1800 mg/L above background levels. **Figure 5-7** shows such increases are confined to an area very close to the disturbance location, and **Figure 5-8** shows this peak occurs for a very short period of time (less than an hour). Sediment disperses rapidly with distance away from the discharge site with concentrations decreasing to 100 mg/l at the limit of the tidal excursion and approaching background within a single tidal cycle. Similar plots for the ebb tide are shown in **Figure 5-9** to **Figure 5-11**.

Noting that each case is unique, results appear conservative when compared with observations from studies related to cable laying operations for wind farms. During the construction of the Nysted Offshore Wind Farm in Denmark (BERR, 2008), measurements of turbidity 200 m from jetting (mass flow excavation) operations recorded mean and maximum sediment concentrations of 2 and 18 mg/L, respectively.

SmartWind (2013) provides predictions of suspended sediment concentrations from sandwave clearance using jetting (mass flow excavator) offshore of the Holderness and Lincolnshire coast. The scenario to clear a sandwave where there was 5 per cent fine sediment content was predicted to produce peak depth-averaged concentrations of approximately 900 mg/l above background levels. As in the modelling undertaken for Barossa, these levels were confined to an area very close to the sandwave location and occurred for a very short period of time (less than an hour). Increases of up to 200 mg/l were observed up to 18 km to the north of the sandwave and increases of 20 to 50 mg/l were observed in the southern extent of the plume.

In summary, modelling predicts short term elevations in suspended sediment concentrations (typically up to 100 - 200 mg/L with short term spikes of up to 1,800 mg/L) and low-level deposition, typically restricted to the near vicinity of operations (within 400 m). Suspended sediment will return to background levels within a single tidal cycle. Whilst modelling has been undertaken only at a single location, maximum volume of sediment and excavation rates were applied so conditions at other mass flow excavation locations – where currents are equally strong - will be no worse. Similarly, worst case conditions for dispersion were modelled, that is, neap tide slack water discharges, so concentrations at any other stages of the tide should yield lower plume concentrations. Moreover, if operations extend beyond one hour it means that excavation rate is lower so suspended sediment concentrations would be lower but for a longer duration.

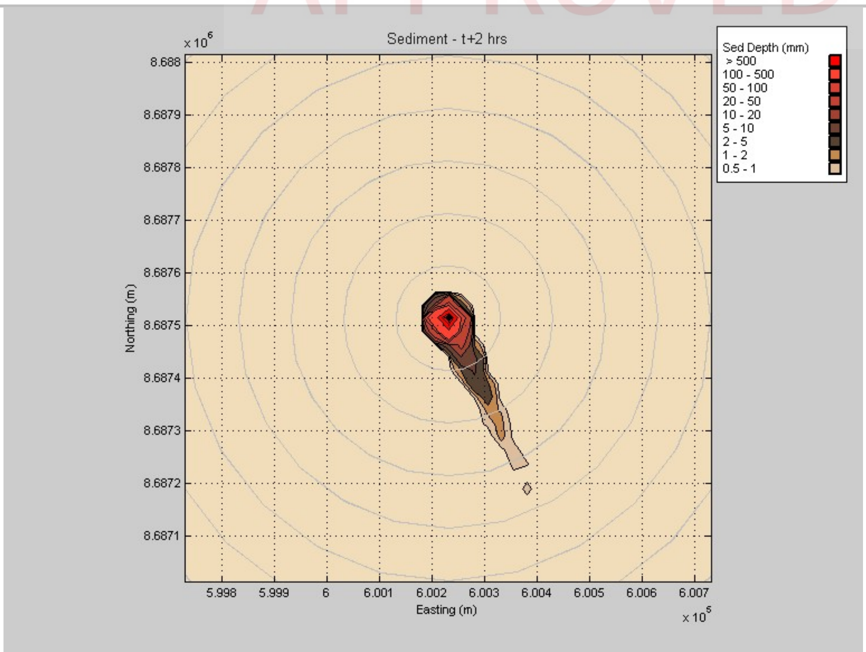
PO No.:	262132	**GTI Perth Client Reference:**	C07-P01-T01
Client:	Arup Pty Ltd	**Filename:**	19-001-PSD-34-PFL
Project:	Barossa Project		
Location:	Gas Export Pipeline and Infield Flowlines (PFL)	**Hydrometer Type:**	ASTM-152H
Borehole:	EP-41-BC	**Pretreatment :**	No
Sample No:	01	**Dispersion Method:**	Dispersion agent - 4g/L
Depth:	0.15 m - 0.40 m	**Loss in Pretreatment:**	NA
Tested By:	LB	**Checked By:**	FL
Date:	16/08/2018	**Date:**	24/08/2018



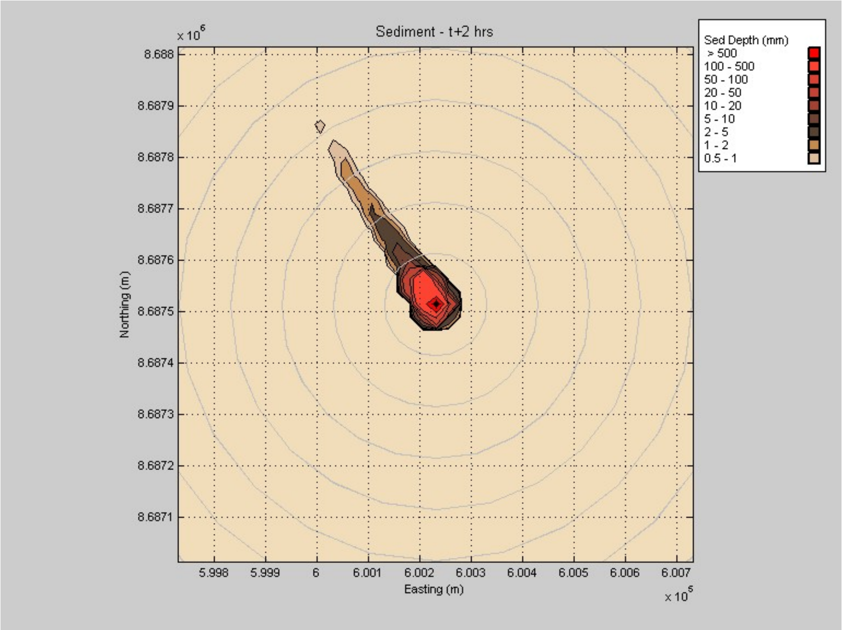
Sieving		Hydrometer	
Size mm	Passing %	Size mm	Passing %
75.0	100	0.0483	22
37.5	100	0.0344	21
19.0	100	0.0246	20
9.5	83	0.0168	19
4.75	69	0.0124	18
2.36	66	0.0094	17
1.18	63	0.0062	16
0.600	59	0.0044	15
0.425	54	0.0031	14
0.300	44	0.0023	14
0.150	24	0.0013	13
0.075	23		

Summary Results	
Average Particle Size, D_{50} (mm)	0.364
Effective Size, D_{10} (mm)	NA
Max Size of the Smallest 30%, D_{30} (mm)	0.184
Max Size of the Smallest 60%, D_{60} (mm)	0.755
Uniformity Coefficient, $C_u = D_{60}/D_{10}$	NA
Coefficient of Gradation, $C_g = D_{30}^2/(D_{60} \times D_{10})$	NA
Fines Content, <75µm (%)	23
Clay size Content, <2µm (%)	13

Figure 5-4: Sediment particle size distribution from a sediment sample collected in substrate in which mass flow excavation could be applied



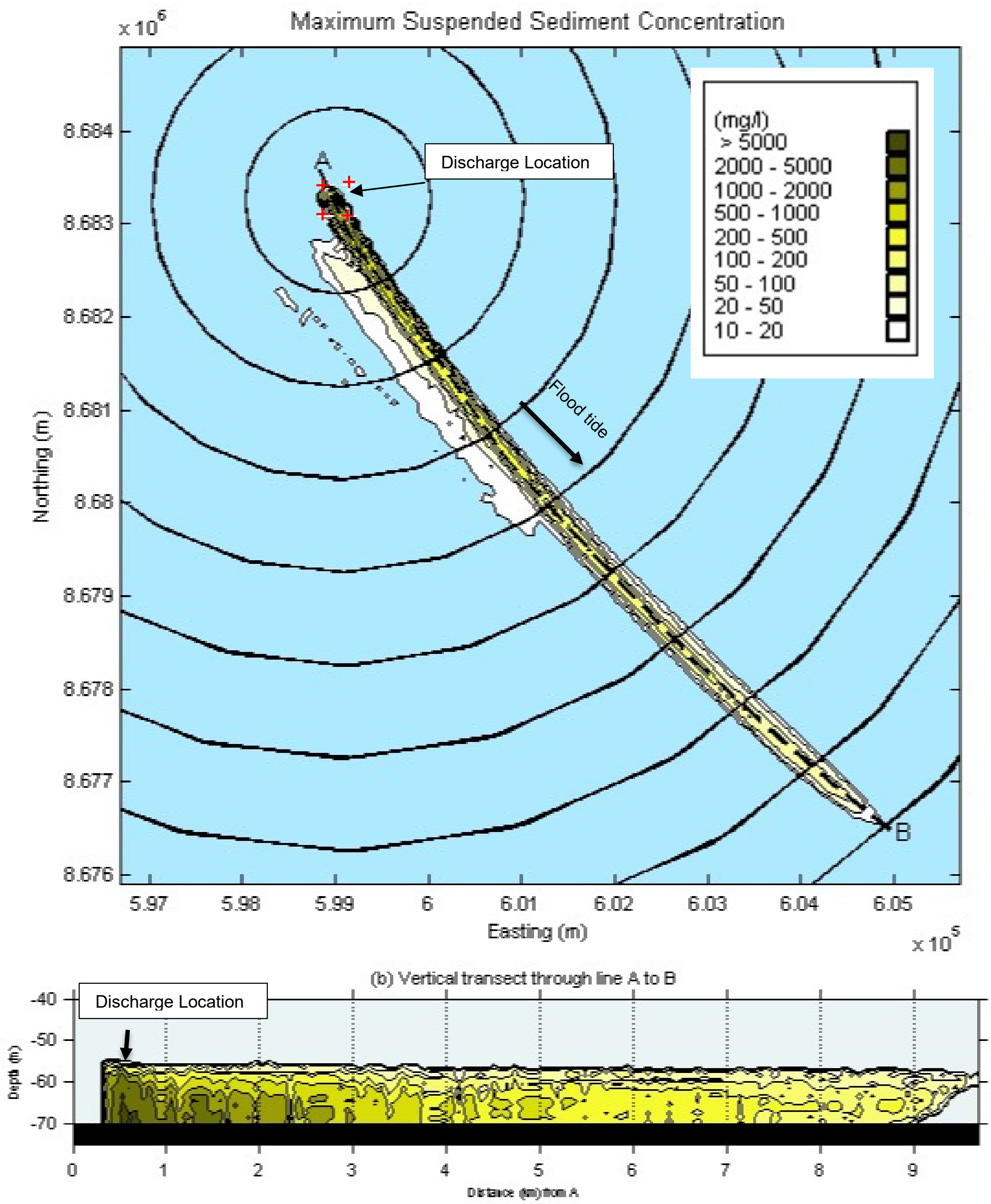
(a) Flood tide



(b) Ebb tide

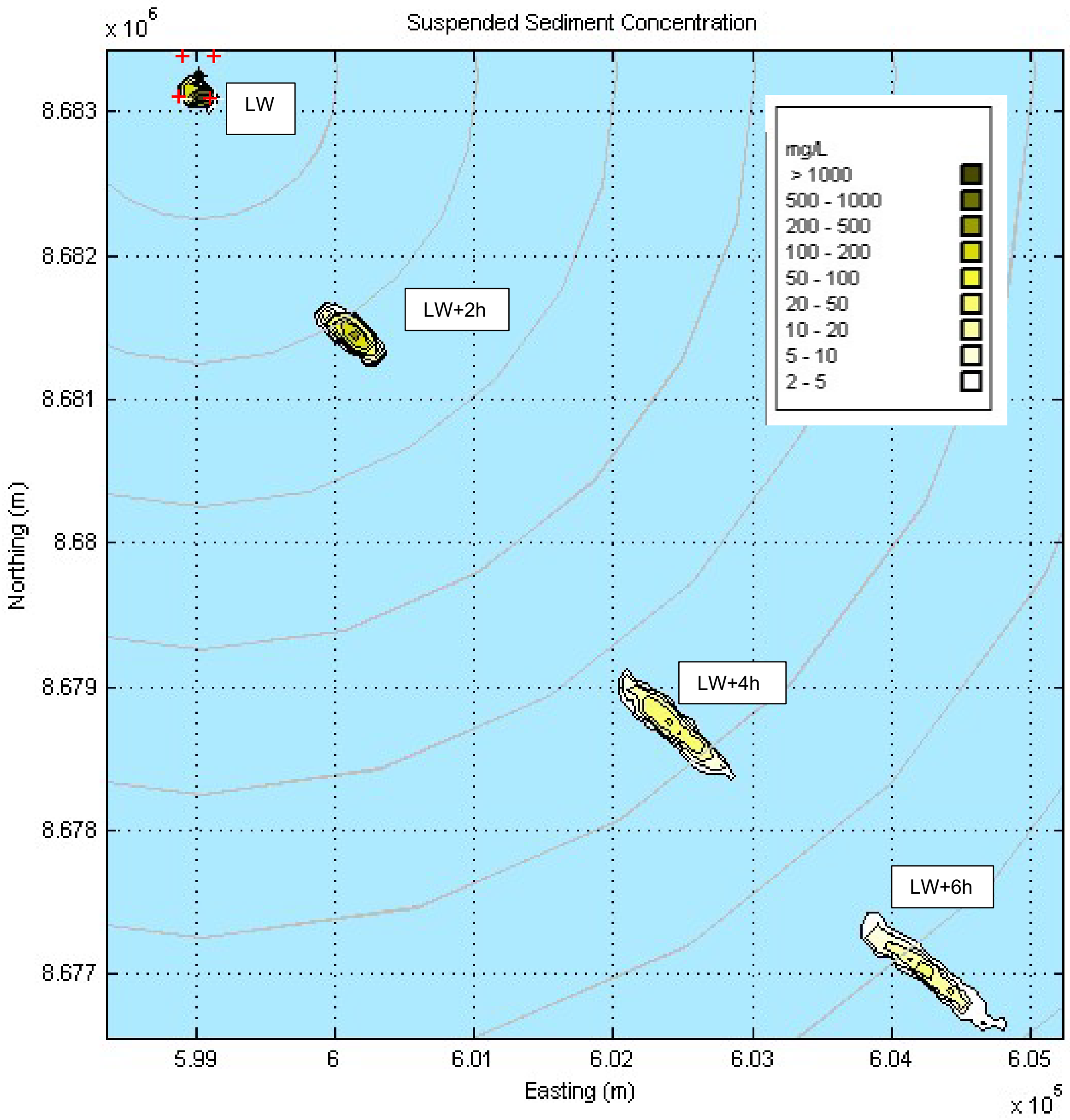
Notes: (1) Concentric circles are range rings drawn at 100 m intervals around the discharge location;

Figure 5-5: Predicted depth of seabed sediment deposition from mass flow excavation at KP249.7 on (a) flood and (b) ebb tide



Notes:
- (a) Discharge rate is 1,025 m^3/hr for a duration of 1 hour.
- (b) Contours show maximum instantaneous concentration within the plume for the duration of the model simulation. Figure 5-7 shows concentrations at a point in time.
- (c) Concentric circles are range rings drawn at 1000 m intervals around the discharge location
- (d) Time series extracted 200 m from the discharge location shown as red crosses

Figure 5-6: Maximum instantaneous suspended sediment concentrations for mass flow excavation from KP249.7 – low water release on a neap tide.



Notes:
(a) Concentric circles are range rings drawn at 1000 m intervals around the discharge location
(b) Concentrations averaged over bottom 10 m water depth
(c) Discharge rate is 1,025 m^3/hr for a duration of 1 hour.
(d) Time series extracted from points 200 m from the discharge location shown as red crosses

Figure 5-7: Suspended sediment concentrations at various stages of the tide for mass flow excavation from KP249.7 – low water release on a neap tide.

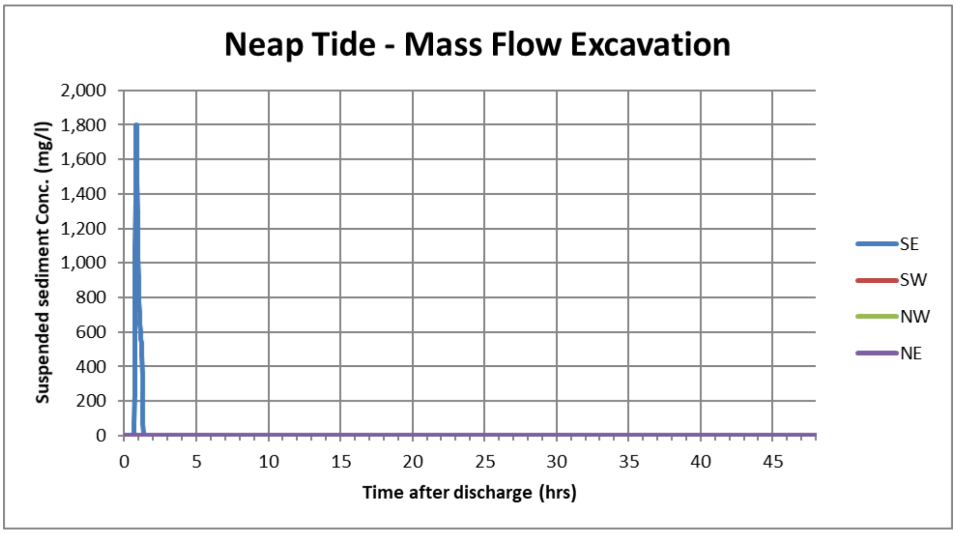
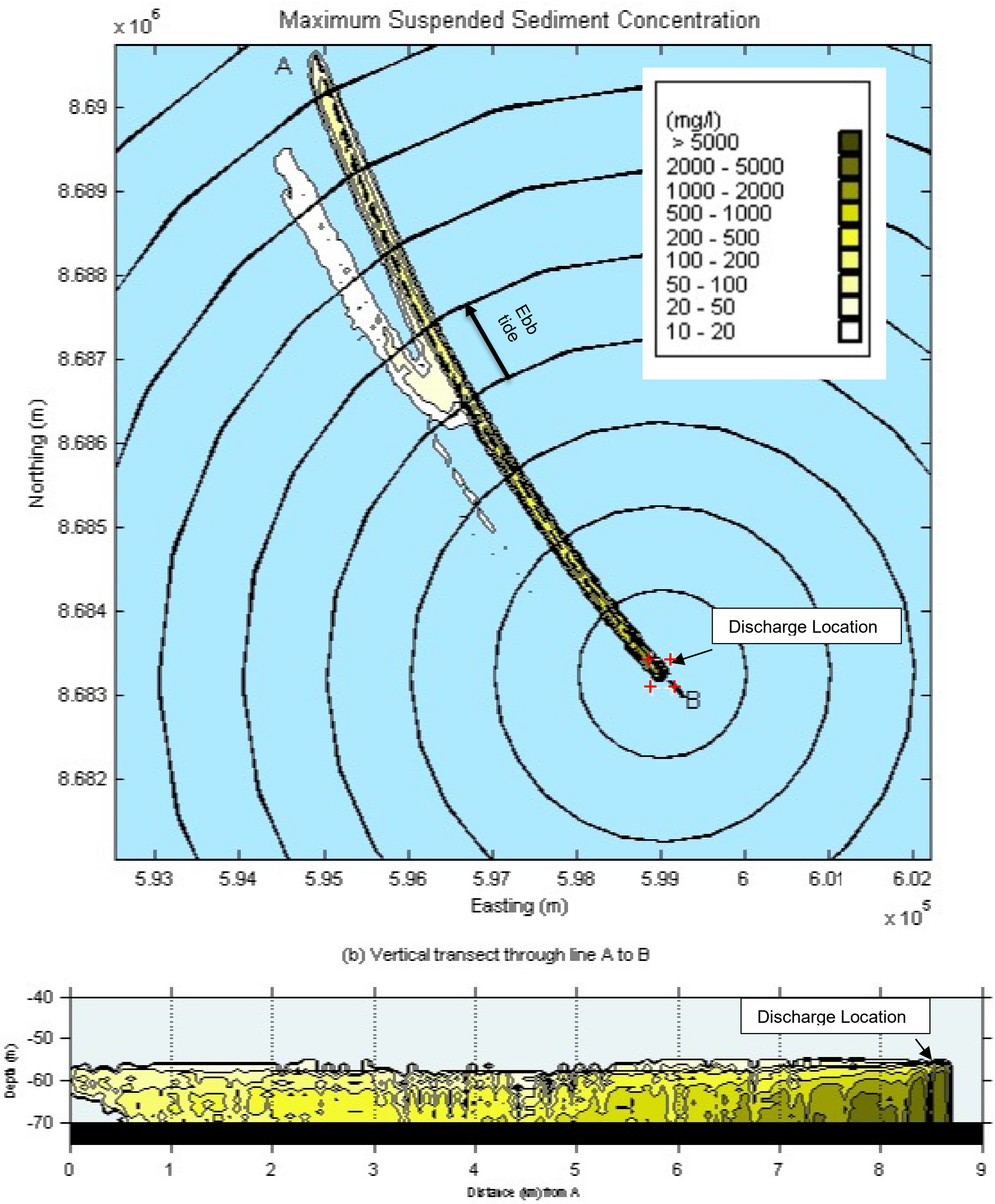


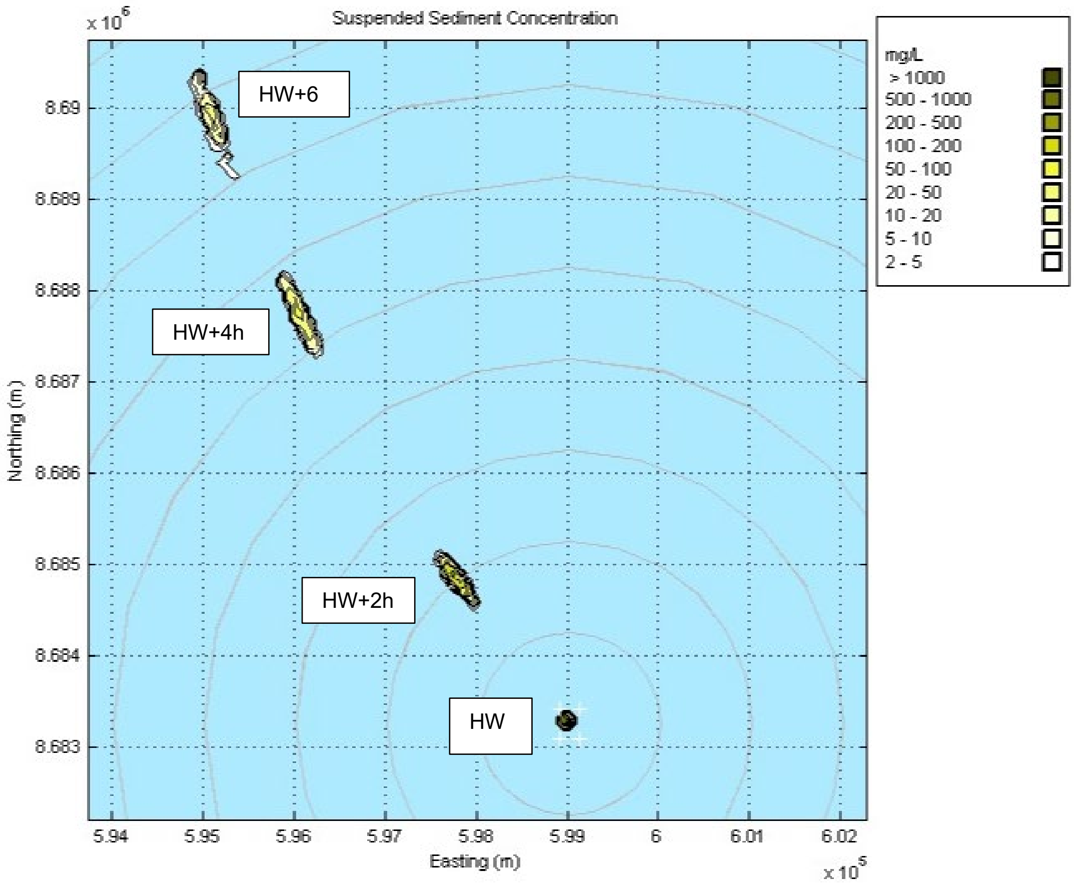
Figure 5-8: Time series of predicted suspended sediment concentration at 200 m from the mass flow excavation site – low water release on a neap tide



Notes:

a. Discharge rate is 1,025 m^3/hr for a duration of 1 hour.
b. Contours show maximum instantaneous concentration within the plume for the duration of the model simulation. Figure 5-7 shows concentrations at a point in time.
c. Concentric circles are range rings drawn at 1000 m intervals around the discharge location
d. Time series extracted from points 200 m from the discharge location shown as red crosses

Figure 5-9: Maximum instantaneous suspended sediment concentrations for mass flow excavation from KP249.7 – high water release on a neap tide.



Notes:

(a) Concentric circles are range rings drawn at 1000 m intervals around the discharge location
(b) Concentrations averaged over bottom 10 m water depth
(c) Discharge rate is 1,025 m^3/hr for a duration of 1 hour.
(d) Time series extracted 200 m from the discharge location shown as red crosses

Figure 5-10: Suspended sediment concentrations for mass flow excavation from KP249.7 – high water release on a neap tide.

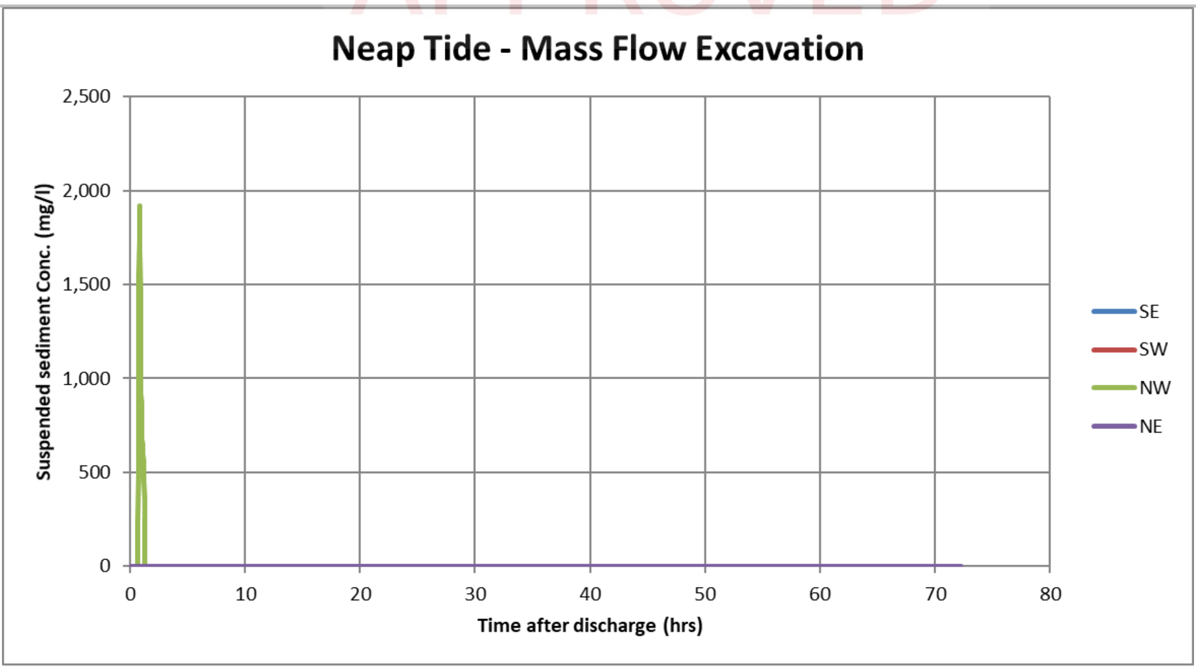


Figure 5-11: Time series of predicted suspended sediment concentration at 200 m from the mass flow excavation site – high water release on a neap tide

Levels of acceptable impact
Seabed impacts from installing the Barossa pipeline and supporting structures (including span rectifications) will be acceptable if there is: i. No substantial change in water quality which may adversely impact biodiversity, ecological integrity, social amenity or human health. ii. No substantial change that may modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results. iii. No substantial change to threatened and migratory species that may lead to a reduction in the area of occupancy of the species or in the size of a population a. lead to a long-term decrease in the size of a population b. reduce the area of occupancy of the species c. adversely affect habitat critical to the survival of a species d. displace threatened and migratory marine fauna from habitat critical areas e. disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas f. disrupt the breeding cycle of a population g. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline h. interfere with the recovery of the species

iv. No substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Oceanic Shoals Marine Park:

a. KEFs of the marine park

b. Threatened and migratory marine species

c. BIA's for foraging and internesting marine turtles

v. No substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Carbonate bank and terrace system of the Van Diemen Rise KEF:

a. sponges, soft corals and other sessile filter feeders associated with hard substrate sediments of the deep channels

b. epifauna and infauna including polychaetes and ascidians

c. olive ridley turtles, sea snakes and sharks

vi. No substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Shelf break and slope of the Arafura Self KEF:

a. Continental slope, patch reefs and hard substrate pinnacles

Potential Impacts

Bathymetry and Seabed Features

The pipeline route avoids banks, shoals and pinnacles in the region being laid on predominantly silty siliceous-calcareous habitats (**Section 4.4**). In areas of soft sediment, the pipeline and associated structures are expected to sink or become partially buried. There may also be sediment accumulation in some areas around the pipeline; this is expected to be highly localised and of low relief (i.e. no higher than the diameter of the pipeline) and will assist in stabilisation of the pipeline. The pipeline may also cause localised scouring; however, its design is intended to prevent this occurring due to the risk it may pose to its structural integrity.

Coarse sediment from mass flow excavation is predicted to travel up to 400 m from the disturbance location (**Figure 5-5**). Given the mobile nature of sediments and high current speeds, the seabed is expected to return to near its original state over time – no substantial changes to seabed features are predicted.

Water quality

Impacts to water quality from pipelay activities are limited to elevated suspended sediment concentrations from mass flow excavation. The main effects from mass flow excavation are expected to be localised in nature and short term, with water column returning near to its original state within days. Impact on water quality is expected to be negligible so there will be no substantial change which could adversely impact biodiversity, ecological integrity, social amenity or human health. The impact is therefore deemed acceptable.

Biological communities, including threatened and migratory species

Benthic Primary Producers

The majority of proposed gas export pipeline route is in water depths of greater than 50 m. These parts of the proposed route are very unlikely to host benthic primary producer habitat (e.g. zooxanthellate corals, macroalgae, seagrasses etc.) as the seabed will receive low levels of photosynthetically active radiation (PAR). Some sections of the proposed route are in relatively shallow water (between 35 and 50 m water depth) to the west of Bathurst Island, approximately 7 km offshore at the closest point to the island. Water quality surveys along this part of the coastline have consistently shown high levels of turbidity, which reduces PAR penetration in the water column and consequently reduces the depths at which benthic primary producers may be found.

Habitat surveys support these conclusions, with no benthic primary producer habitats observed along the proposed route**,** however**,** the benthic habitat model predicts isolated outcrops of hard corals between KP210 to KP231 (**Figure 4-24**). These are assessed in the section below.

Benthic Communities

Direct impact

It is expected that benthic habitat directly below the pipeline and supporting structures will be lost as a result of direct impact from installation. This will be limited to 875 mm width along the length of the pipeline and up to 18 m^2 at each support structure location (**Figure 3-3**), resulting in an overall direct impact of up to 28.7 ha of seabed (**Table 3-6)** .

Table 5-8 show that 87.4% of the route is bare sediment, 8.5% filter feeders, 2.9% burrowers / crinoids and 0.65% hard corals. Whilst communities below the footprint of the pipeline will most likely be lost, these habitats are well represented throughout the region with native flora and fauna likely to recolonise the pipeline once it has been laid.

Table 5-8: Percentages of benthic habitat classes within the operational area of the proposed gas export pipeline route (derived from Heyward et al., 2017; Radford et al., 2019)

Habitat Class	% Within Operationl Area
None (bare sediment)	87.4
Filter feeders	8.5
Burrowers/crinoids	2.9
Alcyon	0.4
Gorgonians	0.0
Halimeda	0.0
Hard corals	0.65
Macroalgae	0.0
Soft corals	0.06
Seagrasses	0.0
Whips	0.0

Indirect impact

Benthic communities (particularly corals and sponges) can be impacted by suspended sediment through three primary cause effect pathways: light reduction, increased suspended sediment concentrations, and sediment deposition (smothering). Studies undertaken as part of the WAMSI Dredging Science Node (WAMSI, 2019) report that both sponges and hard corals are well adapted to sediment and are resilient to increased suspended sediment loads for extended periods of time.

For sponges, adaptations include: incorporation of sediment into their tissue (skeleton reinforcement); forming sediment crusts (providing shade, camouflage and shelter from grazers and desiccation); ability to anchor in soft sediments (sometimes partially embedded); and passive or active cleaning mechanisms (including self-cleaning surfaces, mucus production and tissue sloughing). These tolerance mechanisms come at a cost (depletion of energy reserves, reduced sponge health), suggesting that longer term exposure to such extreme sediment disturbance conditions is likely to result in mortality.

Experiments undertake on both corals and sponges provide threshold concentrations, however these are over extended periods, which are indicative but not directly comparable with a short term discharge such as that for mass flow excavation. Heterotrophic sponges showed considerable resilience to light reduction and general resilience to high loads of suspended sediments (up to 100 mg/L) for 14 days. At exposure to suspended sediment concentration's >30 mg/L for 28 days, many sponges reduced in size, had fewer energy reserves, and (some) bleached. This indicates that exposure to high suspended sediment concentration for extended periods (28 days) can have negative effects on feeding behaviour and growth of sponges. However, most sponges recovered 14 days following cessation of the experimental treatments. Only two sponge species, *Carteriospongia foliascens* (phototrophic) and *Coscinoderma matthewsi* (heterotrophic), exhibited necrosis and mortality when exposed to >30 mg/L. These results were corroborated by findings from the field, which demonstrated that three sponge species (*Cliona* sp., *C. stipitata* and *Stylissa flabelliformis*) persisted throughout a recent, two year, dredging programs.

For corals, WAMSI (2019) reports light attenuation and sediment deposition leading to smothering as the key cause effects pathways that define zones of high impact (mortality). Most can tolerate a 3-fold decrease in light levels, and a combination of 10 mg/L and 2.3 mol photons/m^2/day over a 42-day period. Light attenuation is directly proportional to suspended sediment concentrations. At the locations hard corals are shown in the habitat model (between KP210 and KP231), pipeline spans will be rectified using mattresses and grout bags with minimal sediment disturbance, so no indirect impact on corals is expected.

The seabed where mass flow excavation may be required is mostly bare sand with sparse outcrops of filter feeders consisting mostly of sponges (**Figure 3-3 (c)**). Modelling for mass flow excavation predicts: short term elevations in suspended sediment (typically up to 200 mg/L with short term spikes of up to 2,000 mg/L) and low level deposition, typically restricted to the near vicinity of operations (within 400m). As elevated suspended sediment concentrations (and reduction in light) are ephemeral and concentrations reduce rapidly within the plume (typically within a single tidal cycle), the duration and concentration of suspended sediment generated from mass flow excavation operations is unlikely to impact sponges. In terms of deposition, for the highest volume of sand requiring removal, the model predicts sand deposition (>0.5m) is predicted to occur within tens of metres of the disturbance. This is considered insignificant given the mobile nature of the seabed in the area and the strength of the tidal currents, which will redistribute the sand over time. Strong currents will prevent deposition of fine sediments and remove any sediment that may deposit on the surface of sponges or corals at locations further afield.

With regards to potential cumulative impact from sequential mass flow excavation operations, modelling demonstrated that the suspended sediment plume is transported long distances whilst rapidly dissipating. Cumulative impacts from sequential operations are, therefore, unlikely.

Considering the low sensitivity and broad regional representation of the habitats within the pipeline route, it is concluded that direct or indirect impacts from the proposed activities will not substantially change or adversely impact on biodiversity or ecological integrity of benthic communities. The impact is therefore deemed acceptable.

Pelagic and Demersal Fish Communities

Span rectification and installation of supporting structures will disturb the seabed, which may make prey for predatory demersal fish (e.g. infauna) temporarily more available. This could result in a short-term attraction of demersal fish to the area due to increased prey availability.

Much of the seabed along the proposed gas export pipeline route is bare sediment habitat, which supports relatively low diversity and low abundance fish assemblages compared to more complex habitats (e.g. reefs). The installation of the gas export pipeline in these areas may create a more rugose seabed and provide substrate for attachment of organisms such as sponges and gorgonians. The resulting habitat will be relatively complex compared to much of the pre-existing habitat and will serve as an artificial reef. Recent survey work on the North West Shelf has highlighted the increased fish species richness and abundance associated with subsea pipelines (Bond et al., 2018; McLean et al., 2017). These studies noted that the fish assemblages associated with pipelines tended to have a relatively high portion of large, commercially important fish species that preferred complex habitats (Bond et al., 2018; McLean et al., 2017). The predicted increase in the fish assemblage diversity and abundance is not expected to have any negative environmental consequences.

Anecdotal evidence provided by stakeholders and bycatch data (Laird, 2018) indicated that the proposed gas export pipeline route west of Bathurst Island may host sawfish. The installation of the pipeline is unlikely to result in adverse impacts to sawfish based on:

- the mobile nature of sawfish species;
- sawfish species' preference for shallow (relative to much of the proposed gas export pipeline route) coastal habitat;
- the wide representation of habitats found along the proposed pipeline route within the region;
- the localised seabed disturbance associated with the installation of the pipeline; and
- the low profile of the gas export pipeline, which is expected to become buried over time and will not prevent the movement of sawfish over the pipeline.

Marine Reptiles

The Tiwi Islands host regionally significant nesting populations of flatback and olive ridley turtles. Internesting habitat critical for the survival of both flatback and olive ridley turtles overlaps the proposed pipeline route (**Figure 4-29**). Other species of marine reptiles, such as sea snakes and saltwater crocodiles, are not expected to be present in notable numbers along the proposed gas export pipeline route and are not considered further here.

Juvenile Turtles

Following the pelagic post-hatchling phase, juvenile flatback and olive ridley turtles may move into continental shelf waters to forage, although olive ridley turtles have been shown to undertake long duration oceanic migrations well beyond the continental shelf (Polovina et al., 2004). Juveniles are not thought to remain in the nearshore habitat around their natal beaches for long periods of time, nor are they thought to make extensive use of benthic habitats. On this basis, the seabed disturbance from gas export pipeline installation activities is not expected to result in significant impacts to juvenile turtles. Potential impacts from other aspects of gas export pipeline installation activities (artificial light and underwater noise) are discussed in **Sections 5.2.4** and **5.2.3**.

Foraging Adult Turtles

Flatback turtles forage in soft-bottom sub-tidal environments. Flatback turtles are carnivorous, and feed opportunistically on a range of benthic invertebrates such as soft corals, sea pens and holothurians; pelagic prey such as jellyfish may also be consumed (Limps 2007). Like flatback turtles, olive ridley turtles are carnivorous and forage in soft bottom habitats on a range of prey. Benthic invertebrates such as molluscs and crustaceans are commonly eaten, along with pelagic fauna such as salps and neustonic molluscs (i.e. *Janthina* spp.) (Colman et al., 2014; Limpus, 2008; Polovina et al., 2004).

As described above in **Benthic Primary Producer Habitat** and **Other Benthic Communities**, the region contains a range of benthic habitats, several of which are expected to be turtle foraging habitats, including:

- alcyon (soft coral);
- filter feeders;
- gorgonians;
- soft corals; and
- whips.

Of these potential foraging habitats, only filter feeding habitat lies within the proposed gas export pipeline route **(Figure 4-28**), primarily along the western coast of Bathurst Island. Most filter feeders (e.g. sponges, gorgonians etc.) typically require hard substrate to become established; hard substrate is often a limiting resource in benthic marine environment. The presence of the gas export pipeline is expected to increase the number of filter feeders due to the substrate it will provide, potentially increasing the availability of prey for foraging adult turtles. However, much of the gas export pipeline is below the depths foraging turtles typically dive to, particularly internesting females – see below for further discussion.

There are foraging area BIAs for marine turtles in the region beyond the Operational Area, including an olive ridley foraging area BIA within the Oceanic Shoals Marine Park. These BIAs lie > 100 km from the Operational Area and will not credibly be impacted by seabed disturbance from the installation of the gas export pipeline and supporting structures.

Nesting and Internesting Female Turtles

Turtle nesting activity is seasonally variable around the Tiwi Islands. Of particular relevance are nesting beaches in relatively close proximity to the pipeline route and Operational Area including (as detailed in Chatto and Baker, 2008b):

- Olive ridley nesting is concentrated on northern parts of Bathurst Island and around Cape van Diemen on Melville Island, with lower density nesting on other beaches. These are the closest high-density olive ridley nesting beaches to the Operational Area and are the justification for the olive ridley internesting BIAs (which is 5 km east of the Operational Area).
- Flatback turtle nesting around the southwestern tip of Bathurst Island (around Cape Fourcroy); flatback turtle nesting is also widespread throughout the region. The flatback turtle internesting BIA overlaps the Operational Area.

Nesting and hatchling activity around the Tiwi Islands is effectively year-round (**Table 5-9**), with peak hatchling activity between July and September for flatback turtles and between June and August for olive ridley turtles (Chatto and Baker, 2008b; Limpus, 2008, 2007; Pendoley, 2019).

Table 5-9: Seasonal patterns in flatback and olive ridley turtle nesting, internesting and hatchling activity at the Tiwi Islands (after Pendoley, 2019)

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flatback (Arafura stock, Tiwi islands)												
Nesting												
Internesting												
Hatchlings												
Olive ridley (Northern Territory stock, Tiwi Islands)												
Nesting												
Internesting												
Hatchlings												

Low level activity

High level activity

Female turtles typically lay a series of clutches of eggs during a nesting season. The period between successive clutches is referred to as the internesting period. Female turtles typically remain in relatively close proximity to their nesting beach during the internesting period, showing high site fidelity. The nesting period for marine turtles is considered a critical stage in the life history of these species, and the aggregation of animals in a single area (e.g. nesting beaches, internesting habitat) may increase vulnerability to impacts. This is the basis for the establishment of the internesting habitat critical to the survival of flatback and olive ridley turtles in the *Recovery Plan for Marine Turtles in Australia 2017-2027* (Commonwealth of Australia, 2017a), shown in **Figure 4-29**.

Internesting olive ridley turtles remain relatively close to nesting beaches during the nesting period (in comparison to post-nesting movements); tagged turtles remained within 48 km of the nesting beach in waters typically < 30 m water depth, although the turtles moved considerable distances within this radius (up to 200 km) (Hamel et al., 2008). These behaviours are consistent with observations from other populations, which indicate internesting olive ridley turtles typically remain in relatively shallow waters within 30 km of the nesting beach (Maxwell et al., 2011; Rees et al., 2012).

Tagging studies of several flatback turtles have shown a range of average interesting dive depths, ranging from 5-9 m around Ashburton Island (RPS 2010), less than 10 m around Barrow Island (Whittock 2017), to up to 20 m around Curtis and Bare Sand islands (Sperling et al. 2010). Suitable internesting habitat for flatback turtles is defined as water depths shallower than 16 m (Whittock et. al 2016 in Pendoley 2019), which is shallower than the shallowest point of the gas export pipeline route.

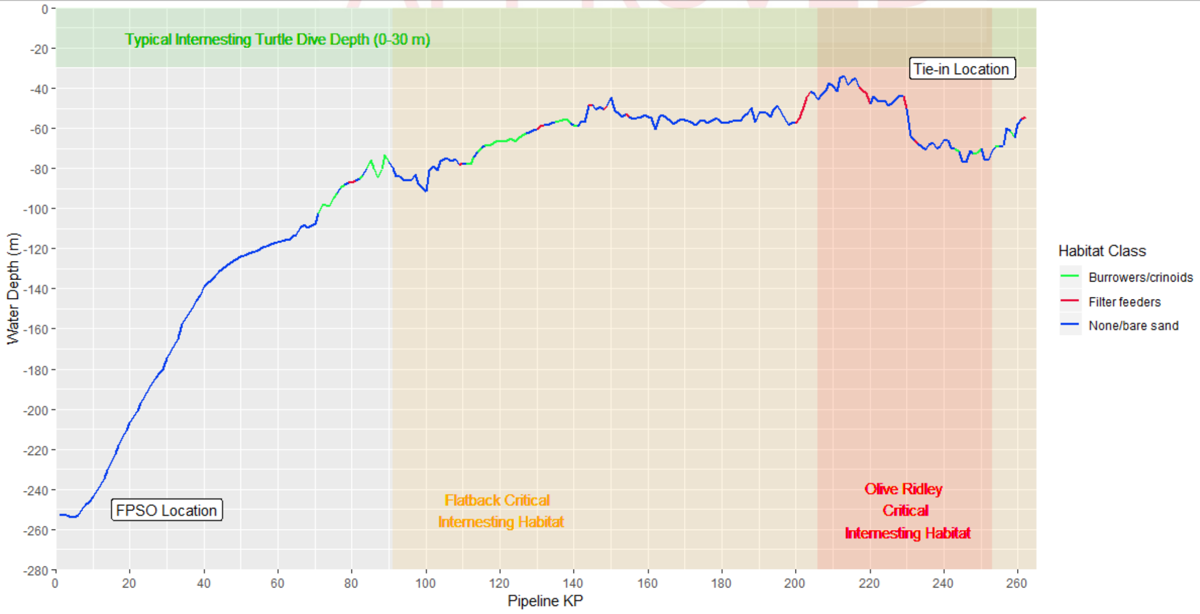


Figure 5-12: Proposed gas export pipeline route depth profile with typical internesting turtle dive depth range (shaded green)

As shown in **Figure 5-3**, the depth profile of the proposed gas export pipeline route is below the typical diving depths of internesting female flatback and olive ridley turtles. The shallowest point along the route, between KP210 and 220, is still greater than 30 m water depth.

On the basis of the available literature, internesting olive ridley and flatback turtles are expected to be concentrated in relatively shallow coastal waters (< 30 m) around nesting beaches. Benthic habitat within the 30 m isobath around the Tiwi Islands is broadly represented and the entire pipeline route is deeper than 30 m (**Figure 4-2**). The proposed gas export pipeline route is deeper than the water depths that internesting flatback and olive ridley turtles typically occupy during the internesting phase; hence, disturbances to benthic habitats from the gas export pipeline installation are unlikely to affect internesting habitat.

Span rectification using mass flow excavation will result in sediment resuspension, however, as discussed above, sediments are predominantly coarse-grained sand and gravel, which settle rapidly. Given the relatively low levels of sediment that may potentially be advected into internesting habitats (water depths of less than 30 m), along with the very low levels of benthic primary producer habitat and high levels of background turbidity, potential impacts from suspended sediments to internesting habitats are negligible.

Impact acceptability summary for threatened and migratory species

The proposed pipeline passes through areas designated as internesting habitat critical for the survival of both flatback and olive ridley turtles (**Figure 4-29**). Substantial adverse impact from the pipelay activities is not considered credible given:

- Turtle Internesting habitat covers a large area compared to the pipeline operational area.
- Marine turtles are highly mobile and widely distributed.
- Internesting flatback and olive ridley turtles preferentially occupy coastal waters shallower than 30 m so are unlikely to frequent the Operational Area.
- Pipelay is short duration taking approximately three months to complete. Time within the habitat critical areas adjacent to Bathurst Island is expected to be approximately 23 days, representing a maximum of 25% of the peak nesting/internesting period.
- Pipelay is a slow and controlled process so physical impact to marine biota is highly unlikely.
- Impact from suspended sediment is predicted to be negligible.

Other protected species of marine reptiles (e.g sea snakes) and fish (e.g (sharks and sawfish) are not expected to be affected due to the their mobile nature, wide distribution (in the case of sea snakes and sharks) and preference for shallow coastal habitats (eg sawfish).

For the above reasons, no substantial change to threatened and migratory species is anticipated that may:

a. lead to a long-term decrease in the size of a population
b. reduce the area of occupancy of the species
c. fragment an existing population into two or more populations
d. adversely affect habitat critical to the survival of a species

e. displace threatened and migratory marine fauna from habitat critical areas

f. disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas

g. disrupt the breeding cycle of a population

h. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or

i. interfere with the recovery of the species

Australian Marine Parks

The proposed gas export pipeline route overlaps two sections of the Oceanic Shoals Marine Park (**Figure 4-10**):

- the Multiple Use Zone (IUCN Category VI) to the south of the Barossa offshore development area, and
- the Habitat Protection Zone (IUCN Category IV) to the north-west of Bathurst Island.

The Oceanic Shoals Marine Park contains representative habitats from the region. Benthic habitat modelling and mapping along the proposed gas export pipeline route within the Multiple Use Zone and the Habitat Protection Zone indicated two benthic habitats were present – bare sediment (> 82.8%), filter feeders (10.1%) and burrowers and crinoids (6.2%)). Potential impacts to these benthic habitats are considered above in **Other Benthic Communities**. Likewise, other environmental values of the Oceanic Shoals Marine Park, such as marine fauna and KEFs, are representative of the region. Refer to the preceding and following sections of this impact assessment.

The proposed gas export pipeline route and the installation of the pipeline, PLET and supporting structures are aligned with the IUCN principles and management objectives for the multiple use and habitat protection zones and are consistent with the objectives for these defined in the *North Marine Parks Network Management Plan* (Director of National Parks, 2018). The alignment with these principles and objectives is provided in **Table 5-9.**

For the above reasons, there is no substantial change that may modify, destroy, fragment, isolate or disturb the values of the Oceanic Shoals Marine Park.

Key Ecological Features

The pipeline passes through two KEFs:

- Shelf break and slope of the Arafura Shelf (KP0 to KP73) ; and.
- Carbonate bank and terrace system of the Van Diemen Rise (KP73 to KP107 and KP248 to KP252).

Defined values of the KEFs are:

- Sponges, soft corals and other sessile filter feeders associated with hard substrate sediments of the deep channels
- Epifauna and infauna
- Olive ridley turtles, sea snakes and sharks (addressed above)
- Continental slope, patch reefs and hard substrate pinnacles (addressed above)

The benthic habitat model predicts that habitat along the pipleine route within both KEFs between KP0 and KP107 are devoid of filter feeders (which inludes sponges, soft coral, epifauna and infauna (**Figure 4-10** and **Figure 4-12**). This is conirmed by photographic observations taken during the geotechnical survey of the pipeline route, which showed bare sand on the seabed at all locations within the KEFs and along the whole of the pipeline. The closest sponge communities are located on Goodrich Bank, however, these were also sparsely distributed and found only in the shallow waters on top of the bank (see **Figure 4-16**). Accuracy of the model for the filter feeder class, which inlcudes sponges, is high at 92% (**Table 4-4**).

BIAs for foraging turtles within the KEF are located more than 100 km from the operational area and the pipeline route avoids the banks, shoals and pinnacle seabed features, therefore, there will be no impact to these values.

Surface sediment along the pipeline route within the KEFs between KP0 and KP110 (**Figure 4-9** and **Figure 4-11**) are generally medium dense clayey and silty siliceous calcareous sands. The pipleine is expected to self bury within these soft sediments. There is a span locations at KP108 associated with a calcareous outcrop. This is just outside the boundry of the KEF and will be rectified using mattress or grout bags, with minimal liberation of sediment and no disturbance to the KEF.

Between KP248 **and** KP251 **(**Figure 4-23**), sediments** are fine to coarse gravel with an isolated area of hardground. There are eight span locations between KP249.5 and KP250, some of which may require mass flow excavation. The benthic habitat model, predicts mostly bare sediment with outcrops of filter feeders, burowers and crinoids in these locations (see Figure 3-3 **(c), Inset 7**). Mass flow excavation has been assessed above with minimal impact to benthic communities predicted.

Potential impacts to Olive Ridley turtles, sea snakes and sharks are addressed above.

Impact to the environment within the KEFs are predicted to be negligible, therefore, there will be no substantial changes that could modify, destroy, fragment, isolate or disturb their defined values. On this basis the impact is deemed acceptable.

Table 5-10: Demonstration of alignment with IUCN principles and *North Marine Parks Network Management Plan* objectives

Principle / Objective	Demonstration of Alignment
IUCN Category Management Principles – Multiple Use Zone (IUCN Category VI)	
The biological diversity and other natural values of the reserve or zone should be protected and maintained in the long term.	The biological diversity and other natural values, of the Oceanic Shoals Marine Park will not be affected by installation of the gas export pipeline due to: • the benthic habitats that exist within the proposed gas export pipeline route (including a 250 m buffer either side of the pipeline), both within the Habitat Protection Zone and the Multiple Use Zone of the marine park consist of burrowers/crinoids (approximately 19%) and filter feeders (approximately 4%), with the remaining area supporting bare sand habitat (approximately 76%). These habitats are well represented in both the Multiple Use Zone and the wider marine park as well as within the broader region (Heyward et al., 2017; Radford et al., 2019).
Management practices should be applied to ensure ecologically sustainable use of the reserve or zone.	Installation of the gas export pipeline is consistent with the principle of ecological sustainable use of the Oceanic Shoals Marine Park. The natural processes and life-support systems of the Multiple Use Zone of the Oceanic Shoals Marine Park will be sustained, and the potential for the marine park to meet the needs and aspirations for future generations will be maintained, due to the following: • The installation and operation of the gas export pipeline will not result in a significant impact to the ecological values associated with the marine park. Overall, the seabed disturbance resulting from the installation and operation of the proposed pipeline within the Oceanic Shoals Marine Park will cause very localised disturbance of benthic habitats and short - term changes to benthic communities in the immediate vicinity (within tens of metres). The representativeness of habitats and habitat diversity of the Oceanic Shoals Marine Park will be maintained. • There are no significant feeding, breeding or aggregation habitats for marine fauna within the proposed gas export pipeline route within the Oceanic Shoals Marine Park, with the exception of internesting habitat critical to the survival of flatback turtles. However, internesting turtles are not expected to frequent the area of the proposed gas export pipeline due to water depth and the installation of the pipeline is not expected to modify any use of this habitat. ConocoPhillips will apply a series of management controls (detailed below in **Controls and Demonstration of ALARP**) to ensure the ecologically sustainable use of the Multiple Use Zone.
Management of the reserve or zone should contribute to regional and national development to the extent that this is consistent with these principles.	Installation of the gas export pipeline is a central element of the Barossa project that is expected to contribute to local, regional and national development, and seabed disturbance from these activities is not anticipated to impact on the biological diversity and other natural values of the Oceanic Shoals Marine Park.
IUCN Category Management Principles – Habitat Protection Zone (IUCN Category IV)	
Habitat conditions necessary to protect significant species, group or collections of species, biotic communities or physical features of the environment should be secured and maintained, if necessary, through specific human manipulation.	The proposed gas export pipeline route (including a 250 m buffer) overlaps approximately 0.0002% of the Habitat Protection Zone of the Oceanic Shoals Marine Park. The proposed pipeline route does not overlap any known burrower/crinoid habitat within the Habitat Protection Zone. The physical footprint of the pipeline and indirect impacts from installation (allowing a 250 m buffer either side) within the Habitat Protection Zone are expected to result in the loss of approximately 0.05% of the filter feeder habitat present in Habitat Protection Zone, or 0.009% of the total filter feeder habitat available within the Oceanic Shoals Marine Park. It is highly unlikely that the physical presence of the gas export pipeline, installation activities and operations will result in a significant impact to the ecological values associated with the Habitat Protection Zone. Overall, the seabed disturbance resulting from the installation and operation of the proposed pipeline within the Oceanic Shoals Marine Park is expected to cause very localised disturbance of benthic habitats and short - term changes to invertebrate communities in the immediate vicinity (within tens of metres). There are no significant feeding, breeding or aggregation habitats for marine fauna within the vicinity of the pipeline route within the Habitat Protection Zone, with the exception of internesting habitat critical to the survival of flatback turtles identified by the *Recovery Plan for Marine Turtles 2017-2027*. As discussed above, this habitat is likely to be too deep to be utilised as internesting habitat by flatback turtles. The physical presence of the gas export pipeline is considered highly unlikely to impact flatback turtle internesting use of the area, considering the area affected represents a very small portion of the internesting habitat critical to the survival of flatback turtles. Therefore, any impacts to marine turtles as a result of pipeline activities are aligned with the IUCN management principle.

Principle / Objective	Demonstration of Alignment
Scientific research and environmental monitoring that contribute to reserve management should be facilitated as primary activities associated with sustainable resource management.	The data collected and analysed during the collaborative studies that ConocoPhillips and AIMS have undertaken to date has not only been used to support this EP, but it is being used by AIMS to update its model/knowledge of the Oceanic Shoals Marine Park habitats and it is also being shared with Parks Australia to support the implementation of the management plan. In this way, the data and information that Parks Australia and ConocoPhillips are using to assess potential impacts to the marine park is from a common source.
The reserve or zone may be developed for public education and appreciation of the characteristics of habitats, species or collections and for the work of wildlife management.	Through the agreement ConocoPhillips has with AIMS for the collaborative studies, AIMS is able to use the data and information derived for non-commercial purposes and AIMS is planning to publish the results of the studies.
Management should seek to ensure that exploitation or occupation inconsistent with these principles does not occur.	ConocoPhillips considers that the impacts and risks that the gas export pipeline installation activities may pose to the Habitat Protection Zone of the Oceanic Shoals Marine Park are demonstrated to be acceptable based on the following: • habitats necessary to the survival of protected species will not be impacted • impacts to biotic species, including benthic habitats are expected to be minor and will not impact on the habitat representativeness or habitat diversity of the marine park, and • impacts to physical features considered values of the Oceanic Shoals Marine Park, such as the identified KEFs, are expected to be negligible. Therefore, the gas export pipeline installation within the Habitat Protection Zone is consistent with the management principles of the Oceanic Shoals Marine Park.
People with rights or interests in the reserve or zone should be entitled to benefits derived from activities in the reserve or zone that are consistent with these principles.	Gas export pipeline installation activities are not expected to result in any benefits to people with rights or interests in the Oceanic Shoals Marine Park.
If the reserve or zone is declared for the purpose of a botanic garden, it should also be managed for the increase in knowledge, appreciation and enjoyment of Australia's plant heritage by establishing, as an integrated resource, a collection of living and herbarium specimens of Australian and related plants for study, interpretation, conservation and display.	Not applicable to the Oceanic Shoals Marine Park.
Oceanic Shoals Marine Park Management Objectives – Multiple Use Zone (IUCN Category VI)	
The objective of the multiple use zone is to provide for ecologically sustainable use and the conservation of ecosystems, habitats and native species.	Installation of the gas export pipeline is consistent with the principle of ecological sustainable use of the Oceanic Shoals Marine Park: • It is highly unlikely that the physical presence of the gas export pipeline, installation activities and operations will result in a significant impact to the ecological values associated with the Oceanic Shoals Marine Park. Overall, the seabed disturbance resulting from the installation of the gas export pipeline within the marine park is expected to cause very localized disturbance of benthic habitats and short-term changes to invertebrate communities in the immediate vicinity (within tens of metres). The representativeness of habitats and habitat diversity of the Oceanic Shoals Marine Park will be maintained. • There are no significant feeding, breeding or aggregation habitats for marine fauna within the vicinity of the pipeline route within the Oceanic Shoals Marine Park, with the exception of internesting habitat critical to the survival of flatback turtles. However, internesting turtles are not expected to frequent the area of the proposed gas export pipeline due to water depth and the installation of the pipeline is not expected to modify any use of this habitat. Installation of the gas export pipeline is a central element of the Barossa project that is expected to contribute to local, regional and national development. The impacts and risks from these activities is not anticipated to impact on the biological diversity and other natural values of the Oceanic Shoals Marine Park. Therefore, the natural processes and life-support systems of the Multiple Use Zone of the Oceanic Shoals Marine Park will be sustained, and the potential for the Oceanic Shoals Marine Park to meet the needs and aspirations for future generations will be maintained.
The objective of the habitat protection zone is to provide for the conservation of ecosystems, habitats and native species in as natural a state as possible while allowing activities that do not harm or cause destruction to seafloor habitats.	The gas export pipeline installation activities are consistent with the management objective of the Habitat Protection Zone within the Oceanic Shoals Marine Park based on the following: • Although the presence of the gas export pipeline will result in a small direct loss of benthic habitat, there will be no impact on the habitat representativeness or habitat diversity of the Oceanic Shoals Marine Park.

Principle / Objective	Demonstration of Alignment
	• Where the pipeline overlaps the Habitat Protection Zone, it is distant from seafloor features associated with the KEFs considered values of the marine park. Therefore, no impacts to KEFs are expected from pipeline activities within the Habitat Protection Zone. • Where the pipeline route overlaps the Habitat Protection Zone, it is outside the water depths (i.e. > 30 m) where the majority of flatback turtle internesting activity is known to occur. Therefore, the gas export pipeline installation activities are not likely to have adverse impacts to seafloor habitat considered as internesting habitat critical to the survival of flatback turtles. • There are no sensitive or important benthic habitats, or feeding, breeding or aggregation areas for marine fauna in the vicinity of the pipeline route that could be impacted by gas export pipeline installation activities. Therefore, gas export pipeline installation activities, including direct and indirect impacts from installation and operations, will not result in the destruction of seafloor habitats or impact the conservation of ecosystems within the Habitat Protection Zone of the Oceanic Shoals Marine Park.

Risk Assessment			
Installation of PLET, PLET foundations and pipeline initiation structure			
	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	2 – Minor	3 – Rare	RRII – Medium
Residual risk	2 – Minor	2 – Remote	RRI - Low
Installation of Gas Export Pipeline and Span Rectification (except mass flow excavation)			
	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	2 – Minor	3 – Rare	RRII – Medium
Residual risk	2 – Minor	2 – Remote	RRI - Low
Span Rectification – mass flow excavation			
	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	2 – Minor	3 – Rare	RRII – Medium
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP			
Existing Controls			
Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Confirmation of proposed gas export pipeline route prior to and during installation	This control ensures that the pipeline is laid along the planned route, which was determined taking into account (amongst other factors) environmental sensitivities that were identified during the design phase. This control is very effective in avoiding sensitive habitats and span rectification by design.	**C 2.2**	**EPS 2.2.1** Gas export pipeline route to be surveyed and confirmed prior to installation. **EPS 2.2.2** Gas export pipeline position to be continuously verified during installation.
Dynamically positioned (DP) pipelay vessel will be used for installation of the pipeline	The control is effective in eliminating seabed disturbance from an anchor spread for use by the pipelay vessel. The use of DP also provides high precision station-keeping, which ensures the gas export	**C 2.3**	**EPS 2.3.1** Pipelay vessel will use DP at all times during pipelaying operations.

	pipeline is installed along the designed route, reducing the need for span rectification. The use of DP will generate broadband underwater noise; refer to **Section 5.2.3** for the assessment of impacts from underwater noise.		
DGPS for pipelay vessel to maintain accurate vessel position during installation	The control is effective in ensuring vessels, in combination with DP systems, are positioned with high accuracy. This ensures the gas export pipeline is installed along the desired route. The proposed pipeline route has been designed to avoid sensitive benthic features and minimise the requirement for span rectification.	**C 2.4**	**EPS 2.4.1** Pipelay vessel will use DGPS at all times during pipelaying operations.
Survey technology used to ensure that all structures are installed within designed tolerances	This control is effective in ensuring that the PLETs are installed as designed at the intended locations. The selected locations do not host sensitive benthic habitats.	**C 2.5**	**EPS 2.5.1** Checks prior to PLET installation to confirm: • DGPS used by pipelay vessel during installation • Underwater positioning system (USBL / LBL) and ROV to confirm PLET installation location and positioning (within required location accuracy to reduce disturbance to the seabed)
Placement of pipeline initiation structure to avoid sensitive benthic habitats and mitigate initiation structure dragging	This control is effective in ensuring the initiation structure avoids sensitive benthic habitats and minimises the potential for the structure to drag.	**C 2.6**	**EPS 2.6.1** Initiation structure plan developed based on pre-lay survey information and include: • Requirement for trained and experienced vessel crews • Continuous monitoring of initiation wire tensions to prevent structure drag on seabed during pipelay • Review of initiation structure plan to verify location avoids sensitive habitat
No planned anchoring in the Habitat Protection Zone (IUCN IV) -zone 2 of the Oceanic Shoals Marine Park or on named Shoals and Banks, unless it is required in an emergency	This control is effective in preventing anchoring on sensitive benthic habitats associated with the named banks and shoals in the region. The proposed gas export pipeline route has been designed to avoid these features.	**C 2.7**	**EPS 2.7.1** All anchoring restricted to the areas beyond named banks and shoals. **EPS 2.7.2** Activity vessels shall not anchor in the Habitat Protection Zone (IUCN IV) -zone 2 of the Oceanic Shoals Marine Park, unless it is required in an emergency.
No pipeline installation activities within olive ridley turtle internesting BIA	This control is effective in avoiding the internesting BIA for olive ridley turtles, which may host turtles undertaking	**C 2.8**	**EPS 2.8.1** All gas export pipeline installation activities restricted to areas beyond the olive ridley turtle

	biologically significant behaviour. Given the behaviour of olive ridley turtles, they are unlikely to be encountered within the water depths of the proposed gas export pipeline route when internesting.		internesting BIA.

Assessment of additional controls

Additional control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
Eliminate rock dumping span rectification method	Yes	Yes	An assessment of span rectification methods indicated that rock dumping is, overall, the least preferred span rectification method. Rock dumping shall be excluded and replaced by localised span correction mattresses and grout bags.	N/A
Eliminate mechanical trenching based span rectification methods	Yes	Yes	Mechanical trenching, either pre lay or post lay, can be used to locally lower the pipeline at span shoulders to reduce spans. Mechanical trenching shall be excluded and replaced by localised span correction mattresses and grout bags.	N/A
Substitution				
Gas export pipeline route to avoid the Oceanic Shoals AMP Habitat Protection Zone	No	No	(see row below)	N/A

Justification

ConocoPhillips examined a preliminary route to the east of the Oceanic Shoals Marine Park that did not overlap the HPZ (IUCN Cat IV). Investigations along this preliminary route indicated the seabed was more rugose than the proposed route through the HPZ and would require considerably more seabed intervention and pipeline stabilisation (e.g. dredging/trenching). Benthic habitats along this preliminary route are also more diverse than those along the route within the HPZ and may support relatively diverse biological communities. Additionally, the preliminary route overlaps internesting habitat critical for the survival of the olive ridley turtle identified in the Recovery Plan for Marine Turtles (Commonwealth of Australia, 2017a). Therefore, the preliminary route east of the HPZ was identified as having greater environmental impacts than the proposed route through the HPZ.

Installation the gas export pipeline to the west of the Habitat Protection Zone (IUCN Cat IV) would result in the route overlapping the National Park Zone (IUCN Cat II), which has a higher level of protection. The Australian Marine Parks North Marine Park Management Plan (Director of National Parks, 2018) states construction of a pipeline is an allowable activity. However, routing the gas export pipeline through the National Park Zone is not acceptable as a route through an area with a lower level of protection (i.e. the proposed route) is available.

Based on the preceding points, ConocoPhillips considers the proposed route through the Oceanic Shoals marine park HPZ is the only practicable route. The Director of National Parks has granted ConocoPhillips a licence within the HPZ for the installation of the gas export pipeline.

Engineering				
Additional stabilisation to prevent pipeline flex	Yes	No	The gas export pipeline has been designed to allow some flexing (e.g. lateral movement on the seabed within design limits). This lateral movement is expected to be small due to the concrete weight coating but may result in disturbance to benthic habitats. The footprint of	N/A

			additional stabilisation required to restrain pipe movement is expected to exceed the footprint of sections of the gas export pipeline that may flex laterally, hence the pipeline shall be allowed to flex.	
Administrative				
Divide the pipeline installation scope into multiple campaigns to minimise work performed during the peak internesting periods within important habitat for listed marine turtles.	No	No	(see Justification below)	N/A
Justification Unlike other turtle populations (e.g. on the North West Shelf of WA), the olive ridley and flatback turtles nesting seasons on Bathurst Island do not exhibit discrete nesting seasons. Rather, there is low level nesting year-round, with a peak in nesting and internesting during winter months. A seasonal exclusion would not avoid all turtle nesting and internesting activity but may avoid the known peaks. Should timing of pipeline installation and associated activities be scheduled to avoid peak interesting season this will impose impractically tight restrictions on the window for starting operations in order to ensure the activities can be completed outside of the peak internesting season, without the risk of the activities having to be split over multiple seasons. The start date for the pipelay operations is driven by the limited availability of pipelay vessels in region, prior commitments of pipelay vessels and the availability of associated equipment such as linepipe materials and PLET structures to support the activities. Due to the uncertainty on these elements it is standard practice to negotiate a large window for commencement of pipelay operations with a mechanism to reduce the window as the project progresses and the factors detailed above become more certain. The call down window is initially under the control of ConocoPhillips before passing to the pipelay vessel operator in order that they can manage their prior vessel commitments. As a result of the call down mechanism for the pipelay vessel and the uncertainty on the pipelay start date it is impractical to guarantee that pipelay activities can be fully completed in a given season. If seasonal exclusions are imposed and activities cannot be completed in a single season then this will require the activities to be split over multiple seasons. This will result in an overall extension in the duration of the activity, additional vessel mobilisations and demobilisations and will considerably increase the cost of pipelay. If the campaign extends over two seasons there is a risk that spans are left unrectified in the intervening period which may markedly increase the number of span corrections required or could result in unacceptable fatigue damage to the pipeline resulting in the need to replace a section of pipeline. It may also be counterproductive as multiple vessel mobilisations could increase the overall environmental impact. It may also raise the risk of simultaneous operations (SIMOPS), where the pipelay vessel ends up interacting with other Barossa construction activities (spool installations, drilling or FPSO mooring installation). SIMOPS is highly undesirable mode of operation as it means vessels either being stood down for a period of time or operating in close proximity to one another. Apart from the additional cost, this could increase collision risk and result in enhanced cumulative environmental impact for aspects such as light and noise. ConocoPhillips has assessed if certain activities associated with the pipelay operations, such as pre-lay and post-lay span correction, can be performed outside of peak internesting periods. However, the construction vessels used to support pipelay operations are also required throughout the full pipelay campaign and as such the sequence of pre-lay activities, pipelay and post-lay activities is more effectively performed in a single campaign in order to avoid the requirement to perform multiple mobilisations/demobilisations of the construction vessel(s). As highlighted above it is also necessary to ensure spans are corrected as soon as practicable and as such post-lay work cannot practically be separated from the pipelay activity. Performing the work in a single continuous campaign also enables pre-lay and post-lay activities to be performed in parallel with pipelay where practicable to further reduce the schedule, optimise the offshore campaign and minimise the extent of span correction required thus reducing the seabed footprint and environmental impact. Given the likely low impact to turtles, implementing seasonal control for elements of the activity and the whole activity was discounted.				
Sequence activities to minimise the time pipelay, and associated activities, are performed within	Yes	Yes **C 2.10**	Whilst it is not practicable to time the start date of the activity due to scheduling constraints (that is, the Barossa pipelay must fit in with the overall pipelay vessel job sequence),	**EPS 2.10.1** Planning for pipelay installation (including span rectification) shall consider turtle

peak internesting periods in important habitat for listed marine turtles.			it is possible to sequence activities to minimise the time pipelay, and associated activities, are performed within peak turtle internesting periods. For example, it is possible to select the direction of pipelay based on the start date in relation to peak internesting seasons, or sequence span rectification activities to prioritise certain regions over others (notwithstanding technical drivers to rectify critical spans in a timely manner). No timing restrictions are proposed for the pre and post lay site survey due to their inherently low impact.	internesting season and activities shall be sequenced to avoid peak periods where the pipeline integrity is not compromised as a result.
Pre-lay and post-lay surveys at initiation structure location	Yes	Yes **C 2.11**	Pre-lay surveys confirm the nature of the seabed within the initiation structure location to ensure the structure is installed on bare area of the seabed. Post-lay surveys will allow verification of the impact assessment.	**EPS 2.11.1** The pipeline initiation structure shall be placed on a bare area of seabed. **EPS 2.11.2** Pre and post-lay surveys of anchoring locations will be undertaken.
Pre-lay and post-lay benthic habitat surveys along the full gas export pipeline route	Yes	No	Habitats along the pipeline route are well known having been extensively studied (**Section 4.4**). The route has been shown to be devoid of sensitive habitat, including within the areas of the KEF and Oceanic Shoals Marine Park. Pre or post lay benthic habitat surveys would provide no further information or environmental benefit and have been ruled out.	N/A
Monitoring of the seabed to determine environmental impact during span rectification	Yes	No	Preliminary span engineering has been carried out and rectification techniques will be limited to mattresses, grout bags, mechanical support structures and mass flow excavation (see **Section 3.5.4**). The seabed types at rectification locations are well understood and deemed to be well distributed throughout the region. The impact from span rectification has been demonstrated to be acceptable and no further environmental monitoring is considered necessary.	N/A
Limiting duration for continuous mass flow excavation at any one location.	Yes	Yes **C2.13**	Mass flow excavation may be used to locally reduce high spots at the span shoulders to lower the pipeline and control spans. Excavation will be limited to twelve hours in the event that the excavation rate is lower and to place boundaries on its use. The impact assessment demonstrated minimal impact from suspended sediment for mass flow excavation at maximum excavation	**EPS 2.13.1** Mass flow excavation procedures, shall include the requirement to limit mass flow excavation at any one location to no greater than 12 hours within a 24 hour period.

			rate for one hour. If excavation is required for longer periods, then it means that sand is being excavated at a slower rate with less sediment liberated into the water column but for a longer duration. Procedures shall be developed if mass flow excavation is required limiting the duration excavation can occur at any one location in order to limit turbidity caused by sediment transfer.	

ALARP Statement

Based on the outcomes of the impact assessment and the implementation of controls throughout the activity, ConocoPhillips considers that the impacts from seabed disturbance from installation of the gas export pipeline, PLETs and supporting structures are reduced to ALARP.

Relevant legislative requirements and standard industry practices have been applied to control the risk. Additional controls were evaluated; several were selected for implementation, three were rejected as the reductions in impacts were considered grossly disproportionate to the cost of implementation.

The controls selected for implementation re effective in reducing impacts to a range of environmental receptors. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts.

Summary of alignment with EPBC Management Plans

Relevant Receptor	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Australian Marine Park	North Marine Parks Network Management Plan	See **Table 5-10**	See **Table 5-10**

Marine turtles	Recovery Plan for Marine Turtles 2017-2027	Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival of the species. Manage anthropogenic activities in Biologically Important Areas to ensure that biologically important behaviour can continue Manage infrastructure, coastal development, dredging and trawling to ensure ongoing biologically important behaviours for marine turtle stocks continues Use up to date information regarding nesting, internesting and foraging habitat to inform future development proposals and approval decisions	There is no evidence to suggest that the proposed activity will result in marine turtles being displaced from habitat critical to their survival nor that important biological behaviour will be interrupted. Pipelay is short duration taking approximately three months to complete. Time within the habitat critical areas adjacent to Bathurst Island is expected to be approximately 23 days, representing a maximum of 25% of the peak nesting/internesting period. Pipelay is a slow and highly managed process so physical impact to marine turtles is highly unlikely. The footprint of the pipeline represents a small area of important habitat in this area. The pipeline itself will form suitable habitat for colonisation by flora and fauna. This EP and the literature review (Pendoley, 2020) summarises the most up-to-date information on turtle nesting, internesting and foraging habitat.
Sawfish	Sawfish and River Shark Multispecies Recovery Plan	Reduce adverse impacts of habitat degradation and modification[2] Ensure all future developments will not significantly impact upon sawfish and river shark habitats critical to the survival of the species, or impeded upon the migration of individual sawfish or river sharks	The management of seabed disturbance from the installation of the gas export pipeline, PLETs and supporting structures are aligned to the objectives of the Sawfish and River Shark Multispecies Recovery Plan. No habitat critical to the survival of the species has been identified in the Operational Area or EMBA and therefore adverse impacts from the modification of habitat is not predicted to result in adverse impacts to sawfish species, as described above.
Environmental Protection Outcomes (Table 6-1)			
EPO 2 Direct impacts to benthic habitats will be restricted to the footprint of the pipeline and supporting structures. Beyond the footprint of the pipeline and supporting structures impact will be limited to localised, short term disturbance associated with suspension and deposition of surface sediment.			

[2]Note that in the *Sawfish and River Sharks Multispecies Issues Paper* (Commonwealth of Australia, 2015) the habitat threats exist for sawfish and river shark species, particularly those species that rely to a greater extent on freshwater and inshore areas. The threats identified included coastal developments and the impacts on juveniles within those habitats.

5.2.3 Noise Emissions

<table>
<tr><td rowspan="2">Risk</td><td colspan="2">Underwater noise from vessels, MBES, SBP Chirper, LBL and USBL resulting in:
• Masking of vocalisations / signals from predators / prey
• modification of fauna behaviour (avoidance / attraction / disruption of normal behaviour)
• physical injury to fauna from exposure to excessive noise (barotrauma, hearing loss)</td></tr>
<tr></tr>
<tr><td rowspan="2">Aspect-receptor Reference (Table 5-5)</td><td>3I – Pelagic and demersal fish communities</td><td>3J – Marine mammals</td></tr>
<tr><td>3K – Marine reptiles</td><td>3L – Sharks and rays</td></tr>
<tr><td colspan="3">Description of Source of Impact</td></tr>
</table>

There will be a period of increased noise emissions during installation activities due to the operation of activity vessels, operation of survey and positioning equipment and from helicopters supporting the installation activity.

Underwater noise emissions will be temporary and will take place for a relatively short period of time in any one location, because the pipelay vessel is continuously moving at a speed of approximately nominally 3 km a day.

Pipeline Installation Activities – Vessel

Noise associated with vessel activity that could impact marine fauna includes noise generated by vessel thrusters, engines and propellers, as well as noise emitted onboard which is converted to underwater noise through the hull (e.g. from heavy machinery). The main source of vessel noise will be from propellers or DP thrusters.

Noise will also be generated during installation of the gas export pipeline from span rectification activities, placement of the pipeline on the seabed during gas export pipeline installation and use of ROVs. However, sound from the vessels themselves will be the primary source of sound during span rectification, pipeline placement and ROV use, and therefore vessel sound has been used to determine the noise emissions during gas export pipeline installation.

Helicopters

The main source of noise emissions from helicopters is the engines and the rotor blades. The landing and take-off of helicopters would be the only time noise emissions from helicopters would occur in the Operational Area as this is when helicopters are at their lowest (and therefore closest to the surface of the water). Helicopters are expected to land / take-off up to 4 times a day on the pipelay vessels and up to twice a day on other activity vessels.

Survey Equipment

Survey activities will be undertaken along the pipeline route to understand the seabed features and the location of relevant infrastructure. Survey methods will primarily involve the following sources:

- Multi-Beam Echo-Sounder (MBES), such as the Reson SeaBat 7125 transmitting at 400 kHz. At 400 khz it has a 1° beamwidth along the track, and a source level of 220 dB re 1 μPa (Coastal Frontiers, 2017).
- Compressed High Intensity Radar Pulse (CHIRP) Sub-bottom Profiler (SBP) with a chirp frequency range from 2 – 50 kHz, with three chirp transducers for three frequency ranges, 2-9 kHz, 10-20 kHz and 20-50 kHz. The in-beam estimated maximum source levels are about 200 - 205 dB re 1 μPa @ 1 m (DOC, 2016).

Underwater Acoustic Positioning

USBL or LBL acoustic positioning system will be utilised on board the pipelay vessel. This tool is used to locate the position of subsea transponders that have been placed on the seabed. The USBL and LBL system uses a vessel mounted transceiver to detect the range and bearing to a target using acoustic signals.

An acoustic pulse is transmitted by the transceiver and detected by the subsea transponder, which replies with its own acoustic pulse. This return pulse is detected by the shipboard transceiver. The time from the transmission of the initial acoustic pulse until the reply is detected is measured by the USBL or LBL system and is converted into a range. To calculate a subsea position, the USBL or LBL calculates both a range and an angle from the transceiver to the subsea beacon. Angles are measured by the transceiver, which contains an array of transducers. The transceiver head normally contains three or more transducers separated by a baseline of 10 cm or less. A method called "phase-differencing" within this transducer array is used to calculate the angle to the subsea transponder. The transducer will then send sound signals, typically at 19 to 33 kHz to a USBL transponder.

Table 5-11 details the nominal specifications of likely acoustic positioning systems as detailed in McPherson, 2020.

Table 5-11: Specifications of nominal acoustic positioning systems

Manufacturer	Model	Source Frequency (kHz)	Source Level (dB re 1 µPa @ 1 m)
Kongsberg	HiPAP 500	33	206
Sonardyne	Ranger USBL	18-36	204

Levels of acceptable impact

The impact caused by sound emissions from pipelay installation activities will be acceptable if there is no substantial change to threatened and migratory species that may:

i. lead to a long-term decrease in the size of a population

ii. reduce the area of occupancy of the species

iii. adversely affect habitat critical to the survival of a species

iv. displace threatened and migratory marine fauna from habitat critical areas

v. disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas

vi. disrupt the breeding cycle of a population

vii. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

viii. interfere with the recovery of the species

Potential Impacts

Underwater noise emissions have the potential to affect marine fauna that may transit the Operational Area, including marine mammals, reptiles, sharks/rays and other fish. Marine fauna use sound for a range of functions such as social interaction, foraging and orientation. Marine fauna respond variably when exposed to underwater noise from anthropogenic sources, with effects dependent on a number of factors, including distance from the sound source, water depth and bathymetry, the animal's hearing sensitivity, type and duration of sound exposure and the animal's activity at time of exposure (JASCO Applied Sciences, 2016b). Broadly, the effects of sound on marine fauna can be categorised (JASCO Applied Sciences, 2016b) as:

- acoustic masking – anthropogenic sounds may interfere with, or mask, biological signals, therefore reducing the communication and perceptual space of an individual. Auditory masking impacts may occur when there is a reduction in audibility for one sound (signal) caused by the presence of another sound (noise). For this to occur the noise must be loud enough and have a similar frequency to the signal and both signal and noise must occur at the same time.
- behavioural response – behavioural impacts will depend on the audible frequency range of each potential receptor in relation to the frequency of the noise, as well as the intensity of the noise. Behavioural changes vary significantly and may include temporary avoidance, increased vigilance, reduction in foraging and reduced vocalisations.
- physiological impacts – auditory threshold shift (temporary and permanent hearing loss) – marine fauna exposed to intense sound may experience a loss of hearing sensitivity, or even potentially mortal injury. Hearing loss may be in the form of a temporary threshold shift (TTS) from which an animal recovers within minutes or hours, or a permanent threshold shift (PTS) from which the animal does not recover.

Available threshold criteria associated with behavioural and physiological impacts for sensitive receptors have been derived from a number of studies (NMFS, 2018; NMFS 2014; Popper et al 2014; Southall et al 2019). These criteria have been compared with measured and predicted sound levels for different sound sources to assess potential impacts.

Marine Mammals

No significant feeding, breeding or aggregation areas for marine mammals are known within the Operational Area. The only BIA's for marine mammals in the NMR are for the Indo-Pacific bottlenose dolphin (Darwin Harbour), Australian humpback dolphin (Darwin Harbour and Van Diemen Gulf) and Australian Snubfin Dolphin (Darwin Harbour and Van Diemen Gulf) (**Section 4.5.5.5**). These areas are located approximately 66km from the Operational Area at the closest point. However, as described in **Section 4.5.5.5**, several marine mammals may occur in the Operational Area.

A number of species of baleen whales may occur in the Operational Area, including Omura's, pygmy blue and Bryde's whale. Based on their hearing range these whales have been classified as low frequency (LF) cetaceans. A number of odontocetes (including dolphins and false killer whales) may also be present in the northern section of the Operational Area. Dolphins may also transit through the southern section of the Operational Area. Odontocetes have been classified as high frequency (HF) cetaceans (using the hearing group classification from Southall et al 2019, previously these were classified as mid-frequency cetaceans (Southall et al 2019 and NMFS 2018).

While dugongs may occur in the Operational Area, dugongs spend most of their time in shallow tidal and subtidal seagrass meadows. There are no assessments for impacts of vessel noise on dugongs (sirenians) using the Southall et al 2019 criteria. As their frequency-weighting is most similar to HF cetaceans, and their thresholds are higher (as they are less sensitive), results for vessel noise impacts on HF cetaceans have been used as a proxy for those on dugong, noting that this is likely to be conservative.

Table 5-12 and **Table 5-13** detail receptor noise impact and behavioural thresholds for continuous noise (vessels) and impulsive noises (survey equipment).

Table 5-12: Impulsive Noise: Summary of marine mammal impact thresholds as derived from Southall et al. (2019) and NMFS (2014)

Potential Marine Fauna Receptor	PTS Onset Thresholds[3]		TTS onset thresholds3		Behaviour (SPL, dB re 1 µPa)
	Weighted SEL_{24h} (dB re 1 µPa^2·s)	PK (dB re 1 µPa)	Weighted SEL_{24h} (dB re 1 µPa^2·s)	PK (dB re 1 µPa)	
High-Frequency (HF) cetaceans	185	230	170	224	160
Low-Frequency (LF) cetaceans	183	219	168	213	

Table 5-13: Continuous Noise: Summary of marine mammal impact thresholds as derived from Southall et al. (2019) and NMFS (2014)

Potential Marine Fauna Receptor	Physiological (SEL, db re 1 µPa^2·s; weighted)		Behaviour (SPL, dB re 1 µPa)
	PTS	TTS	
High-Frequency (HF) cetaceans	198	178	120
Low-Frequency (LF) cetaceans	199	179	

Marine Mammals: potential impacts from vessels

The estimated distances to behavioural and physiological thresholds (as listed in **Table 5-13**) for marine mammals are provided in **Table 5-14**.

Zykov et al (2013) considers a range of modelling scenarios for pipelay and support vessels in 23-80 m of water, with seafloor surface geology consisting of sand and silt. The depths and geology are similar to those within the Barossa Project area and along the pipeline route, and the sound speed profile is similar at the relevant shallow depths to that used in previous work for the Barossa Project (JASCO 2016). The vessel referenced in Zykov et al (2013) is the Allseas *Solitaire*, a similar vessel to the Allseas *Audacia*, which is proposed to be used for this project.

The Allseas *Audacia* has a similar total installed thruster power to the MODU considered in McPherson et al (2019), 35,000 kW compared to 30,400 kW. McPherson et al (2019) is one of the few limited studies available considering the most recent criteria for potential physiological effects (Southall (2019) (**Table 5-13**) and the equivalent NMFS 2018) from vessels, in water depths less than 600 m. Therefore, it has been considered where there are similarities to the sound sources for the Barossa Gas Export Pipeline Installation.

[3] Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset.

Table 5-14: Estimated distances to behavioural and physiological thresholds (as listed in Table 5-13) for marine mammals from vessels

Potential Marine Fauna Receptor	Estimated Distance (km)	Justification/ Reference
PTS		
High-Frequency (HF) cetaceans	Not predicted to occur	McPherson et al (2019), Offshore support vessel under DP, Mobile Offshore Drilling Unit (MODU) under DP JASCO (2016), Barossa FPSO during offload (thrusters in use)
Low-Frequency (LF) cetaceans	< 110 m	McPherson et al (2019), Offshore support vessel under DP, MODU under DP
Sirenians (Dugongs)	Not predicted to occur	HF cetaceans used as a proxy
TTS		
High-Frequency (HF) cetaceans	< 120 m	McPherson et al, 2019 Offshore support vessel under DP, MODU under DP
Low-Frequency (LF) cetaceans	< 1.5 km	McPherson et al, (2019) Offshore support vessel under DP, MODU under DP
Sirenians (Dugongs)	< 120 m	HF cetaceans used as a proxy
Behaviour		
High-Frequency (HF) cetaceans	1.3 – 9.8 km	JASCO (2016), Barossa FPSO during operations (1.3 km) McPherson et al (2019), Offshore support vessel under DP (1.3 km) Zykov, et al (2013), Pipe-laying vessel under DP in 80m water (9.8 km)
Low-Frequency (LF) cetaceans		
Sirenians (Dugongs)		

The modelling for the Barossa FPSO during normal operations (JASCO, 2016) has been included to provide context for sound levels likely when vessels are under idle / very low power. Two studies, JASCO 2016 and McPherson et al, 2019 have been included in reference to HF cetaceans to demonstrate that in both the project location and for a reasonable surrogate using the latest criteria, PTS is not exceeded.

Auditory masking impacts may occur when there is a reduction in audibility for one sound (signal) caused by the presence of another sound (noise). For this to occur the noise must be loud enough and have a similar frequency to the signal and both signal and noise must occur at the same time. Therefore, the closer the marine mammal is to the vessel, and the more overlap there is with their vocalisation frequencies, the higher the probability of masking. The potential for masking and communication impacts is therefore classified as high near the vessel (within tens of metres), moderate within hundreds to low thousands of metres, and low at greater distances (Clark et al, 2009).

As outlined in **Table 5-14**, marine sound generated from vessel activities has the potential to cause behavioural responses, such as avoidance, in marine mammals who are within 1.3-9.8 km of the pipelay vessel.

Whilst it is considered unlikely that transiting individuals would remain in close proximity to the sound source, PTS may occur in low frequency cetaceans within close proximity (<110m) of the vessel. TTS may occur up to 1.5km away for low-frequency cetaceans and within close proximity (<120m) for high frequency cetaceans and dugongs).

The risk of impact is further reduced as the pipeline installation vessels will be slowly moving along the pipeline route at a rate of approximately 3 km per day. The likelihood of an individual remaining within the distances above for any length of time is highly unlikely.

Marine Mammals: potential impacts from helicopters

Helicopter noise has been measured at a maximum received level of 109 dB re 1uPa (SPL) and only detectable underwater for 11 to 38 seconds (based on transit speed), depending on water depth (Richardson et al., 1995). Therefore, the only credible impact would be behavioural impacts, limited to short term behavioural responses such as diving and /or increased swimming speed when the helicopter is landing or taking off. Such impacts are unlikely to result in substantial impacts to marine mammal populations or distribution.

Marine Mammals: potential impacts from survey equipment and positioning equipment

Modelling of survey geophysical equipment has been undertaken at a number of locations including the coast of Russia, Greenland, California and the Otway basin (Zykov et al 2013, Austin et al 2012, McPherson and Wood, 2017; Zykov et al, 2012). These studies, along with the example of accumulation provided in McPherson 2020 indicate that both peak and frequency-weighted SEL noise emissions from survey equipment such as MBES operating at 400 kHz or CHIRP SBP are typically below sound levels that could result in low and high-frequency marine mammal TTS or PTS from either PK or SEL criteria (**Table 5-12**) in a horizontal direction. The threshold for behavioural disturbance (**Table 5-12**) could be exceeded within 120 m (McPherson, 2020).

Measurements of vessel mounted CHIRP SBP operating at 3.5 kHz indicated that the threshold for behavioural disturbance could be exceeded within 22 – 30 m (Chorney et al 2011; Warner et al, 2011).

Positioning equipment similar to that proposed to be used during the Barossa Gas Export Pipeline Installation have been considered. The source levels for the positioning equipment are below those for the MBES. As the MBES will not cause the thresholds for physiological impact to be exceeded (**Table 5-12**), neither will the positioning equipment. However threshold for behavioural disturbance (**Table 5-12**) could be exceeded within 40 m (McPherson, 2020).

Survey and positioning equipment could cause masking of vocalisations of cetaceans due to the overlap in frequency range between signals and vocalisations. Masking will primarily apply to HF cetaceans, with all signals above 2 kHz. Higher frequency sounds have limited propagation, and attenuate rapidly, resulting in a relatively small area of influence. Therefore, the range at which masking impacts could occur would be limited to within hundreds of meters from the sound source.

The risk of impact is further reduced as the survey vessels will be moving along the pipeline route. The likelihood of an individual remaining within the distances above for any length of time is highly unlikely.

Marine Reptiles

The Operational Area traverses internesting habitat for flatback and olive ridley turtles. Therefore, flatback and olive ridley turtles in particular may transit the Operational Area in higher numbers, particularly during the peak internesting period (June to September for flatbacks and April to August for olive ridley turtles).

Marine turtles: potential impacts from vessels

No numerical thresholds have been developed for impacts of continuous sources (e.g. vessel noise) on marine turtles. However, Popper et al. (2014) have developed risk-based criteria, and these are presented in **Table 5-15**.

Table 5-15: Criteria for vessel noise exposure for turtles, adapted from Popper et al. (2014)

Potential Marine Fauna Receptor	Masking	Behaviour	TTS	Recoverable injury	Mortality and Potential mortal injury
Marine Turtle	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low

Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of meters, intermediate (I) - hundreds of meters, and far (F) – thousands of meters.

Based on the criteria detailed within **Table 5-15** there is a low risk of any injury to marine turtles from vessel noise. Behavioural changes, such as avoidance and diving, are only predicted for individuals in close proximity to the activity vessels (high risk of behavioural impacts within tens of metres of a vessel and moderate risk of behavioural impacts within hundreds of metres of a vessel). There is a high risk of masking within hundreds of metres of the vessel, and a moderate risk of masking within thousands of metres from the vessel. Little is known regarding masking in marine turtles, and behavioural reactions have been found to be highly context specific, with behavioural sensitisation and habituation affecting the onset threshold for reactions and impacts (Ellison et al, 2012). However, given the relatively low-level increase in sound over a short term period, it is unlikely that vessel noise will cause significant masking impacts in turtles.

Marine turtles: potential impacts from helicopters

Impacts to marine turtles from helicopter noise is expected to be limited to short term behavioural impacts (e.g diving or swimming rapidly) when the helicopter is taking off, based on measurements of helicopter noise (maximum received level of 109 dB re 1uPa and only detectable underwater for 11 to 38 seconds) (based on transit speed), depending on water depth (Richardson et al., 1995). Such impacts are unlikely to result in substantial impacts to marine turtle populations or distribution.

Marine turtles: potential impacts from survey equipment and positioning equipment

Survey equipment and positioning equipment are considered impulsive sources for this assessment, therefore the criteria from Popper et al. (2014) for seismic airguns has been adopted **Table 5-16**).

Table 5-16: Criteria for impulsive noise exposure for turtles, adapted from Popper et al. 2014

Potential Marine Fauna Receptor	Masking	Behaviour	TTS	Recoverable injury	Mortality and Potential mortal injury
Marine Turtle	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) High (I) Low (F) Low	(N) High (I) Low (F) Low	> 210 dB SEL_{24h} or > 207 dB PK

Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of meters, intermediate (I) - hundreds of meters, and far (F) – thousands of meters.

The sound levels of the survey equipment and positioning equipment are below those associated with the PK criteria for injury (**Table 5-16**) beyond a few metres (McPherson, 2020), and due to the low per-pulse SEL (McPherson, 2020), the SEL criteria will also not be exceeded. Recoverable injury and TTS could occur within tens of metres applying the relative risk criteria from Popper et al (2014) (**Table 5-6**). Behavioural changes, such as avoidance and diving, are only predicted for individuals in close proximity to the activity vessels (high risk of behavioural impacts within tens of metres of source and moderate risk of behavioural impacts within hundreds of metres of the source).

Turtles are unlikely to experience masking even at close range to the source. This is in part because the sounds from survey and positioning equipment are all outside of the hearing frequency range for turtles (approximately 50–2000 Hz, with highest sensitivity to sounds between 200 and 400 Hz) (Ridgway et al. 1969, Bartol et al. 1999, Ketten and Bartol 2005, Bartol and Ketten 2006, Yudhana et al. 2010, Piniak et al. 2011, Lavender et al. 2012, 2014).

Impacts to marine turtles from underwater noise generated by survey and positioning equipment are unlikely to result in substantial impacts given that impacts are likely to be limited to physiological impacts in individuals located within tens of metres of the sound source, and behavioural impacts in individuals located within hundreds of metres of the sound source. The risk of impact is further reduced as the vessels will be moving along the pipeline route and is highly unlikely that any individual would remain within the distances above for any length of time.

Sea snakes:

There is limited information on the effects of noise on sea snakes. A current research project investigating the impacts of seismic surveys found that hearing sensitivity of sea snakes is similar to species of fish without a swim bladder (discussed below). Therefore, it is considered that there is a moderate risk in the near and intermediate distances (which extends hundreds of metres) of behavioural impacts to sea snakes, with the impacts being limited to temporary avoidance of the area. Such impacts are unlikely to result in substantial impacts to sea snake populations or distribution.

Fish (including Pelagic and Demersal Fish Communities, Sharks and Rays)

There are no known fish aggregation areas along the pipeline route, however, individuals or schools may pass through. The closest area that is considered likely to support site attached fish is Goodrich Bank, which is located approximately 300 m from the Operational Area (and approximately 2.3km from the pipeline) (**Figure 4-14**).

Fish: potential impacts from vessels

The criteria defined in Popper et al. (2014) for continuous noise sources has been adopted (**Table 5-17** below). This indicates that vessel noise has a low risk of resulting in mortality and a moderate risk of TTS impacts when fish are within tens of metres of a vessel. The most likely impacts to fish from noise will be behavioural responses. Popper et al. (2014) identified a moderate risk of behavioural impacts to fish in near (tens of metres) and intermediate distances (hundreds of metres) from the noise source. Masking in fish could also occur within thousands of metres under a worst-case scenario.

Impacts to fish from underwater noise generated by vessel operations are unlikely to result in substantial impacts to populations or distribution given that impacts are likely to be limited to physiological impacts in individuals located within tens of metres of the vessel, behavioural impacts in individuals located within hundreds of metres of the vessel and masking of fish within thousands of metres. Fish are considered unlikely to remain in proximity to vessels and are therefore unlikely to be exposed to sound at the above thresholds. Site attached fish at Goodrich Bank, which is located approximately 2km from the pipeline and 300 m from the boundary of the Operational Area, are unlikely to be exposed to these thresholds. Given the pipelay vessel is moving at approximately 3km/day, vessel noise will not impact Goodrich Bank or any other one location for an extended duration.

Fish: potential impacts from survey equipment and positioning equipment

The criteria defined in Popper et al. (2014) for impulsive noise sources has been adopted (**Table 5-18** below). Impulsive noises from survey equipment could result in physiological impacts to fish located within metres of the sound source considering the results presented in McPherson (2020). The likelihood of fish being close enough to the sound source for physiological impacts to occur is considered remote.

Table 5-17: Criteria for continuous noise exposure for fish, adapted from Popper et al. 2014

Potential Marine Fauna Receptor	Mortality and Potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: No swim bladder (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: Swim bladder not involved in hearing (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	(N) Low (I) Low (F) Low	170 dB SPL for 48 h	158 dB SPL for 12 h	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Fish eggs and fish larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of meters, intermediate (I) - hundreds of meters, and far (F) – thousands of meters.

Table 5-18: Criteria for impulsive noise exposure for fish, adapted from Popper et al. 2014

Potential Marine Fauna Receptor	Mortality and Potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: No swim bladder (particle motion detection)	> 219 dB SEL_{24h} or > 213 dB PK	> 216 dB SEL_{24h} or > 213 dB PK	>> 186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder not involved in hearing (particle motion detection)	210 dB SEL_{24h} or > 207 dB PK	203 dB SEL_{24h} or > 207 dB PK	>> 186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	207 dB SEL_{24h} or > 207 dB PK	203 dB SEL_{24h} or > 207 dB PK	186 dB SEL_{24h}	(N) Low (I) Low (F) Moderate	(N) High (I) High (F) Moderate
Fish eggs and fish larvae	> 210 dB SEL_{24h} or > 207 dB PK	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low

Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of meters, intermediate (I) - hundreds of meters, and far (F) – thousands of meters.

Behavioural impacts to fish from survey equipment noise may occur in individuals located within hundreds of metres of the source. None of the survey equipment has energy below 1khz, and therefore it is unable to be heard by most fish, which further reduces the risk of impact (Ladich and Fay, 2013). The impact of masking is low at all ranges, apart from fish who specialise in pressure detection, which can be impacted in a moderate way at thousands of meters. However, as these signals are outside the hearing range of most fish in the region, the risk of impact is reduced.

Impacts to fish from underwater noise generated by survey or positioning equipment are unlikely to result in substantial impacts to populations or distribution given that impacts are likely to be limited to behavioural impacts within hundreds of metres and masking within thousands of metres. Fish are considered unlikely to remain in proximity of the sound source for long periods of time, and are therefore unlikely to be exposed to sound at the above thresholds. Site attached fish are more at risk of impacts. Goodrich Bank is located approximately 2km from the pipeline and 300 m from the boundary of the Operational Area. Given the survey vessels are constantly moving, noise from survey or positioning equipment is not expected to impact Goodrich Bank or any other one location for an extended duration.

Impact acceptability summary for threatened and migratory species

Impacts to marine mammals from underwater noise generated by pipelay activities are unlikely to result in substantial impacts given there are no significant feeding, breeding or aggregation areas in the vicinity of the Operational Area. The closest marine mammal BIA's are located approximately 66 km away from the Operational Area, which is outside the area predicted to exceed thresholds for behavioural, masking or physiological impacts. Therefore, any responses will be limited to transiting individuals, which is unlikely to result in substantial impacts to marine mammal populations or distribution.

The proposed pipeline passes through areas designated as important habitat for both flatback and olive ridley turtles (**Figure 4-29**).

Impacts to marine turtles from underwater noise are unlikely to result in substantial impacts to populations or distribution given that impacts are likely to be limited to behavioural and masking impacts within a relatively small area of important turtle habitat. The risk of impact is further reduced as the pipeline installation vessels will be slowly moving along the pipeline route at a rate of approximately 3 km per day, therefore vessel noise will not impact any one location for an extended duration. Based on this, the pipelay vessel will take approximately 23 days to lay pipeline through turtle internesting habitat. Construction vessels may be in the Operational Area for the duration of offshore operations, however, these will generally be in one location for less than 3 days unless performing flood/gauge/testing operations where the vessels will be stationary up to 14 days. The survey vessel will travel at about 25 km/day and traverse the turtle internesting habitat within about 2 days. Other activity vessels (e.g. supply vessels) will only be in the Operational Area for very limited durations (less than 24 hours).

Other protected species of marine reptiles (e.g sea snakes) seabirds and fish (e.g (sharks and sawfish) are not expected to be affected given their wide distribution (in the case of sea snakes and sharks), distances to seabird breeding colonies, and preference for shallow coastal habitats (sawfish).

For the above reasons, no substantial change to threatened and migratory species is anticipated that may:

a. lead to a long-term decrease in the size of a population
b. reduce the area of occupancy of the species
c. fragment an existing population into two or more populations
d. adversely affect habitat critical to the survival of a species
e. displace threatened and migratory marine fauna from habitat critical areas
f. disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas
g. disrupt the breeding cycle of a population
h. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or
i. interfere with the recovery of the species

Risk Assessment			
	Consequence	***Likelihood***	***Risk rating***
Inherent risk	2 – Minor	2 – Remote	RRI – Low
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Note ConocoPhillips implements EPBC Regulations– Part 8 Division 8.1 Interacting with cetaceans (and applied for marine turtles) to reduce the risk of a collision with marine fauna (**Section 5.3.3**). This control may result in a minor ancillary reduction in the potential for noise impacts to cetaceans and turtles, however the control is considered ineffective in managing the impacts of noise from subsea infrastructure installation and activities to marine fauna.			
Maintaining helicopter separation from cetaceans as per EPBC Regulations	Control is effective as it maintains a separation distance between the helicopter and cetaceans thus reducing noise levels received at the sea surface	**C 3.1**	**EP 3 1.1** Helicopters will comply with EPBC Regulations– Part 8 Division 8.3 Interacting with cetaceans, specifically: • Helicopters shall not operate lower than 1650 feet or within a horizontal radius of 500 m of a cetacean known to be present in the area, except for take-off and landing.

Assessment of Additional Controls

Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No additional controls identified				
Engineering				
No additional controls identified				
Administrative				
Cease noise generating activities (e.g. DP) when near marine fauna	No	No	Ceasing activities that generate underwater noise when near sensitive fauna may reduce the potential for impacts. However, the potential for impacts beyond behavioural disturbance are very low. Engine / DP thruster noise cannot reliably be ceased due to the safety critical role of vessel propulsion. It is also not practical to cease pipelay or other critical construction activities in a short timeframe as safely abandoning such operations	N/A

			can often take a number of hours (namely laying down the pipeline or disconnecting from a structure), during which time the impacted fauna will have left the area. Therefore, this control is not deemed feasible.	

ALARP Statement
Based on the outcomes of the risk assessment and the adoption of controls throughout the activity, ConocoPhillips considers that the impacts and risks from vessel light emissions are reduced to ALARP.

Summary of alignment with EPBC Management Plans

Relevant Factor	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Gas Export Pipeline Installation***	***Demonstration of Alignment***
Blue whale	Blue Whale Conservation Management Plan (October 2015) (DoE 2015a)	Assess and address anthropogenic noise	• The impacts from anthropogenic noise have been assessed as minor given: - there are no significant feeding, breeding or aggregation areas for marine mammals within the predicted area of impact for underwater noise - assessment of underwater noise from pipeline installation activities predicts that the extent of underwater noise that be cause impacts in marine mammals is limited to approximately 10 km from the vessels. This represents a very small portion of the offshore waters which may be traversed by marine mammals. • Any potential impacts in the Operational Area are likely to restricted to a small number of individuals that may be travelling through the area and does not present a significant risk to these species at a population level. • This is consistent with the Blue Whale Conservation Management Plan that assessed shipping and industrial noise as 'minor – individuals are affected but no affect at the population level'.
Humpback Whale	Humpback Whale Recovery Plan 2005-2010 (May 2005) (under review) (DEH 2005a) Conservation advice (October 2015) (DoE 2015b)	Assess and address anthropogenic noise	
Sei Whale	Conservation advice (October 2015) (DoE 2015c)	Assess and address anthropogenic noise	
Fin Whale	Conservation advice (October 2015) (DoE 2015d)	Assess and address anthropogenic noise	

			Based on the assessment detailed above, ConocoPhillips has demonstrated that the management of the installation of the gas export pipeline will be aligned with the objectives of the relevant management plans and conservation advice.
Marine Turtles	Recovery Plan for Marine Turtles in Australia 2017-2027	Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival turtles. Manage anthropogenic activities in BIAs to ensure that biologically important behaviour can continue. Chronic noise was identified as a threat to marine turtles	There is no evidence to suggest that the proposed activity will result in marine turtles being displaced from habitat critical to their survival nor for important biological behaviour to be interrupted. Based on Popper (2014) moderate risk for behaviour is limited to hundreds of metres from the vessel. This is a fraction of the habitat available for internesting turtles. Any behavioural impact will be limited to short term and is not expected to effect biologically important behaviour. Nesting beaches are beyond the distance at which any impacts are likely so displacement or disruption of biologically important behaviour (nesting and hatchling emergence) is not considered a credible impact or risk. On this basis ConocoPhillips believe that impacts from the proposed activity are not inconsistent with the Recovery Plan for Marine Turtles in Australia.
Environmental Performance Outcomes (Table 6-1)			
EPO 3 No significant impacts to marine fauna from noise generated during the gas export pipeline installation campaign No displacement of marine turtles from habitat critical to the survival of marine turtles during the pipelay installation activities and biologically important behaviour to continue in BIAs			

5.2.4 Light Emissions

Risk	Change in fauna behaviour due to light emissions from vessels	
Aspect-receptor Reference (Table 5-5)	4I – Pelagic and demersal fish communities	4K – Marine reptiles
	4M – Seabirds and migratory shorebirds	4L – Sharks and rays
Description of Source of Impact		

Light is perceived differently by humans and fauna. To humans, light is visible between wavelengths of approximately 380 to 780 nm whilst for fauna it is visible between 300 to over 700 nm, depending on the species (Commonwealth of Australia, 2019). The source of impact from light is therefore not only related to the amount of artificial light, but also the types of light and the wavelengths that the different light types emit.

Activity vessels will have external lighting to provide a safe working environment and to comply with relevant maritime navigation requirements, at night. Light from the pipelay vessel will be the most visible as it is the largest vessel and therefore has been used to determine the worst-case distance that light may be visible for activity vessels.

Figure 5-13 provides photographs of the Allseas pipelay vessel *Audacia* with lights on at dusk. Lights include:

- Regular halogen light bulbs (60-75 Watts) and fluorescent lights (18 – 36 Watts) that provide illumination for the various gangways throughout the vessel and will be on all night for safety reasons;
- Floodlights of various power rating (250 – 500 Watts) that provide illumination of working areas. Sometimes these floodlights may be directed outward to assist crew transfer or loading of supplies.
- Helideck lights, including floodlight (35 Watts) and LEDs (3W) provide lighting for the helicopter platform. These lights are obligatory but will be illuminated only for safe landing and take-off of helicopters.
- Navigation LEDS, which are located at various locations around the vessel and are obligatory
- Search lights, which are very bright but used only in emergency situations so turned off under normal operation.

Light modelling was undertaken for the proposed pipelay and construction vessels to predict the extent of biologically relevant light spill. Specifics of the respective vessel's lighting design and luminaire specifications were applied to the Illumina Artificial Light At Night (ALAN) model (Aube *et al*. 2005). The Illumina model is a three-dimensional model that accounts for both line of sight and atmospheric scattering, allowing the attenuation of light over distance and extent of light glow to be modelled.

Since light sources (i.e. individual luminaires) can be placed individually with the area of interest, the model is able to replicate specific lighting designs in terms of light type, spectral distribution, height and orientation of individual luminaires, including any shielding, increasing model accuracy. This information was extracted from lighting layout drawings and light manufacturer data sheets for both the *Audacia* pipelay vessel and *Oceanic* construction vessel. Both models assumed that all lights on the vessels were turned on (apart from search lights which are only used in an emergency situation) with no additional shielding (other than that provided inherently by the vessel structures). Vessels were also orientated north-south. As typical for the Timor Sea, cloud cover was zero, and therefore, the simulation has no contribution of light from cloud reflectance. Model outputs are provided in radiance ($W/m^2/sr$, where W = watts, m^2 =meters squared and sr = steradian).

In the absence of any published or generally accepted units of measurement, or scale, for measuring the impact of artificial light at night on turtle hatchlings, moonlight is used as a proxy. Output from the light model (radiance, units of Watts/m2/sr) was converted to units of full moon equivalents to provide biological relevance to the radiance output.

Table 5-19 presents potential impact criteria for marine turtles related to the proportion of radiance of a full moon. This was derived by Pendoley Environmental using their extensive experience observing marine turtles and their response to light in field settings. The range of moon brightness across a whole lunar cycle provides a realistic scale representative of ambient light levels that turtle eyes are adapted to. The scale is logarithmic to represent the nature of light decay with distance (a function of the inverse square law). At the lower end of the scale the radiant output is equivalent to no light in the sky (a new moon) while the upper limit is equivalent to the brightness of 10 full moons. The upper limit was selected to try to account for the increase in radiance levels that can be caused when light is reflected from clouds. Extending the scale beyond this limit was deemed unnecessary.

Table 5-19: Artificial light impact potential criteria (marine turtles) (Pendoley, 2020)

Proportion of radiance of a full moon*	Impact potential to marine turtles
1 - 10	Light or light glow visible and impact likely
0.1 - 1	Light or light glow visible and behavioural impact possible, depending on moon phase
0.01 - 0.1	Light or light glow visible but behavioural impact unlikely (i.e. not biologically relevant)
<0.01	Light or light glow is considered ambient and no impact expected

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

Model results

Pipelay vessel

Results from the llumina model undertaken for the pipelay vessel are summarised in **Table 5-20** and presented in **Figure 5-14** (Pendoley, 2020). Model results are independent of location so are representative all along the pipeline route. The location shown in the figure is the closest point that the vessels will sail to the nesting beaches. Applying the potential impact criteria in **Table 5-19**, the results show that at ~11 km light levels have reduced to ambient. At ~ 3.3 km from the source, radiance is equivalent to 0.1 radiance of a full moon and, therefore, light will be visible but unlikely to result in a behavioural impact (i.e. biologically relevant). Impacts may occur within ~3.3 km of the pipelay vessel. At the closest point to land (6 km), radiance is equal to 0.03 (3%) that of a full moon.

Table 5-20: Distance of equivalent moon radiances for the pipelay vessel (from Pendoley, 2020)

Proportion of radiance of a full moon*	Distance from source (m)
10	332
1	1,050
0.1	3,335
0.01	11,073

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

Construction vessel

Results for the construction vessel are summarised in **Table 5-21** and presented in **Figure 5-15** (Pendoley, 2020). At ~1.6 km light levels have reduced to ambient. At ~ 0.5 km from the source, radiance is equivalent to 0.1 radiance of a full moon and, therefore, light will be visible but unlikely to result in a behavioural impact (i.e. biologically relevant). Impacts may occur within 0.5 km of the construction vessel. At the closest point to land (6 km), radiance is equal to 0.0007 (0.07%) that of a full moon.

Table 5-21: Distance of equivalent moon radiances for the construction vessel (from Pendoley, 2020).

Proportion of radiance of a full moon*	Distance from source (m)
10	51
1	162
0.1	512
0.01	1,622

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

Cumulative impact when pipelay vessel and construction vessel are in close proximity

Table 5-22 presents results of the Illumina model when including both the pipelay and construction vessel located side by side. Modelling of both vessels resulted in negligible increases in the distance at which the same level of radiance was reached, compared to the model results for the pipelay vessel alone. Applying the potential impact criteria in **Table 5-19**, impacts may occur within ~3.4 km of the pipelay and construction vessel when they are simultaneously positioned adjacent to one another. At the closest point to land (6 km), radiance is equal to 0.03 (3%) that of a full moon.

Table 5-22: Distance of equivalent moon radiances for the pipelay and construction vessel (from Pendoley, 2020).

Proportion of radiance of a full moon*	Distance from source (m)	Difference to pipelay vessel alone (m)
10	336	+4
1	1,062	+12
0.1	3,375	+40
0.01	11,226	+153

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

Figure 5-13: Photographs of a typical pipelay vessel at dusk

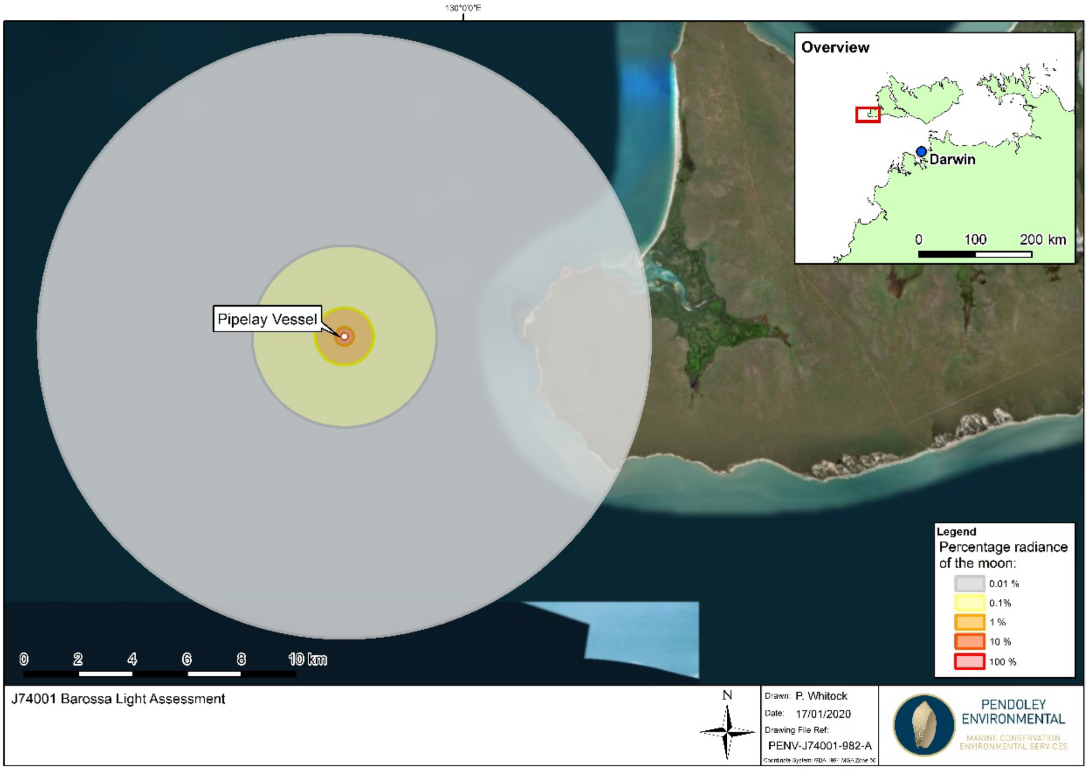


Figure 5-14: Light emissions from the pipelay vessel, measured as the proportion of radiance of one full moon.

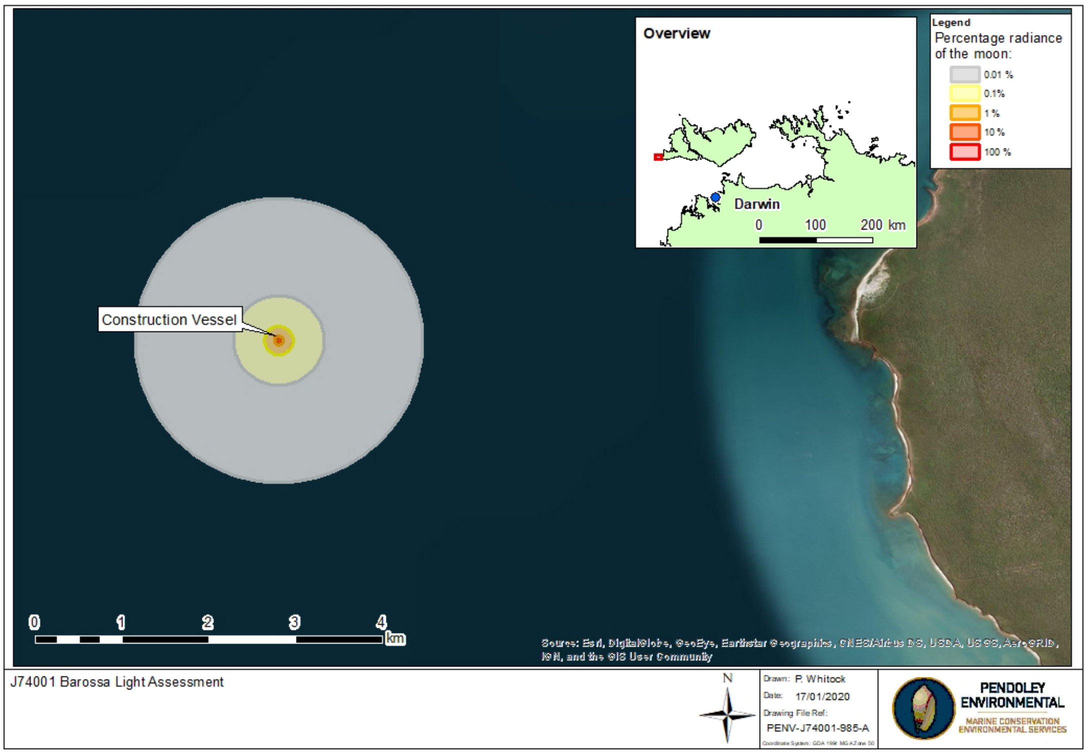


Figure 5-15: Light emissions from the construction vessel measured as the proportion of radiance of one full moon.

Notes: Model results are independent of location so are representative all along the pipeline route. The location shown in the figures is the closest point to the nesting beaches.

Levels of acceptable impact
The impact caused by light emissions from pipelay installation activities will be acceptable if there is no substantial change to threatened and migratory species that may: i. lead to a long-term decrease in the size of a population ii. reduce the area of occupancy of the species iii. adversely affect habitat critical to the survival of a species iv. displace threatened and migratory marine fauna from habitat critical areas v. disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas vi. disrupt the breeding cycle of a population vii. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline viii. interfere with the recovery of the species
Potential Impacts
Light emissions associated with the gas export pipeline installation campaign may present a potential risk to marine fauna in the open waters and cause a temporary change in movement patterns and/or behaviour, such as the attraction or disorientation of individuals. Artificial lighting can affect several marine fauna including seabirds and migratory shorebirds, marine turtles as well as sharks/rays and other fish. The extent of biologically relevant light intensity is predicted to extend out to 3.3 km and 0.5 km from the pipelay and construction vessels, respectively. During the installation period, the pipelay vessel will travel along the pipeline route at a rate of nominally 3 km per day (i.e. it is not a stationary vessel), therefore the small extent of biologically relevant light will not impact any one location for an extended duration. Based on this, the pipelay vessel will take approximately 23 days to lay pipeline through the turtle internesting habitat. Construction vessels may be in the Operational Area for the duration of offshore activities, however, these will generally be in one location for less than 3 days unless performing flood/gauge/testing operations where the vessels will be stationary up to 14 days. When performing flood/gauge/testing operations, the construction vessel will be located at either end of the pipeline. The southernmost point of the pipeline is located >24 km from the nearest turtle nesting beach, a distance greater than at which visible light at intensities considered biologically relevant to nesting turtles and/or hatchlings in any scenario. The survey vessel will travel at about 25 km/day and traverse the turtle internesting habitat within about 2 days. Other activity vessels (e.g. supply vessels) will only be in the Operational Area for very limited durations (less than 24 hours). **Marine Reptiles** *Marine Turtles* The Operational Area traverses internesting habitat for flatback and olive ridley turtles. Significant numbers of olive ridley turtles (at the genetic stock, national and international level) nest at beaches along the west coast of Bathurst Island and are the priority stock for protection. Flatback turtles also nest here, though numbers are not significant when compared to other nesting sites of this genetic stock (see Section 4.5.5.6). Unlike other turtle populations (e.g. on the North West Shelf of WA), the olive ridley and flatback turtles on Bathurst Island do not exhibit discrete nesting/hatching seasons. Rather, there is low level nesting year-round, with a peak in nesting, internesting and hatching during winter months. Artificial lighting on or near beaches is known to disrupt nesting behaviour (see Witherington and Martin, 2003 for review) and has the potential to deter nesting activity. On completion of laying, nesting females use light cues in order to return to open ocean, orientating towards the brightest light (Witherington and Martin, 2003). However, observations of nesting females and emerging hatchlings at the same beach showed that females were disorientated much less often than hatchlings (Witherington, 1992a) indicating that nesting females are less vulnerable to impacts of artificial light on sea finding than hatchlings.

Hatchlings emerging from the sand are known to locate the ocean using a combination of topographic and brightness cues, orienting towards the lower, brighter oceanic horizon and away from elevated silhouettes of dunes and/or vegetation bordering the beach on the landward side (Limpus, 1971; Limpus and Kamrowski, 2013; Pendoley and Kamrowski, 2016; Salmon et al., 1992). Salmon (2003) identified two distinct behavioural responses of hatchling turtles exposed to artificial light after emerging from the nest:

- misorientation – misorientation occurs when hatchling turtles orientate towards artificial light sources instead of directly towards the ocean and
- disorientation – disorientation occurs when turtle hatchlings crawl in circuitous paths, often near artificial light sources.

Hatchlings disoriented or misoriented by artificial lighting may take longer, or fail, to reach the sea. This may result in increased mortality through dehydration, predation or exhaustion (Salmon and Witherington, 1995).

During normal operations, the greatest light intensity from the pipeline installation vessel at the closest point to shore is equivalent to 3% radiance of a full moon, which is not considered biologically relevant to adults or hatchlings (Pendoley, 2020). As such, behavioural impacts to nesting females and emerging hatchlings at nesting beaches are not expected.

Although the Operational Area overlaps important internesting habitat, the number of individuals likely to be present is expected to be limited. Suitable internesting habitat for flatback turtles is defined as water depths shallower than 16 m (Whittock et. al 2016 in Pendoley 2019). Internesting olive ridley turtles remain relatively close to nesting beaches during the nesting period (in comparison to post-nesting movements); tagged turtles remained within 48 km of the nesting beach in waters typically < 30 m water depth (Hamel et al., 2008). Water depths along the pipeline route are below 35 m (**Figure 5-12**) leading Pendoley (2019) to conclude that the majority of flatback and olive ridley turtles are not expected to use waters along the pipeline route for internesting, although some individual turtles may be encountered. Internesting may occur year-round with a peak expected between April and June with increased potential for internesting females to occur in the Operational Area during this time. However, the pipelay vessel would be within critical habitat for approximately 23 days, representing approximately 25% of the peak nesting/internesting period should installation entirely overlap with peak nesting/internesting periods.

If individual turtles are present, light emissions from any of the vessels are unlikely to be of concern. There is no evidence, published or anecdotal, to suggest internesting turtles are impacted by light from offshore vessels, and nothing in their biology would indicate this as a plausible threat (Pendoley 2019, Witherington and Martin 2003).

Once hatchlings enter the ocean, they are thought to employ a survival strategy that involves rapid dispersal away from predator rich nearshore habitats to reach deeper waters where they develop into juveniles. An internal compass set while crawling down the beach, together with wave cues, are used to reliably guide them offshore (Lohmann & Lohmann 1992, Stapput & Wiltschko 2005; Wilson et al, submitted). In the absence of wave cues however, swimming hatchlings have been shown to orient towards light cues (Lorne & Salmon 2007, Harewood & Horrocks 2008) and in some cases, wave cues were overridden by light cues (Thums et al. 2013; 2016). The speed and direction of at-sea dispersal is substantially influenced by currents; the offshore trajectory of flatback hatchlings at Thevenard Island was displaced by tidal currents which ran parallel to the beach, an effect that increased as the hatchlings moved further offshore (Wilson et al. 2018, 2019).

However, when light was present this effect was diminished, showing that hatchlings actively swam against currents and towards the light source, which slowed their offshore dispersal from 0.5 m/s when no light was present, to 0.35 - 0.44 m/s, depending on the type of light (Wilson et al., 2018). The mean swimming of flatback hatchlings under natural light conditions (0.5 m/s) were similar to speeds of green turtle hatchlings (0.49 m/s) (Thums et al., 2016). The swimming speed of olive ridley hatchlings has not be measured, however, since they are smaller than both flatback and green turtle hatchlings, swimming speeds are expected to be lower (Pendoley, 2020).

These results suggest that hatchlings can move in any direction when their swimming speed is greater than the speed of the nearshore current, although the speed at which currents can no longer be overcome by hatchlings will be species specific and related to swimming speeds. Wilson et al (2018) reported that when flatback hatchlings were within 150 m of the beach, they were able to swim against currents up to 0.3 m/s, although, 0.3 m/s was the maximum current speed recorded during the study and, therefore, whether flatback hatchlings can swim against stronger currents is currently untested. Even if olive ridley hatchlings respond to light cues in the same way flatback hatchlings do, their smaller size suggests reduced capability to swim against currents compared to flatback turtles.

Attraction of dispersing hatchlings to vessel light emissions and spill could result in two main impacts:

- Increased energy expenditure as hatchlings swim against currents towards light sources and when entrapped in light spill, with potential effects to individual fitness; and
- Increased risk of predation while silhouetted in areas of light spill.

At the C4 current meter location, located approximately 20 km northwest of Cape Fourcroy, currents were strongly rectilinear, flooding towards the south and ebbing towards the north. On the spring tide, maximum current speeds were around 1.1 m/s reducing to around 0.3 m/s on the neaps (**Section 4.3.2**). Statistical analysis showed that current speed was greater than 0.3 m/s for approximately 66% of the deployment time (Fugro 2015). Dispersal studies at Thevenard Island (Wilson et al., 2018) suggest that hatchlings will enter the ocean and disperse in the direction of the predominant current, which could be either north or south.

There is potential for hatchlings at sea to be attracted to light emissions if they are carried by currents to within ~3.3 km of the pipelay vessel, ~500 m of the construction vessel, or 3.4 km of both vessel when they are operating simultaneously (when light emissions are equivalent to between one full moon and 1/10th of a full moon). However, the likelihood of attraction would be lower during periods of full moon, further reducing the proportion of the activity duration within critical habitat (~23 days) where attraction is most likely to occur. If attraction did occur it is likely that individuals would remain entrapped in light for shot periods (Wilson et al 2018 and Thums et al., 2010). At worst case individuals would be trapped until dawn.

If hatchlings are attracted to vessel light, they may attempt to swim against the current increasing energy expenditure and depleting energy reserves. If current speed is less than the hatchling swimming speed, they may become entrapped in light spill from the vessel. The proportion of time that currents were above 0.3 m/s was 66%, meaning that for one third of the deployment time flatback hatchlings could swim against the current (and potentially stronger currents) and become entrapped in light spill. Owing to their smaller size, it is considered likely that olive ridley hatchlings will be carried away by weaker currents.

In summary, vessel light emissions are not expected to impact nesting females or emerging hatchings at nesting beaches since modelling predicts that light or light glow at the closest point shore is not expected to exceed intensities considered biologically relevant (Pendoley, 2019). Additionally, vessel light emissions are not expected to impact individual internesting turtles since there is no evidence, published or anecdotal, to suggest internesting turtles are impacted by light from offshore vessels.

Any disruption to hatchling dispersal behaviour is expected to represent an insignificant proportion of the total annual number of hatchlings emerging from the Tiwi Islands for the following reasons:

- Hatchlings would need to be carried to within ~3.3 km of the pipelay vessel, ~0.5 km of the construction vessel, or 3.4 km of both vessels when they are operating simultaneously, for light intensities to be great enough to lead to attraction.
- For this to occur, currents would need to be aligned with the orientation of the vessels from the nesting beach. Adjacent to Bathurst they run north-south, which means it would be virtually impossible for hatchlings to actively reach the vessels.
- It might be possible for individuals to be passively carried to within environmentally significant light intensity around the vessel, however, this is only likely to occur for a small proportion of the overall peak hatchling emergence season given that the pipelay vessel will only be within 20 km (a precautionary distance recommended in the National Light Pollution Guidelines for undertaking an EIA) of nesting beaches for ~23 days (maximum of 25% of the hatchling emergence season) and construction vessel activities will be restricted to discreet three day activities.
- Further, since nesting occurs year-round, there will be a significant proportion of hatchlings originating from the Tiwi Islands that are not exposed to potential light sources.
- Of the hatchlings that are exposed and attracted to light sources, it is not credible that every hatchling will be attracted to vessel light given individual variability in swimming speed and direction, and localised water movements.
- Of the small proportion of hatchlings that may become entrapped in light spill, the worst-case scenario is death from predation which is unlikely to occur in every instance (for example, none of the entrapped

hatchlings anecdotally observed from a pipeline vessel were predated (Pendoley pers ob., 2003 in Pendoley 2019).

- Considering the above, any increased mortality from predation or increased energy expenditure will likely be limited to a negligible proportion of the annual number of hatchlings for the given genetic stocks.
- Once daylight emerges the impacts of artificial light will cease allowing dispersal behaviour of any entrapped hatchlings to resume. It is not credible that the same hatchlings will be entrapped in light spill on subsequent nights since they will be carried away from the vessels by currents. Therefore, any attraction to vessel lighting by hatchlings is not expected to displace individuals from important habitat.

Sea snakes

Studies have shown that sea snakes display varying responses to light. For example, *Hydrophine* species appear to be attracted to light and have been observed floating on the sea surface and swimming up to light (pers. comm. M. Guinea, CDU, 2014). However, the *Aispysurus* species of sea snake do not appear to be attracted to light and are not seen on the surface at night (pers. comm. M. Guinea, CDU, 2014). Most sea snakes are likely to be associated with the offshore shoals/banks in the Timor Sea, with the closest bank being Goodrich Bank, which is 250 m from the Operational Area.

It is recognised that some pelagic sea snake individuals (*Pelamis* genus) may occur in the Operational Area and may be attracted to the light from the gas export pipeline installation campaign. However, while such individuals may come to investigate the light source, it is considered unlikely that they will stay within the area (pers. comm. M. Guinea, CDU, 2014). In addition, as mentioned above, there are no permanent light sources proposed along the gas export pipeline.

Seabirds and shorebirds

A number of migratory bird species may transit the Operational Area along their migratory pathway, as outlined in **Section 4.5.5.8**. Research indicates that seabirds may be attracted to artificial light, thereby possibly affecting migration patterns, and could potentially collide with infrastructure.

In general, the impacts are considered to be dependent on weather conditions. During clear weather conditions, well-lit structures have minimal or no impact on avifauna. During conditions of persistent light rain fog or mist, which are unusual events in the Timor Sea, the reflectance of light is increased, compounding the disorientation effects of avifauna and potentially resulting in high mortalities due to collision with structures. The likelihood and frequency of such events leading to significant mortalities in the Timor Sea are considered low as such events are unusual and generally localised.

Migratory shorebirds are unlikely to interact with the pipelay vessels during the installation of the gas export pipeline given of the low levels of light emissions and temporary nature of the activity (e.g. pipelay vessel constantly moving).

Fledgling seabirds can be affected by lights up to 15 km away (Commonwealth of Australia 2019). Light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns located on the shoreline of Seagull Island given its distance from vessel light sources (> 19 km). Impacts to species foraging are unlikely to be disorientated by light emissions given the scale of lighting required for pipelay vessels and the relatively short-term nature of the activity.

Fish (including Pelagic and Demersal Fish Communities, Sharks and Rays)

Vessel lighting may result in the localised aggregation of fish (including sharks/rays) below the vessel. These aggregations are considered localised and temporary due to the nature of the activity (e.g. pipelay vessel constantly moving).

Sharks and rays identified as potentially occurring in the Operational Area typically inhabit nearshore coastal waters (e.g. green sawfish, largetooth sawfish, dwarf sawfish, speartooth shark, northern river shark and reef manta ray). While individuals (e.g. giant manta ray, great white, whale sharks and mako sharks) may transit the open ocean environments surrounding the northern portion of the Operational Area, impacts from light will not result in population level effects and will not extend to any areas of biological importance for these species.

Cumulative Impacts

There are both offshore and onshore light sources currently in the region of the Operational Area. Existing onshore light sources near the Operational Area are the lights at the Tiwi Islands, such as the Cape

Fourcroy lighthouse and lights from Wurrumiyanga on Bathurst Island and lights from Port Melville and the community of Pirlangimpi on Melville Island. These light sources are approximately 5km (Cape Fourcroy lighthouse), 50 km (Pilangimpi and Port Melville) and 70 km (Wurrumiyanga) from the gas export pipeline. Cumulative impacts from the project vessels and onshore lighting are not anticipated, due to distances between the onshore light sources and the Operational Area, as well as the land mass (Tiwi Islands) acting as a light barrier between most of the onshore light sources (except Cape Fourcroy lighthouse) and project vessels within the Operational Area.

Offshore lighting in the region is mainly associated with commercial shipping, although commercial fishing and recreational vessels also contribute to offshore lighting. The main shipping routes are south-east of the gas export pipeline, between the Tiwi Islands and Darwin, and there are also moderate levels of shipping density as commercial vessels travel north-west from Darwin to south-east Asia through the Operational Area (**Figure 4-40**). The project vessels will add to the overall amount of offshore lighting in the region for the duration of the gas installation pipeline campaign, however cumulative impacts are not predicted due to the following reasons:

- Lighting at any one location will be temporary.
- There will only be a small increase in the number of vessels in the region. The installation campaign will add up to 15 vessels to the overall shipping activity, although these will not all be in the same area at the same time.
- The activity vessels will be in the southern portion of the gas export pipeline route where higher density commercial shipping occurs for a short duration.
- Very few commercial shipping vessels or other marine users are expected further north along the gas export pipeline route.
- Modelling indicates that when both the pipelay and construction vessel are operating simultaneously, only negligible increases in light levels (measures as the distance at which radiance relative to that of the moon) occur, compared to when the pipelay vessel was modelled independently.
- Lighting during simultaneous operation of the pipelay and construction vessel is expected to reach levels considered not biologically relevant within ~3.4 km. Generally, third party vessels are expected to be further than 1.5 km from the project vessels and are not expected within the 500m safety exclusion zone (e.g. commercial shipping vessels that travel past the activity). Furthermore, activity vessels will only come within close proximity of each other for short durations to undertake specific tasks due to safety reasons (i.e. activity vessels are generally expected to be greater than 1.5 km away).

With regards to other activities associated with the Barossa Project, as described in the Barossa OPP, simultaneous operations will be avoided where practicable and therefore cumulative impacts are not anticipated.

Impact acceptability summary for threatened and migratory species

The proposed pipeline passes through areas designated as internesting habitat and within 8 km of nesting habitat critical to the survival of both flatback and olive ridley turtles (**Figure 4-29** and **Figure 4-31**). Substantial adverse impact from artificial light associated with the pipelay activities is not considered credible.

- There is no evidence, published or anecdotal, to suggest internesting turtles are impacted by light from offshore vessels (Pendoley, 2019).
- Modelling shows that direct light or light glow from the activity vessels does not exceed intensities considered biologically relevant at the closest nesting beaches (Pendoley, 2019) so impact to nesting females or emerging hatchings is not expected to occur.
- In the unlikely event that hatchlings do become entrapped in light spill from vessels, the proportion impacted is considered negligible when compared to the total number of hatchlings emerging from Tiwi Island beaches across the year. It will also be a temporary phenomenon, occurring during hours of darkness only. Following sunrise, hatchling dispersal behaviour will resume. Displacement of individuals from habitat critical areas is therefore not a credible outcome.

Other protected species of marine reptiles (e.g sea snakes) seabirds and fish (e.g (sharks and sawfish) are not expected to be affected given their wide distribution (in the case of sea snakes and sharks), distances to seabird breeding colonies, and preference for shallow coastal habitats (in the case of sawfish).

For the above reasons, no substantial change to threatened and migratory species is anticipated that may:

a. lead to a long-term decrease in the size of a population

b. reduce the area of occupancy of the species

c. fragment an existing population into two or more populations

d. adversely affect habitat critical to the survival of a species

e. displace threatened and migratory marine fauna from habitat critical areas

f. disrupt biologically important behaviours of threatened and migratory marine fauna in biologically important areas

g. disrupt the breeding cycle of a population

h. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or

i. interfere with the recovery of the species

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent	2 – Minor	2 – Remote	RRI - Low
Residual	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
No pipeline installation activities within olive ridley turtles internesting BIA	This control is effective in avoiding the internesting BIA for olive ridley turtles, which may host turtles undertaking biologically significant behaviour. Given the behaviour of olive ridley turtles, they are unlikely to be encountered within the water depths of the gas export pipeline route when internesting.	**C 2.8**	**EPS 2.8.1** (**Section 5.2.2**)
The pipelay vessel will have an enclosed pipe welding deck.	An enclosed pipe welding deck is highly effective in preventing light emissions from a highly lit working zone.	**C 5.9**	**EPS 5.9.1** The pipelay vessel shall have an enclosed pipe welding deck to shield light emissions

Assessment of Additional Controls

Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
Avoidance of night work	No	No	The gas export pipeline will be laid using a continuous assembly pipe-welding installation method. Stopping pipelay during the hours of darkness would require the vessel to remain stationary on DP leading to the following: • Unnecessary fatigue loading on the pipeline from vessel motion. The alternative would be to lay the pipeline down every night and recover each morning, which are both regarded as high-risk activities.	N/A

			• Significant increase in installation schedule with associated increase in Project costs. • Significant increases in environmental discharges and emissions. This control was rejected as the cost of implementing far exceeds the benefit gained.	
Do not undertake gas export pipeline installation during peak turtle nesting and hatchling emergence season.	No	No	(see row below)	N/A

Justification

Unlike other turtle populations (e.g. on the North West Shelf of WA), the olive ridley and flatback turtles on Bathurst Island do not exhibit discrete nesting/hatching seasons. Rather, there is low level nesting year-round, with a peak in nesting, internesting and hatching during winter months. Even if pipelay activities occured within peak nesting season, the the pipelay vessel will only be within 20 km (the distance specified in the National Light Pollution Guidelines for undertaken an EIA) of nesting beaches for ~23 days which is approximately 25% of the peak nesting period. During this time, impacts to nesting females, emerging hatchlings and dispersing hatchlings at sea are not expected to result in changes at the individual, population or genetic stock level. A seasonal exclusion would not avoid all turtle nesting, internesting and hatchling activity but may avoid the known peaks. The impact assessment determined the risk to hatchlings from light emissions is low and not inconsistent with the requirements of the Recovery plan for marine turtles in Australia 2017-2027.

Should timing of pipeline installation and associated activities be scheduled to avoid identified sensitivities including the Northern Prawn Fishery season (see **Section 5.2.1**) and the peak internesting turtle periods this will impose impractically tight restrictions on the window for starting operations in order to ensure the activities can be completed outside of the various season, without the risk of the activities having to be split over multiple seasons. The start date for the pipelay operations is driven by the limited availability of pipelay vessels in region, prior commitments of pipelay vessels and the availability of associated equipment such as linepipe materials and PLET structures to support the activities. Due to the uncertainty on these elements it is standard practice to negotiate a large window for commencement of pipelay operations with a mechanism to reduce the window as the project progresses and the factors detailed above become more certain. The call down window is initially under the control of ConocoPhillips before passing to the pipelay vessel operator in order that they can manage their prior vessel commitments. As a result of the call down mechanism for the pipelay vessel and the uncertainty on the pipelay start date it is impractical to guarantee that pipelay activities could be fully completed in a given season.

If seasonal exclusions are imposed and activities cannot be completed in a single season then this will require the activities to be split over multiple seasons. This will result in an overall extension in the duration of the activity, additional vessel mobilisations and demobilisations and will considerably increase the cost of pipelay.

If the campaign extends over two seasons there is a risk that spans are left unrectified in the intervening period which may markedly increase the number of span corrections required or could result in unacceptable fatigue damage to the pipeline resulting in the need to replace a section of pipeline. It may also be counterproductive as multiple vessel mobilisations could increase the overall environmental impact.

It may also raise the risk of simultaneous operations (SIMOPS), where the pipelay vessel ends up interacting with other Barossa construction activities (spool installations, drilling or FPSO mooring installation). SIMOPS is highly undesirable mode of operation as it means vessels either being stood down for a period of time or operating in close proximity to one another. Apart from the additional cost, this could increase collision risk and result in enhanced cumulative environmental impact for aspects such as light and noise.

No obvious additional potential environmental benefits were identified when considering the NPF season and the peak turtle internesting seasons together. Impacts to each are independent and have both been demonstrated to be acceptable.

ConocoPhillips has also assessed if certain activities associated with the pipelay operations, such as pre-lay and post-lay span correction, can be performed outside of fishing and peak turtle internesting seasons. However, the construction vessels used to support pipelay operations are also required throughout the full pipelay campaign and as such the sequence of pre-lay activities, pipelay and post-lay activities is more effectively performed in a single campaign in order to avoid the requirement to perform multiple mobilisations/demobilisations of the construction vessel(s). As highlighted above it is also necessary to ensure spans are corrected as soon as practicable and as such post-lay work cannot practically be separated from the pipelay activity. Performing the work in a single continuous campaign also enables pre-lay and post-

lay activities to be performed in parallel with pipelay where practicable to further reduce the schedule, optimise the offshore campaign and minimise the extent of span correction required thus reducing the seabed footprint and environmental impact. Based on the points outlined above, the cost of implementing this control is considered grossly disproportionate to the benefit gained – specifically to the impact on marine turtles and the NPF, which have already been demonstrated to be negligible.				
Crew transfers or loading of supplies (not including linepipe deliveries) which require direction of floodlights outside vessel will not occur during hours of darkness within 10 km of turtle nesting beaches during peak hatchling season.	Yes	Yes **C 5.10**	Vessel transfer activities at night may require additional lighting, or lights being directed away from the vessel resulting in light spill on the ocean surface and potentially increasing overall light emissions and sky glow. Avoiding vessel transfer activities at night within 10 km of nesting beaches, within peak hatchling emergence, will eliminate additional light spill on the ocean surface, preventing addition risk of hatchlings being attracted to the vessel and becoming entrapped. 10 km is applied as a conservative distance, noting that the modelling predicted that biologically relevant light extended to 3.3 km from the pipelay vessel, 0.5 km from the construction vessel and 3.4 km combined.	**EPS 5.10.1** During peak turtle nesting/hatching season, within 10km from turtle nesting beaches, activities that require direction of floodlights outside the vessels (e.g crew transfers or loading of supplies but excluding linepipe deliveries) shall not be undertaken during hours of darkness.
Do not perform pipe transfer operations at night when operating within 10km of marine turtle nesting habitat during peak hatchling emergence season	No	No	If pipe transfer is restricted to day light hours, the pipelay vessel will run out of pipe and it will have to slow lay, stop laying or lay down the pipe (the impacts of which are discussed above). Slowing down pipelay will result in an increase in the amount of time that the pipelay vessel is operating within 10 km of marine turtle nesting habitat. Light spill during pipe transfer will be minimal as floodlights will be directed onto the deck of the PSV and not the surface of the water. It is also temporary.	N/A
In the event that linepipe deliveries are undertaken during the hours of darkness within 10km of marine turtle nesting habitat during peak hatchling emergence season, the operation shall be undertaken on the westward side of the vessel to limit light spill in the direction of the Bathurst Island.	No	No	The side of pipeline transfer is dictated by prevailing weather conditions for safety and operational reasons. Whilst this control was rejected, winds during peak turtle internesting season are predominantly from an easterly direction so transfer will most likely be undertaken on the westward side of the vessel.	
Vessel searchlights will only be operated in an emergency situation	Yes	Yes **C 5.11**	Searchlights are the most significant source of light from project vessels. Not operating these lights during planned activities will eliminate potential behavioural impacts at the nesting beaches and reduce the likelihood of attraction of hatchings at sea.	**EPS 5.11.1** Vessel searchlights shall only be operated in an emergency situation

Substitution				
No additional controls identified				
Engineering				
Replace some or all lights on vessels with luminaire types considered appropriate for use near marine turtle nesting habitat.	Yes	No	There is a considerable financial cost with replacing lighting for turtle friendly lights. Other costs include the safety risk to personnel carrying out the task and environmental impact in terms of wastage and disposing of old lighting fixtures. Although application of luminaires with spectral output of longer wavelengths have been shown to reduce impacts to turtles, this does not eliminate the risk of impact entirely. Redirecting and shielding lights to prevent light spill is considered a much more effective control than changing luminaries (K Pendoley pers comm). Since the light modelling and impact assessment has predicted the impact to marine turtles is negligible at all life stages, the costs of replacing lights on the vessel is considered grossly disproportionate to any benefits gained.	N/A
Identify highest intensity lights and replace with luminaire types considered appropriate for use near marine turtle nesting habitat.	No	No	As discussed above, light emissions from existing luminaries are not expected to result in an adverse impact to marine fauna, including marine turtles. Light modelling was carried out assuming all lights on the vessels were turned on with no particular luminaire identified as having a notably greater effect on overall light emissions. As discussed below, unnecessary light will be turned off and/or shielded when operating within 10 km of nesting beaches and awareness of the importance of minimising light pollution will be implemented. These controls are more appropriate given the predicted impact.	N/A
Restrict lighting to navigation lights only	No	No	Operational lighting, including lighting of work areas and decks, is required for safe working conditions.	

Minimise direct light spill on the ocean surface by adjusting orientation of lights and installing shielding when operating vessels within 10 km of marine turtle nesting habitat during peak hatchling emergence season.	Yes	Yes **C 5.12**	If in peak turtle season, qualitative assessment of lighting shall be performed on the vessels. Prior to entering within 10 km of marine turtle nesting beaches the orientation of lights resulting in light spill overboard shall be adjusted where it does not impact the ability of light to safely illuminate the work area. Shielding shall be added to lights whose orientation results in excessive glare where it does not impact the ability of light to safely illuminate the work area.	**EPS 5.12.1** A qualitative assessment of vessel lighting shall be undertaken to identify any lights causing light spill overboard from the vessel. **EPS 5.12.2** Prior to entering within 10 km of marine turtle nesting beaches during peak hatchling emergence season, direct light spill on the ocean surface shall be minimised by adjusting orientation of lights and installing shielding where it does not impact safety.
Administrative				
Sequence activities to minimise the time pipelay, and associated activities, are performed within peak internesting periods in important habitat for listed marine turtles.	Yes	Yes **C 2.10**	Whilst it is not practicable to time the start date of the activity due to scheduling constraints (that is, the Barossa pipelay must fit in with the overall pipelay vessel job sequence), it is possible to sequence activities to minimise the time pipelay, and associated activities, are performed within peak turtle internesting periods. For example, it is possible to select the direction of pipelay based on the start date in relation to peak internesting seasons, or sequence span rectification activities to prioritise certain regions over others (notwithstanding technical drivers to rectify critical spans in a timely manner). No timing restrictions are proposed for the pre and post lay site survey due to their inherently low impact.	**EPS 2.10.1** Planning for pipelay installation (including span rectification) shall consider turtle internesting season and activities shall be sequenced to avoid peak periods where the pipeline integrity is not compromised as a result.
Marine fauna observers specifically looking out for turtle hatchlings entrapped within light spill with adaptive management measures should a significant number be spotted	No	No	The pipelay and construction vessels have high freeboards. There is no suitable vantage point on the pipelay vessel from which an object the size of a hatching could be spotted, particularly during the hours of darkness. To effectively observe turtles lights would need to be shone on the water surface, which would present an additional light source. Given the low risk of hatchlings becoming entrapped around vessels the use of a dedicated turtle observers and the requirement for adaptive measures were ruled out.	N/A

Communicate the requirement and implement light management measures when operating vessels within 10 km of marine turtle nesting habitat during peak nesting and hatchling emergence season.	Yes	Yes **C 5.13**	Light management measures shall be implemented on vessels operating within 10 km to marine turtle nesting habitat in peak nesting/hatchling emergence season to minimise lighting impacts. Lighting management measures shall include the switching off of lights not required to safely operate the vessel and the closing of curtains in sleeping accommodation. Lighting management measures shall be posted onboard the vessels and discussed at toolbox talks and prestart meetings when operating within 10 km of marine turtle nesting habitat in peak nesting/hatching season.	**EPS 5.13.1** Light management measures shall be implemented when operating vessels within 10 km of marine turtle nesting habitat during peak nesting and hatchling emergence season. Lighting management measures includes crew awareness through inductions and daily HSE meetings, the switching off of lights not operationally critical and the closing of curtains in sleeping accommodation.

ALARP Statement

Based on the outcomes of the risk assessment and the adoption of controls throughout the activity, ConocoPhillips considers that the impacts and risks from vessel light emissions are reduced to ALARP.

Summary of alignment with EPBC Management Plans

Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to gas export pipeline Installation***	***Demonstration of Alignment***
Marine Turtles	Recovery Plan for Marine Turtles in Australia 2017-2027	Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats. Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival turtles. Manage anthropogenic activities in BIAs to ensure that biologically important behaviour can continue.	There is no evidence to suggest that the proposed activity will result in marine turtles being displaced from habitat critical to their survival nor for important biological behaviour to be interrupted. The impact assessment predicts that light emissions from the pipelay and construction vessels will not occur at intensities considered biologically relevant at any of the nearby nesting beaches so displacement or disruption of biologically important behaviour is not considered a credible impact or risk. Moreover, there is no evidence that suggests internesting turtles are impacted by light from offshore vessels, and nothing in their biology would indicate this is a plausible threat. Management measures will be put in place to ensure that artificial light from the vessels will be managed and risks reduced to ALARP. On this basis ConocoPhillips believe that impacts from the proposed activity are not inconsistent with the Recovery Plan for Marine Turtles in Australia.

		Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.	Cumulative impacts on turtles from multiple sources of onshore and offshore light pollution has been assessed and deemed to be acceptable.
	National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (Draft) (2019)	These Guidelines should be followed to ensure all lighting objectives are adequately addressed. Where there is important habitat for listed species that are known to be affected by artificial light within 20 km of a project, species specific impacts should be considered through an Environmental Impact Assessment (EIA) process.	An EIA has been undertaken or the activity (as described in **Section 5.2.4** above). As per the guidelines (Commonwealth of Australia 2019), identification of the project lighting, identification of species, an assessment of the risk of impact of artificial light to wildlife, and an assessment of additional mitigation and management controls has been undertaken. Based on the impact and risk assessment, ConocoPhillips has demonstrated that the management of the installation of the gas export pipeline will be aligned with the recommendations of the national light pollution guidelines.
Environmental Performance Outcomes (Table 6-1)			
EPO 4 No significant impacts to marine fauna from the gas export pipeline installation campaign No displacement of marine turtles from habitat critical to the survival of marine turtles during the pipelay installation activities and biologically important behaviour to continue in BIAs			

5.2.5 Atmospheric Emissions

Impact	Atmospheric emissions from vessels combustion engines and incinerators impacting on air quality.
Aspect-receptor Reference (Table 5-5)	5D – Air quality
Description of Source of Impact	
Emissions to atmosphere from vessels will be primarily from the combustion of fossil fuels, and potentially from the incineration of waste. The main emissions identified are carbon dioxide (CO_2), carbon monoxide (CO), oxides of nitrogen (NO_X), sulphur dioxide (SO_2), particulate matter, non-methane volatile organic compounds (VOCs) and BTEX (benzene, ethylbenzene, toluene and xylenes). The actual expected volumes will depend on the size of vessel, the types and duration of the vessel's activities in the Operational Area and whether the vessel uses a waste incinerator. ODS may be found onboard activity vessels in old air-conditioning and refrigeration systems.	
Levels of acceptable impact	
The impact from vessel emissions will be acceptable if there is no substantial change in air quality which may adversely impact biodiversity, ecological integrity, social amenity or human health.	

Potential Impacts

The Operational Area is in a remote offshore environment where there are no other permanent sources of air pollution and the air quality is expected to be nearly pristine. Atmospheric emissions from activity vessels can result in deterioration of local air quality, while emissions of greenhouse gas emissions (GHG) can cause an incremental increase in global GHG concentrations. Given the nature and scale of gas export pipeline installation activities (low frequency and relatively short duration), both risks are considered to have a negligible impact on air quality in Commonwealth waters.

The impact from atmospheric emissions is considered minor given the location of the gas export pipeline installation campaign in the open ocean, which is well- removed from nearest residential or sensitive populations of the Tiwi Islands or NT coast and the duration of the gas export pipeline installation campaign. There are no relevant requirements within any EPBC management plans/recovery plans or conservation advices that are of direct relevance to atmospheric emissions.

Impact acceptability summary

For the above reasons, there will be no substantial change in air quality that may adversely impact biodiversity, ecological integrity, social amenity or human health. The impact is therefore acceptable.

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent	2 – Minor	2 – Remote	RRI - Low
Residual	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Atmospheric emissions from combustion, incinerators and ODS managed in accordance with standard maritime practice	This control is consistent with standard maritime practices which have been developed through international consensus. The control is consistent with relevant requirements (including fuel sulphur content restrictions) and implements the MARPOL convention and Australian Marine Order 97.	**C 5.1**	**EPS 5.1.1** Vessels will comply with the *Navigation Act 2012* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 97 (Marine Pollution Prevention – Air Pollution) including (as required by vessel class): – A valid International Air Pollution Prevention (IAPP) Certificate and / or Engine International Air Pollution Prevention (EIAPP) Certificate and / or International Energy Efficiency (IEE) Certificate; – A Ship Energy Efficiency Management Plan (SEEMP); – Use of low sulphur fuel – Use of incinerators in accordance with Annex VI of the MARPOL Convention – ODS record book

Assessment of Additional Controls

Additional Control	***Practicable ?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				

No additional controls identified			
Engineering			
No additional controls identified			
Administrative			
No additional controls identified			
ALARP Statement			
Based on the outcomes of the risk assessment and the implementation of the control throughout the activity, ConocoPhillips considers that the impacts and risks to air quality from the gas export pipeline installation campaign are reduced to ALARP. Relevant legislative requirements and standard industry practices have been applied to control the risk. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the impacts.			
Summary of alignment with EPBC Management Plans			
Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to gas export pipeline Installation***	***Demonstration of Alignment***
No relevant management plans identified			
Environmental Performance Outcomes (Table 6-1)			
EPO 5 No substantial change in air quality during the pipeline installation campaign that may adversely impact biodiversity, ecological integrity, social amenity or human health.			

5.2.6 Planned Discharges: Activity Vessels

Impact	Impacts to the marine environment from planned discharges	
Aspect-receptor Reference (Table 5-5)	6B – Water quality 6O – Australian Marine Parks	6H – Plankton

Description of Source of Impact

During the gas export pipeline installation campaign, activity vessels will discharge the following to the marine environment:

- sewage, grey water and putrescible (e.g. food scraps) waste. These wastes are treated on board the vessel (e.g. sewage treatment plant or macerator) before being discharged.
- small periodic discharges of bilge water which can contain water and small volumes of oil, detergents, solvents and chemicals. Bilge water that cannot comply with the discharge limits of 15 parts per million (ppm) oil concentration is stored on vessels for disposal onshore.
- discharge from decks during rainfall events or during cleaning/wash down of decks which may contain small quantities of oil and grease.
- cooling water used to cool down vessel machinery, and
- brine from reverse osmosis plants used to generate potable water by desalinating seawater (the process removes minerals from seawater).

The actual expected volumes will be dependent on the size of vessels.

Levels of acceptable impact

Impacts from vessel discharges will be acceptable if there is:

i. No substantial change in water quality which may adversely impact biodiversity, ecological integrity, social amenity or human health

ii. No substantial change that may modify, destroy, fragment, isolate or disturb the values of the Oceanic Shoals Marine Park:

Potential Impacts

Water Quality and Plankton

Impacts from the discharge of sewage, grey water and putrescible waste are associated with eutrophication, where an increase in nutrients within the water column leads to a depletion of dissolved oxygen and dissolved oxygen and an increase in phytoplankton (i.e. phytoplankton bloom). Considering the relatively small volumes and the location, open offshore waters (and large scale currents), no significant impacts to the marine enviroment are expected from the planned discharge of sewage, grey water and putresible waste due to rapid dilution.

Deck drainage and bilge generally contain small quantities of hydrocarbons and other chemicals (e.g. detergents). The impact of these substances can vary depending on the types of contaminants, volumes discharged and sensitivity of the receiving environment. If discharged in large enough quantities or for a significant time period, many of these chemicals can have toxic effects to marine organisms (e.g. plankton). However, at small quantities and over short durations (as expected during the gas export pipeline installation campaign as the vessels will be moving continously along the pipeline route) chemicals are expected to disperse rapidly to levels below those which would cause adverse impacts.

Any potential impacts from planned discharges from activity vessels are expected to be highly localised and temporary decreases in water quality, with a negligible increase in cumulative discharges from other vessels in the area and negligible impacts to any plankton.

Australian Marine Park

In more sensitive environments impacts from planned discharges may be more significant, such as in protected areas. Although the Operational Area overlaps the Oceanic Shoals Marine Park, given the physical environmental characteristics (i.e. open, relatively deep offshore environment with significant current and tidal action) of the section of the Oceanic Shoals Marine Park that lies within the Operational Area, no impacts to the Oceanic Shoals Marine Park from vessel discharges is expected.

In summary, the potential impacts to the marine environment from routine discharges described above are considered negligible.

Risk Assessment			
	Consequence	***Likelihood***	***Risk rating***
Inherent risk	2 – Minor	2 – Remote	RRI - Low
Residual risk	2 – Minor	2 – Remote	RRI - Low
Controls and Demonstration of ALARP			
Existing controls			
Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Routine discharges of treated sewage, grey-water, putrescible waste, deck drainage, and bilge water managed in accordance with standard maritime practice	This control is consistent with standard maritime practices which have been developed through international consensus. The control is consistent with relevant requirements, including the MARPOL convention and Australian Marine Orders.	**C 6.1**	**EPS 6.1.1** Vessels shall be equipped and crewed in accordance with the *Navigation Act 2012 (*Cth*)* and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 91 (Marine Pollution Prevention – Oil), including (as required by vessel class): - Machinery space bilge/oily water shall have International Maritime Organisation (IMO) approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure Oil in Water (OIW) content to be less than 15 ppm prior to discharge. - A deck drainage system capable of controlling the content of discharges for areas of high risk of fuel/oil/grease or hazardous chemical contamination. - Waste oil storage available - Valid International Oil Pollution Prevention (IOPP) Certificate - Vessel-specific Shipboard Oil Pollution Emergency Plan (SOPEP) - oil record book maintained.
			EPS 6.1.2 Vessels shall be equipped and crewed in accordance with the *Navigation Act 2012* and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (as applicable for vessel size, type and class), including implementing: • Marine Order 96 (Marine Pollution Prevention – Sewage) including (as required by vessel class): - a valid International Sewage Pollution Prevention (ISPP) Certificate;

			- an ASMA approved sewage treatment plant; - a sewage communiting and disinfecting system; - a sewage holding tank sized appropriately to contain all generated waste (black and grey water); - discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land; - discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant will only occur at a distance of more than 3 nm from the nearest land
			EPS 6.1.3 Vessels shall be equipped and crewed in accordance with the *Navigation Act 2012 (*Cth*)* and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 95 (Marine Pollution Prevention – Garbage) including: - Putrescible waste and food scraps are passed through a macerator prior to discharge so that it can pass through a screen with no opening wider than 25 mm. - Garbage management plan in place. - Garbage record book maintained onboard.

Assessment of Additional Controls				
Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
Storage and transport of sewage, putrescible and waste for disposal onshore	No	No	Waste are managed in accordance with required legislative controls and the discharge of sewage, greywater and putrescible results in a negligible impact. The additional costs for transport and disposal, increased health and safety risks (e.g. hygiene) and increased environmental impact (e.g. atmospheric emissions from vessels transporting waste) outweigh any environmental benefit gained.	NA

Substitution			
No additional controls identified			
Engineering			
No additional controls identified			
Administrative			
No additional controls identified			
ALARP Statement			
Based on the outcomes of the risk assessment and the implementation of the control throughout the activity, ConocoPhillips considers that the impacts and risks to water quality, plankton and the Oceanic Shoals Marine Park from activity vessel discharges are reduced to ALARP. Relevant legislative requirements and standard industry practices have been applied to control the impact. The control selected for implementation is effective in reducing the risk to water quality and plankton from vessel utility discharges. ConocoPhillips considers the control adopted is commensurate to the nature and scale of the potential impacts.			
Summary of alignment with EPBC Management Plans			
Relevant Receptors	**Relevant Plan / Conservation Advice**	**Specific Requirements Relevant to Pipeline Installation**	**Demonstration of Alignment**
Marine Park	North Marine Parks Management Plan	Waste from vessel operations must be compliant with MARPOL and IMO	**C 6.1** implements MARPOL requirements for vessel discharges
Environmental Performance Outcomes (Table 6-1)			
EPO 6 No substantial change in water quality during the pipeline installation campaign that may adversely impact biodiversity, ecological integrity, social amenity or human health.			

5.2.7 Planned Discharges: Pipeline Hydrotest and Dewatering

Impact	Impacts to the marine environment from planned treated seawater discharges during pipeline hydrotesting and dewatering.	
Aspect-receptor Reference (Table 5-5)	7B – Water quality	7C – Sediment quality
	7H – Plankton	7G – Other communities
	7J – Marine mammals	7I – Pelagic and demersal fish communities
	7K – Marine reptiles	7L – Sharks and rays
	7N – KEFs	

Description of Source of Impact

Hydrotest water is filtered seawater with biocide and oxygen scavenger added to control microbiologically induced corrosion. Concentrations are configured to provide protection of up to two years protection. Fluorescein dye (50 ppm) is also added to aid with leak detection in the event that the pipeline fails the test.

Hydrotest of the pipeline will lead to the discharge of the following quantities of treated water (**Table 5-23**):

Table 5-23: Volumes of treated water discharged and the proposed locations and depth

Activity	Discharge Volume (m^3)	Discharge Locations (see Figure 3-1 and Table 3-2)	Discharge Depth
Flooding	12,000 (if flooded from the FPSO PLET); or 15,000 (if flooded from the Bayu Undan PLET)	Bayu-Undan tie-in PLET FPSO PLET	Either 1 m below the surface or approx. 3 m above the seabed
Hydrotest depressurising	2,000	Either the FPSO PLET or Bayu-Undan tie-in PLET	Either 1 m below the surface or approx. 3 m above the seabed
Dewatering	85,000	FPSO PLET	Approx. 3 m above the seabed

Table 5-24 presents the chemical composition of hydrosure 0-3670R which is the proposed biocide and oxygen scavenger mixture to be used in the Barossa pipeline.

Table 5-24:Chemical composition of the hydrotest chemical treatment package equivalent to that required in the Barossa pipeline

Function	Chemical	Formula	CAS No.	Composition	Pipeline concentration (mg/L)[1]
Biocide	Alkyl dimethyl benzyl ammonium chloride	$C_{22}H_{40}ClN$	68424-85-1	10‐30 %	55 - 165
Oxygen Scavenger	Ammonium Bisulphite	NH_4HSO_3	10192-30-0	10‐30 %	55 - 165
Solvent	Dipropylene Glycol Methylether	$C_7H_{16}O_3$	34590-94-8 (mixture of isomers)	1‐10 %	5.5 – 55
Solvent	Ethylene glycol	$C_2H_6O_2$	107-21-1	<1 %	<5.5
Solvent	Water	H_2O	7732-18-5	30‐50 %	165 - 275

Note: [1] mg/L is essentially equivalent to ppm

On completion of FCGT, the flooded pipeline will be dewatered, conditioned with MEG and purged with nitrogen. The gas export pipeline will be dewatered using a train of dewatering pigs separated by MEG slugs. Approximately 1,000 m^3 will be discharged.

The impact being assessed is toxicological effects to marine organisms in the receiving water for the discharge.

Levels of acceptable impact
Impacts from dewatering will be acceptable if there is: iii. No substantial change in water quality which may adversely impact biodiversity, ecological integrity, social amenity or human health iv. No substantial change that may modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results. v. No substatial change to threatened and migratory species, that may lead to a reduction in the area of occupancy of the species or in the size of a population vi. No substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Oceanic Shoals Marine Park: a. KEFs of the marine park b. Threatened and migratory marine species c. BIA's for foraging and internesting marine turtles vii. No substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Carbonate bank and terrace system of the Van Diemen Rise KEF: a. sponges, soft corals and other sessile filter feeders associated with hard substrate sediments of the deep channels b. epifauna and infauna including polychaetes and ascidians c. olive ridley turtles, sea snakes and sharks viii. No Substantial change that may modify, destroy, fragment, isolate or disturb the following values of the Shelf break and slope of the Arafura Self KEF: a. Continental slope, patch reefs and hard substrate pinnacles
Potential Impacts
Chemical Additives ***Biocide*** The biocide is an Alkyl dimethyl benzyl ammonium chloride (ADBAC), which is a mixture of alkylbenzyl dimethylammonium chlorides of various alkyl chain lengths. It is a nitrogenous cationic surface-acting agent belonging to the quaternary ammonium group. The mechanism of microbicidal action is thought to be due to disruption of intermolecular interactions that cause dissociation of cellular membrane bilayers. This compromises cellular permeability controls and induces leakage of cellular contents. ADBAC is reported to have a half-life of between 8 and 15 days in seawater and is considered to be highly biodegradable. This indicates that the potential persistence in marine water and sediments is unlikely. Bioconcentration factor testing reported values for fish of 79 L/Kg (Centre for Environment, Fisheries & Aquaculture Science). Substances with a bioconcentration factor reported below 1000 L/Kg are considered to not bioconcentrate (Champion Technologies, 2013). Alternatives to ADBAC are glutaraldehyde and THPS. These were ruled out for reason provided in the ALARP section. ***Oxygen Scavenger*** The oxygen scavenger is Ammonium Bisulphite, a pale-yellow liquid with a pungent sulphur smell. It is soluble in water and readily reacts with oxygen to form sulphate salts and acids: $2NH_4HSO_3 + O_2 \rightarrow (NH_4)2SO_4 + H_2SO_4$ Neither the product component nor its by-products are classified as hazardous. It is listed on the Oslo and Paris Commission (OSPAR) list of substances which are considered to pose little or no risk (PLONOR) to the environment. It is therefore considered safe to discharge to the marine environment. Approximately 8 mg/L of NH_4HSO_3 are required to react with 1 mg/L of dissolved oxygen. Hence, 64 mg/L of NH_4HSO_3 are required to react with the dissolved oxygen levels in seawater at 8 mg/L. ***Solvents*** Dipropylene Glycol Methyl Ether and Ethylene glycol (see also MEG below) are organic compounds used in a variety of industrial products, including paints, pastes, dyes, resins, brake fluids and inks, and cosmetics. ***Fluorescein dye***

Fluorecein dye is dark greenish liquid, 60 – 90% aqueous solution of xanthene. Apart from its significant visual effect in the water, it is not hazardous to the environment. The ecological information in the Fluorescein MSDS report the product is not expected to be hazardous to the environment (Champion Technologies 2011).

Monoethylene Glycol

Monoethylene Glycol (MEG) (CAS number 107-21-1) is a colourless, odourless, involatile, hygroscopic liquid. It is characterised by two hydroxyl groups, which contribute to its high water solubility, hygroscopicity and reactivity with many organic compounds. MEG is on the OSPAR PLONOR list and is therefore deemed safe to discharge to the marine environment.

MEG is soluble in water, does not volatilise or undergo photodegradation, and is not adsorbed on to soil particles (Hook and Revill, 2016). Studies on a green alga (*Chlorella tusca*), a freshwater crayfish (*Procambarus* sp.) and a golden orfe carp (*Leuciscus idus melanotus*) revealed low potential for bioaccumulation in the marine environment (International Programme on Chemical Safety 2000). Ethylene glycols biodegrade readily when released to the environment, and several strains of micro-organisms can use them as an energy source. Given the low residual concentrations expected, rapid biodegradation and low toxicity, no significant impacts from the release of treated seawater are expected to the marine environment.

Ecotoxicity

Table 5-25 presents Whole Effluent Testing (WET) for hydrosure 0-3670R. Testing was undertaken according to protocols recommended by ANZECC and ARMCANZ (2000) and included five locally relevant species from a range of trophic levels (primary producer, herbivore and carnivore). Results show that NOECs ranged from 0.13 mg/L for the crustacean to 12.5 mg/L for the fish. In general, simpler life forms (algae and species in their larval stage) exhibited higher sensitivity compared to more complex life forms such as the fish.

Species protection levels calculated from statistical distribution of the NOECs are presented in **Table 5-26**. For long term continuous discharges (e.g. sewage outfalls), ANZECC and ARMCANZ (2000) recommend that the 99% species protection concentrations should be applied to develop environmental criterion for high conservation ecosystems. For chemicals with negligible potential for bioaccumulation the 95 % level of species protection may also be applied.

Taking into consideration that the hydrotest discharge is short term with negligible risk of bioaccumulation, the following environmental criteria is presented as a threshold for comparison with model results:

Beyond the mixing zone, the chemical concentration in the receiving environment is not to exceed a median (50th percentile) concentration of 0.06 mg/L.

This is in line with recent pipeline projects undertaken in Australian Waters (e.g. Wheatstone (see Chevron, 2015)). The mixing zone is an area within which environmental criteria may be exceeded. For the purpose of presenting results, we have nominally set this distance at 200 m.

Table 5-25: Ecotoxicological testing results for hydrosure (from Chevron, 2015)

Species	Test	Type	EC10 ppm (or mg/L)	EC50 ppm (or mg/L)	LOEC ppm (or mg/L)	NOEC ppm (or mg/L)
Nitzschia closterium (Algae)	72 hr Growth Inhibition	Chronic	1.5 *	3.3 (3.0-3.58)	2.50	1.30
Saccostrea echinata (Mollusc)	48 hr Larval Abnormality	Chronic	0.29 (0.24-0.33)	0.54 (0.52-0.56)	0.50	0.250
Heliocidaris tuberculata (Echinoderm)	72 hr Larval Development	Chronic	1.30 (1.27-1.32)	1.71 (1.70-1.74)	2.50	1.25
Melita plumulosa (Crustacean)#	96 hr Acute Toxicity	Acute	0.08 (0.04-0.11)	0.14 (0.10-0.16)	0.25	0.13
Lates calcifer (Fish)#	96 hr Acute Toxicity	Acute	13.5 (12.3-18.0)	17.5 (17.1-18.0)	25.0	12.5

*95% confidence limits are not reliable; Numbers in brackets represent the 95% fiducial limits.

Toxicity test is defined as an acute test.

Table 5-26: Species protection concentrations for Hydrosure 0-3670R based on the NOECs from WET testing (from Chevron, 2015)

	PC99% (ppm or mg/l)	PC95% (ppm or mg/l)	PC90% (ppm or mg/l)	PC80% (ppm or mg/l)
Hydrosure (based on NOEC)	0.06	0.10	0.15	0.23

Biodegradation and bioaccumulation potential

As described above, the constitute components of the hydrotest chemical package do not persist or accumulate within the marine environment. The mixture is therefore considered biodegradable with negligible potential for bioaccumulation.

Dispersion Modelling

Near and far field dilution modelling were undertaken for the possible 12,000 m^3 discharge at the Bayu-Undan tie-in PLET and 85,000 m^3 discharge at the FPSO PLET (RPS, 2019b). The smaller volume of 2,000 m^3 associated with depressurising after the hydrotest was not modelled as flooding and dewatering volumes are much higher and therefore present a worst-case scenario. Similarly, the possible 5,000 m^3 volume associated with flooding from the Bayu Undan end was not modelled as this is covered by the larger dewatering discharge. Results are presented below for scenarios of weak ambient currents, which constitutes worst case mixing conditions for the hydrotest release.

<u>Presentation of results</u>

Results are presented as:

- Plan views of maximum instantaneous concentration recorded within the plume for the duration of the model simulation. This figure plots the peak values attained at each grid point in the model over the course of the simulation. It is presented to illustrate the footprint of the plume down to the 99% species protection level (PC99) given in **Table 5-26**.
- Plan views of concentrations and vertical transects through the centre of the plume at distinct points in time throughout the simulation. These illustrate the actual behaviour of the plume.
- Time series of concentrations at two points through which the plume passes to show the ephemeral nature of plume at fixed points.
- 50th percentile (median) concentration calculated at each grid point in the model over the course of the model simulation. This is for comparison with the environmental criteria threshold and provides a better assessment of impact as it represents duration of exposure at any one location and not just the peak which could occur for a just a single time step in the model (60 secs).

Hydrotest flood discharge at the Bayu-Undan tie-in PLET

Table 5-27 presents the modelling parameters applied. The discharge volume of 12,000 m^3 was simulated over 21.5 hours. Surface and subsea discharges through a four-inch diameter orifice were modelled. The surface release was assumed to discharge horizontally at 1 m below the sea surface and the seabed release assumed to discharge 3.5 m above the seabed orientated vertically upwards.

Table 5-27: Summary of model parameters used in the modelling of the discharge from the Bayu-Undan tie-in PLET

Parameter	Value/design
Maximum discharge volume	12,000 m^3
Discharge duration	21.5 hours
Model duration	48 hours
Discharge depth	Scenario 1: Surface discharge: 1 m below the sea surface orientated horizontally Scenario 2:Seabed discharge: 3.5 m above the seafloor orientated vertically upwards
Outlet pipe internal diameter	4 inch
Hydrotest water temperature	As per ambient seawater
Hydrotest water salinity	As per ambient seawater
Initial chemical treatment concentrations	550 mg/L

<u>Surface discharge at the Bayu-Undan tie-in PLET</u>

Figure 5-16 presents the maximum instantaneous concentration during the model simulation, **Figure 5-17** presents predicted concentrations and vertical transects through the centre of the plume at distinct points in time; and **Figure 5-19** presents time

series at two locations through which the centre of the plume passes **(Figure 5-18)**. The discharge is neutrally buoyant and disperses horizontally, with no appreciable vertical movement. Advection is towards the southeast on the flood tide and northwest on the ebb. Maximum tidal excursion is over 10km, reflecting the strong tidal currents in the area.

Pooling occurs at slack waters during which time concentrations build up over the release point. At 200 m from the discharge, concentration peak at 8.4 mg/L, whilst the 95th percentile and 50th percentile (median) concentrations over the model simulation (48 hours) are 1.95 and <0.06 mg/L, respectively (**Figure 5-19**).

At the furthest point from the discharge, the concentration peak is up to 0.2 mg/L (**Figure 5-16)**, however, both the 95th and 50th percentile are below 0.06 mg/L. **Figure 5-20** shows the median (50th percentile) concentration. This metric is <0.06 mg/L over the whole grid, even in the near vicinity of the discharge, so, on this basis, the environmental criterion given above is comfortably met.

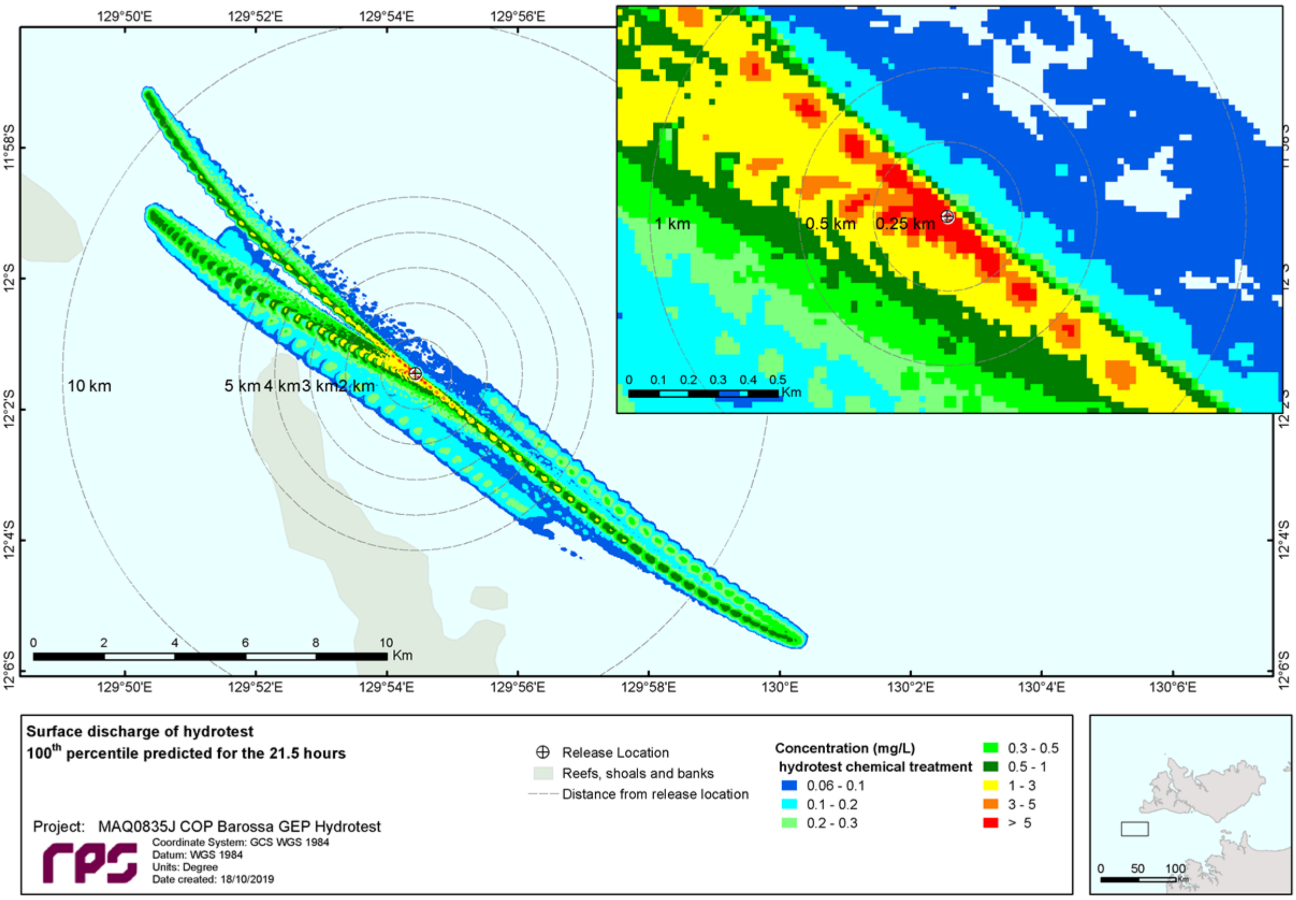
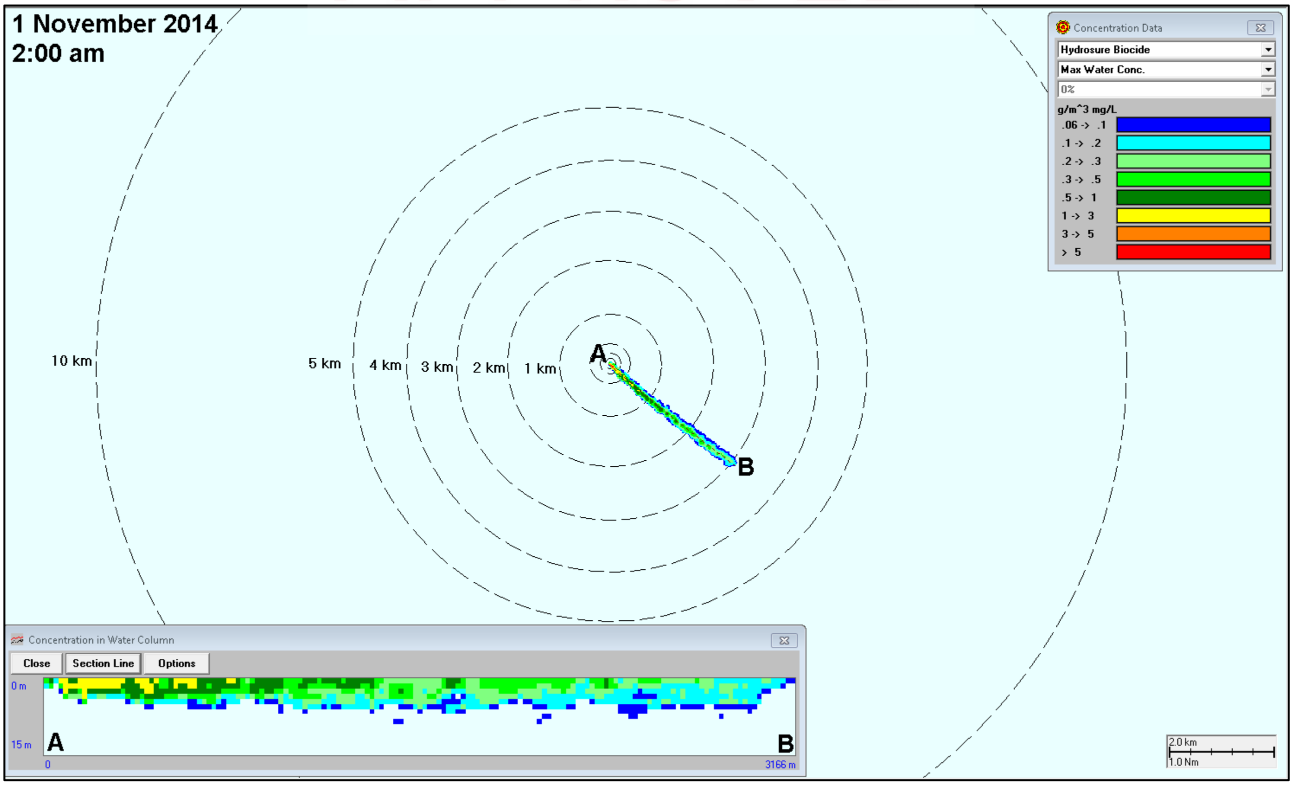
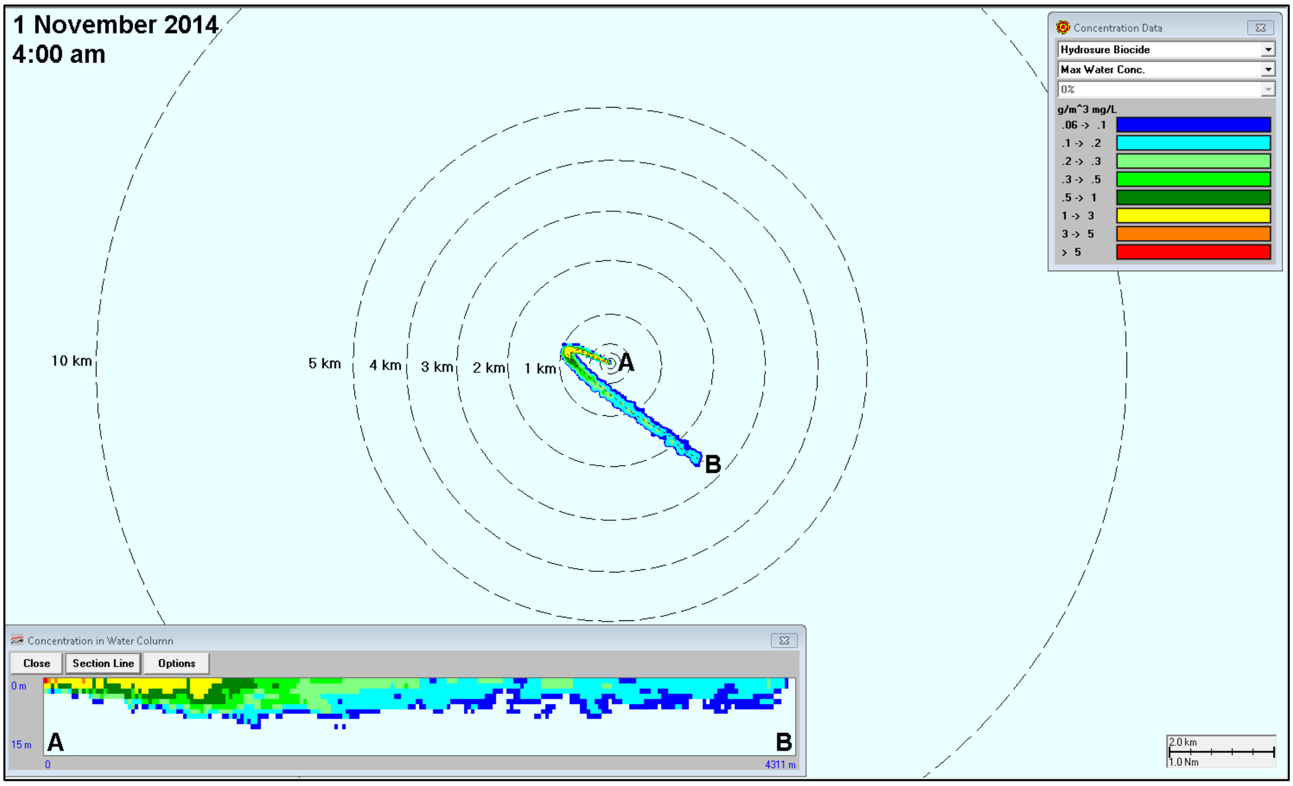
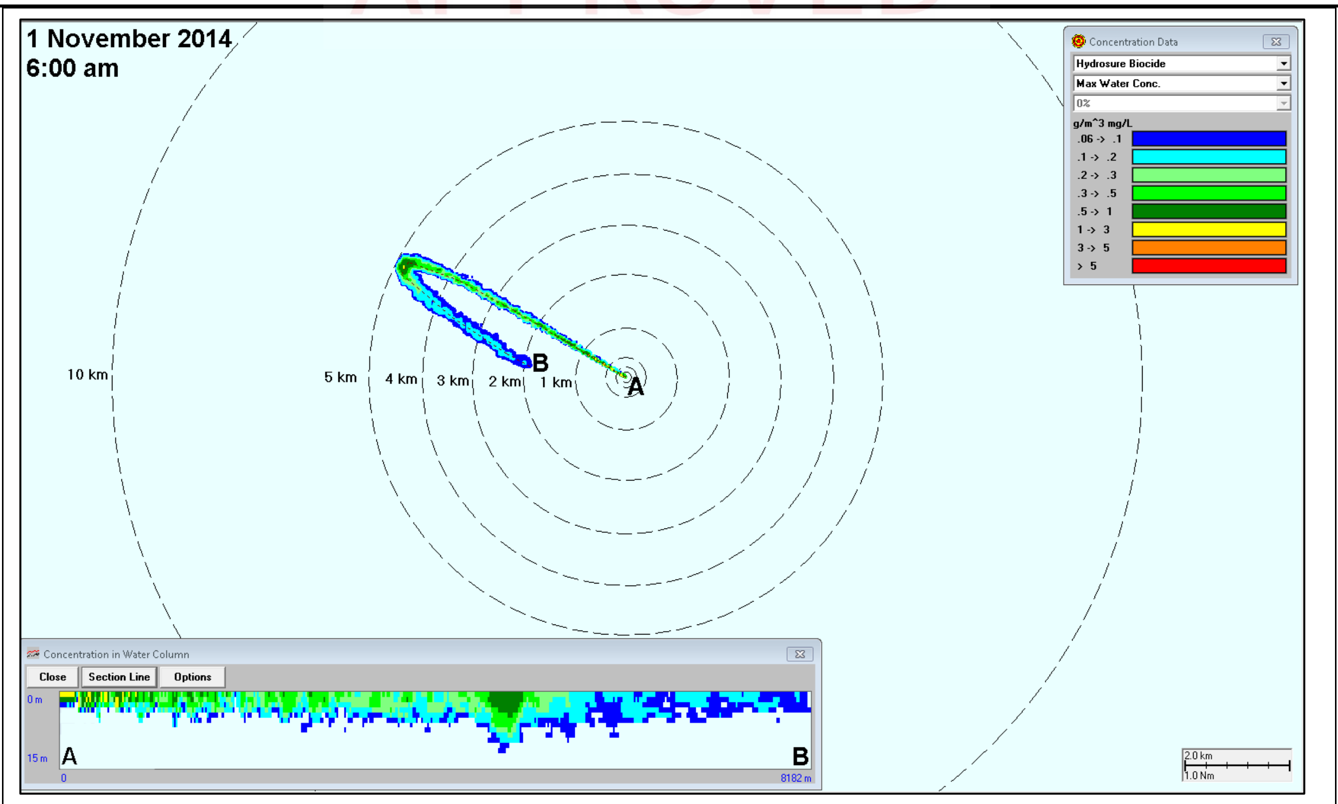
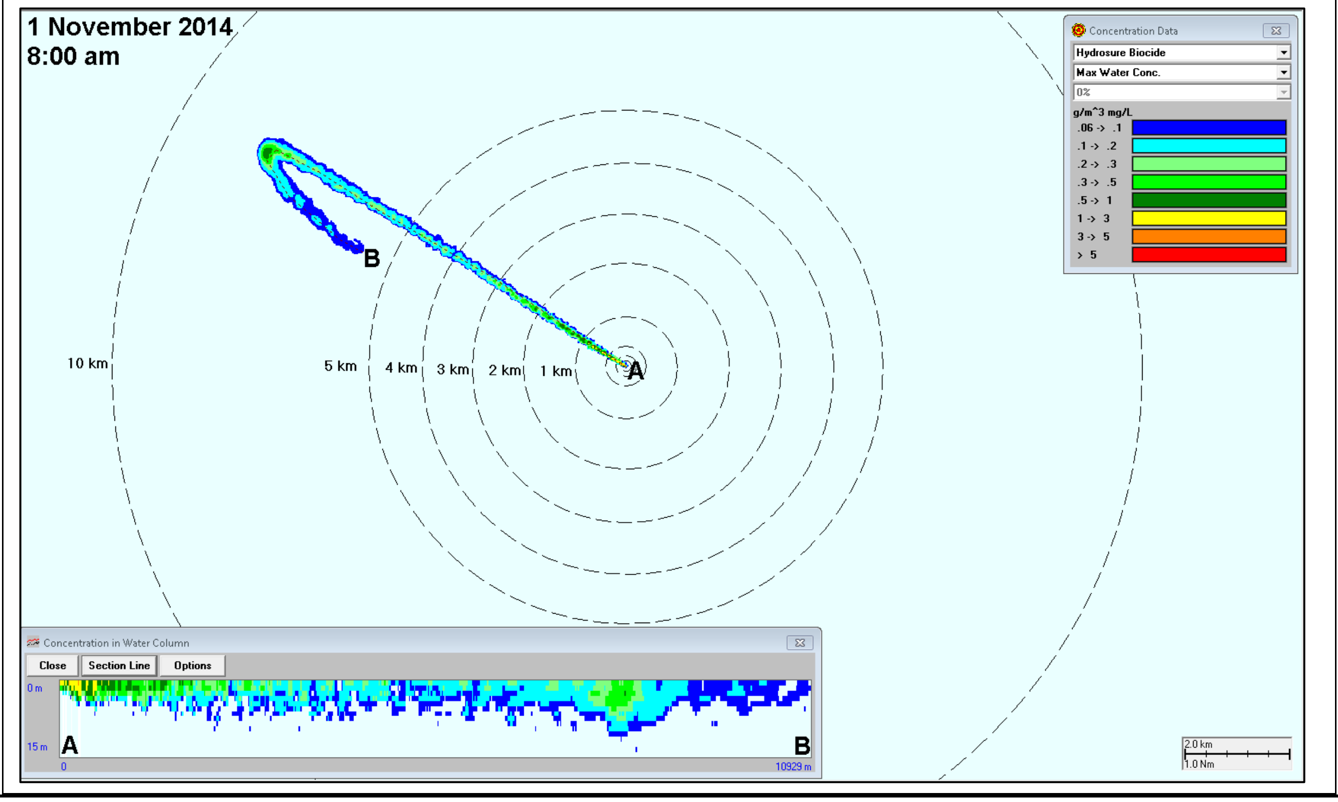


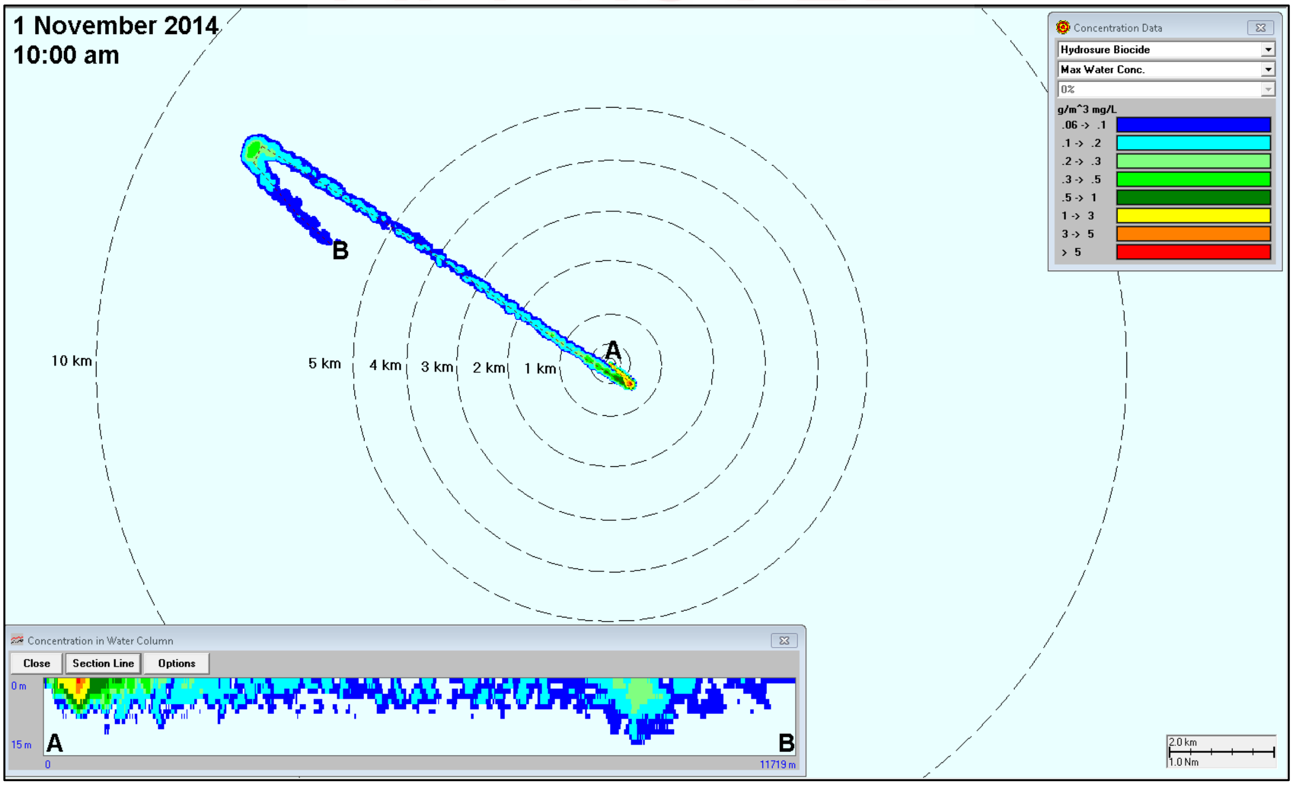
Figure 5-16: Bayu-Undan tie-in PLET surface discharge: Predicted maximum concertation of the hydrotest chemical over the course of the simulation

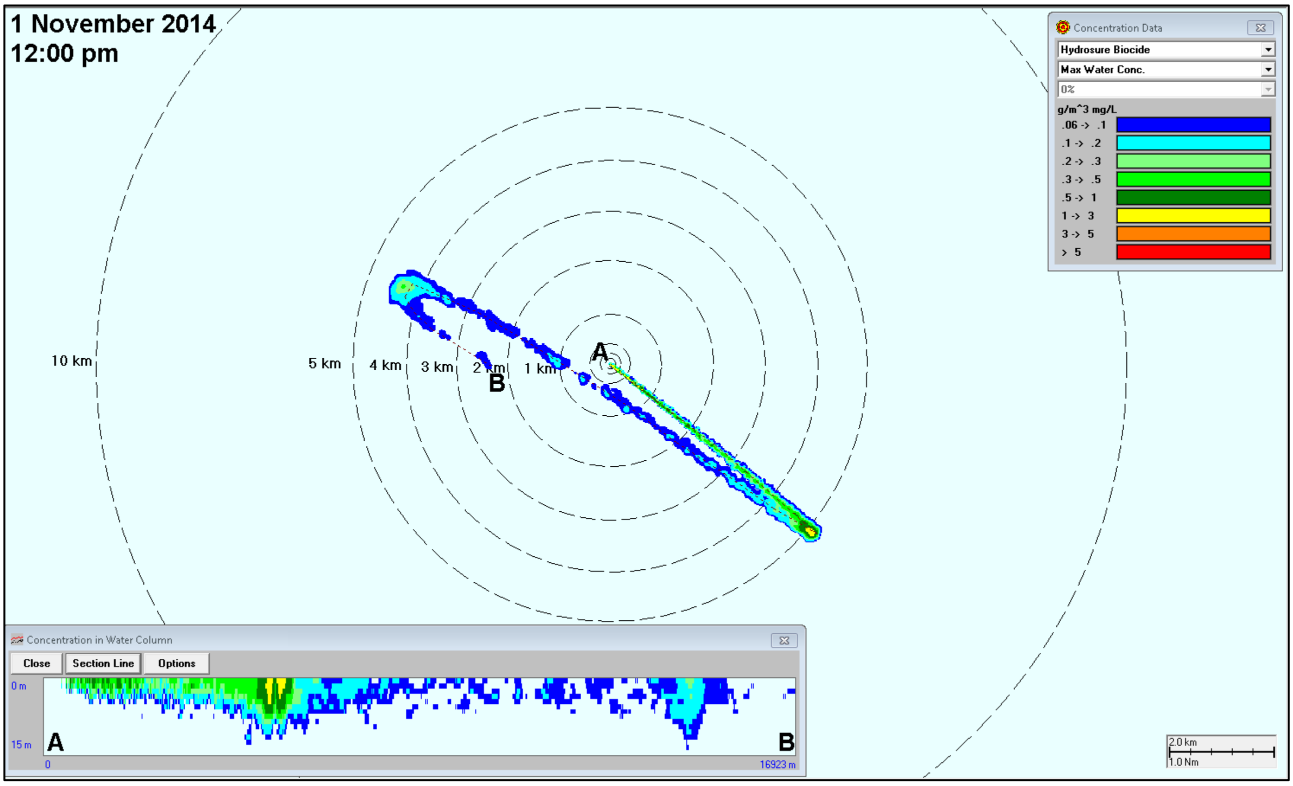

1 November 2014
2:00 am
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
0 m
15 m
0
3166 m
2.0 km
1.0 Nm


1 November 2014
4:00 am
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
0 m
15 m
0
4311 m
2.0 km
1.0 Nm


1 November 2014
6:00 am
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
0 m
15 m
0
8182 m
2.0 km
1.0 Nm


1 November 2014
8:00 am
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
0 m
15 m
0
10929 m
2.0 km
1.0 Nm


1 November 2014
10:00 am
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
Concentration in Water Column
Close
Section Line
Options
0 m
15 m
11719 m
2.0 km
1.0 Nm


1 November 2014
12:00 pm
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
Concentration in Water Column
Close
Section Line
Options
0 m
15 m
16923 m
2.0 km
1.0 Nm

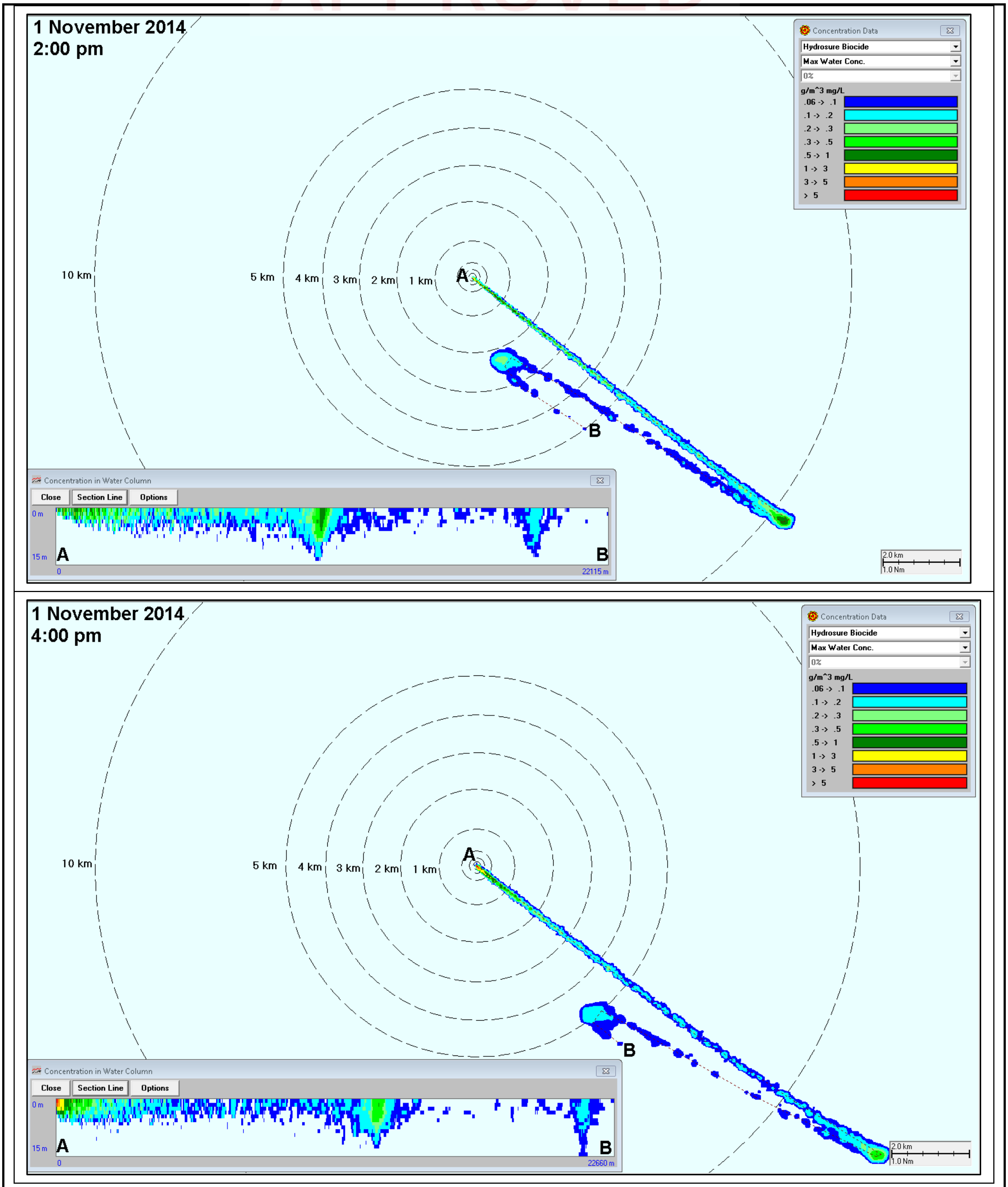


Figure 5-17: Bayu-Undan tie-in PLET surface discharge: predicted dispersion of the hydrotest chemical on a neap tide

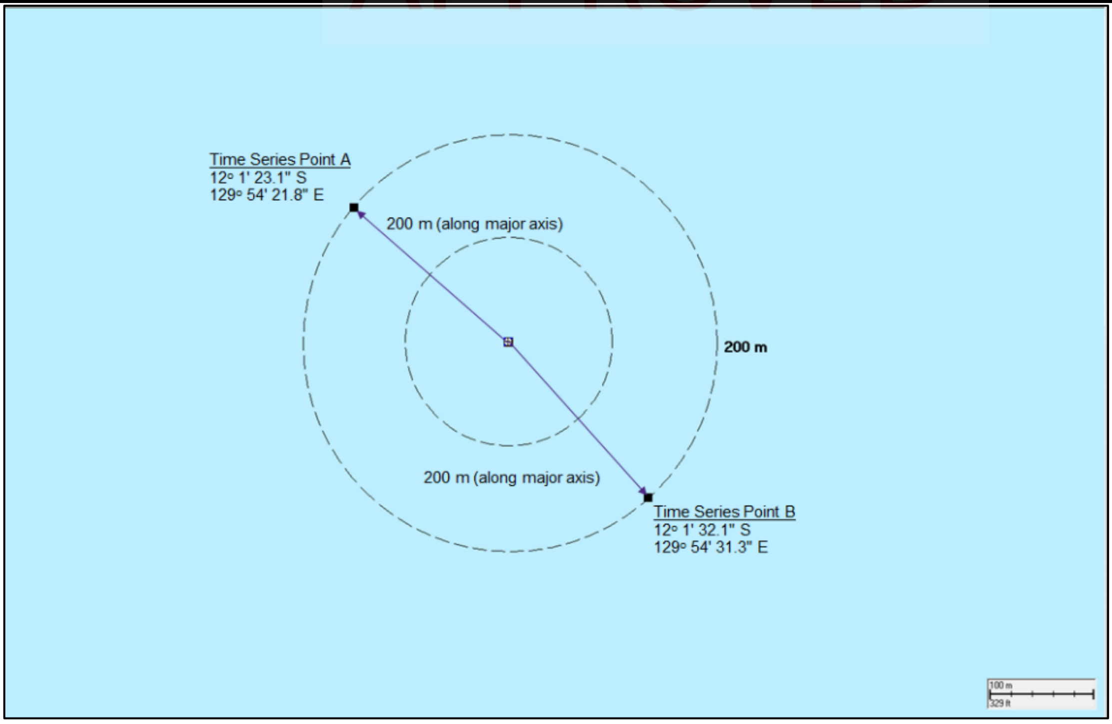
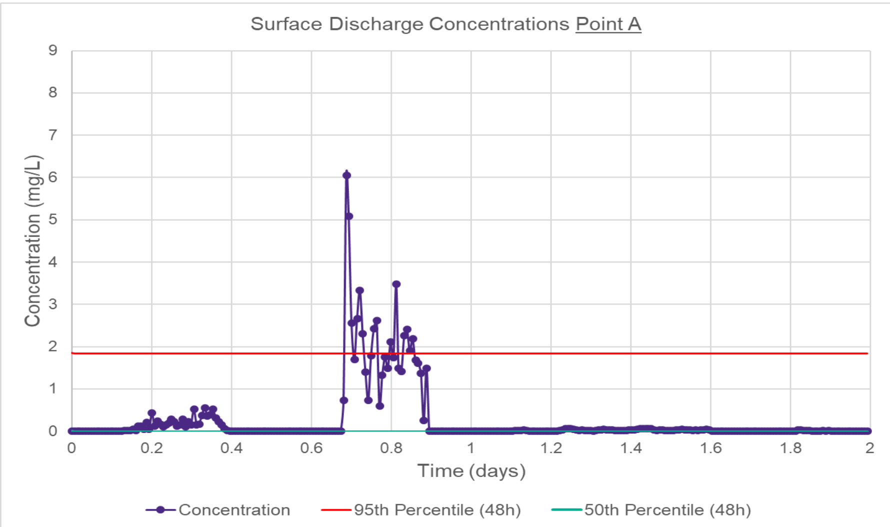


Figure 5-18: Hydrotest discharge time series locations



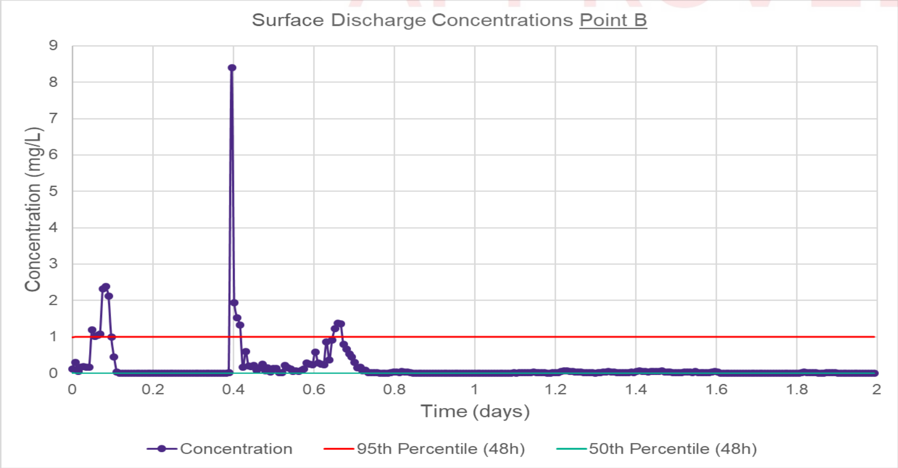
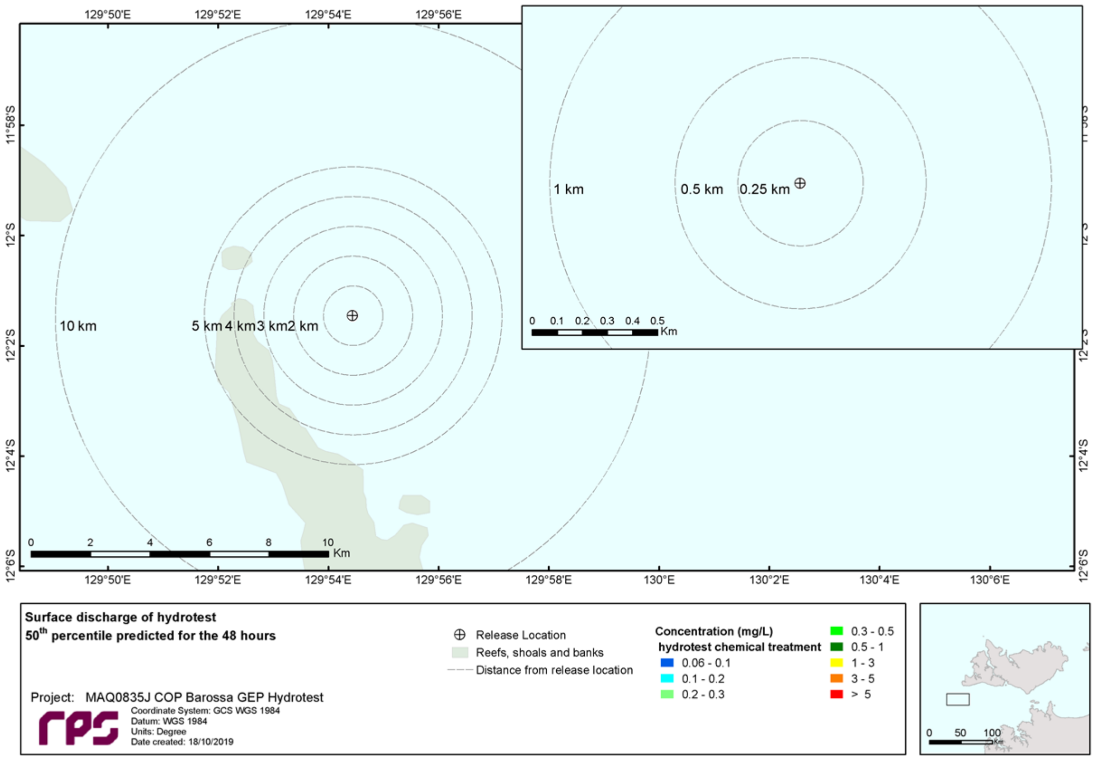


Figure 5-19: Bayu-Undan tie-in PLET surface discharge: Time series of the hydrotest chemical concentration at 200 m from the discharge



Note: median hydrotest chemical concentration below 0.06 mg/L so below the minimum contour level which was set at the environmental criteria for the discharge.

Figure 5-20: Bayu-Undan tie-in PLET surface discharge: median hydrotest chemical concentration on a neap tide

Seabed discharge at the Bayu-Undan tie-in PLET

Figure 5-21 and Figure 5-22 present modelling results for the subsurface discharge. As for the surface discharge, the plume is advected towards the southeast on the flood tide and northwest on the ebb, however, in this case, the plume travels along the seabed. At 200 m from the discharge (within the centre of the plume), concentration peak at 6.2 mg/L, whilst the 95th and 50th percentile (median) concentrations over the duration of the discharge are 0.5 and <0.06 mg/L, respectively (Figure 5-23). At the furthest point from the discharge, the concentration peak is up to 1 mg/L, however, both the 95th and 50th percentile are below 0.06 mg/L. Once again, the 50th percentile (median) concentration over the whole grid is below 0.06 mg/L (Figure 5-24) thus meeting the environmental criterion.

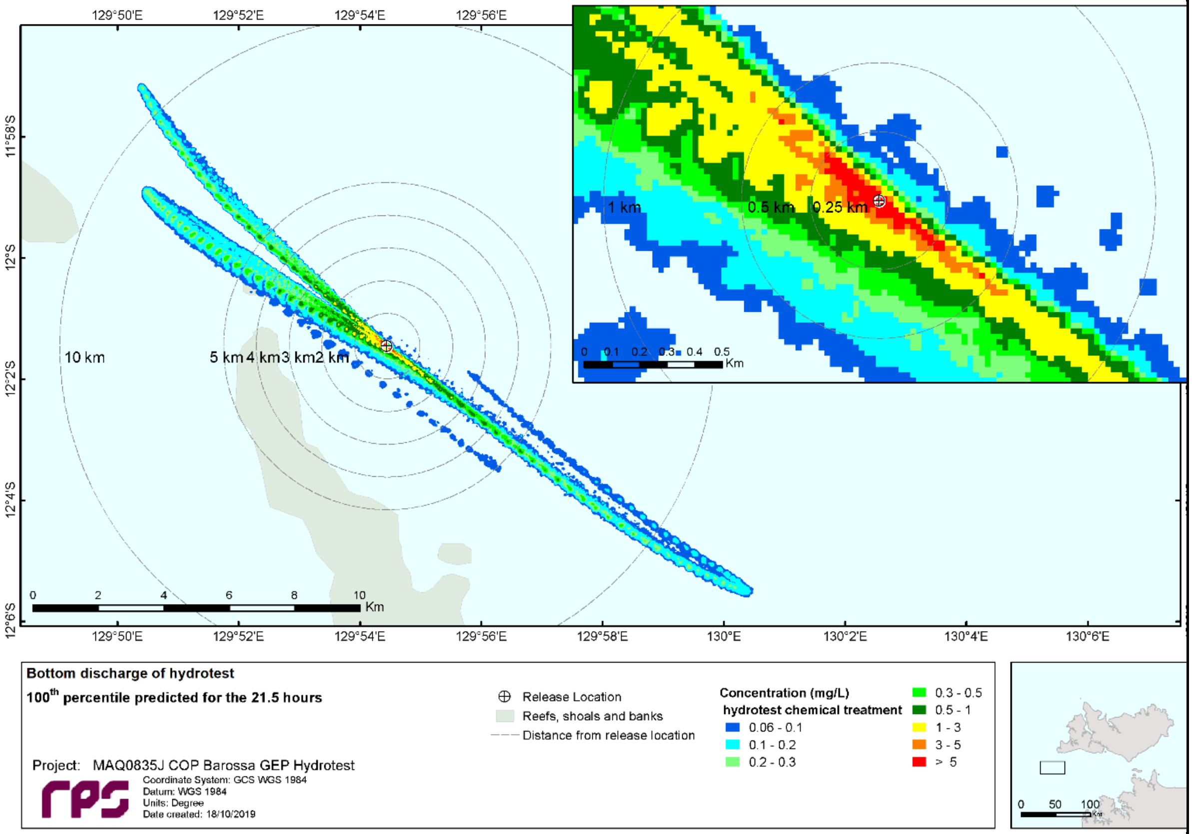
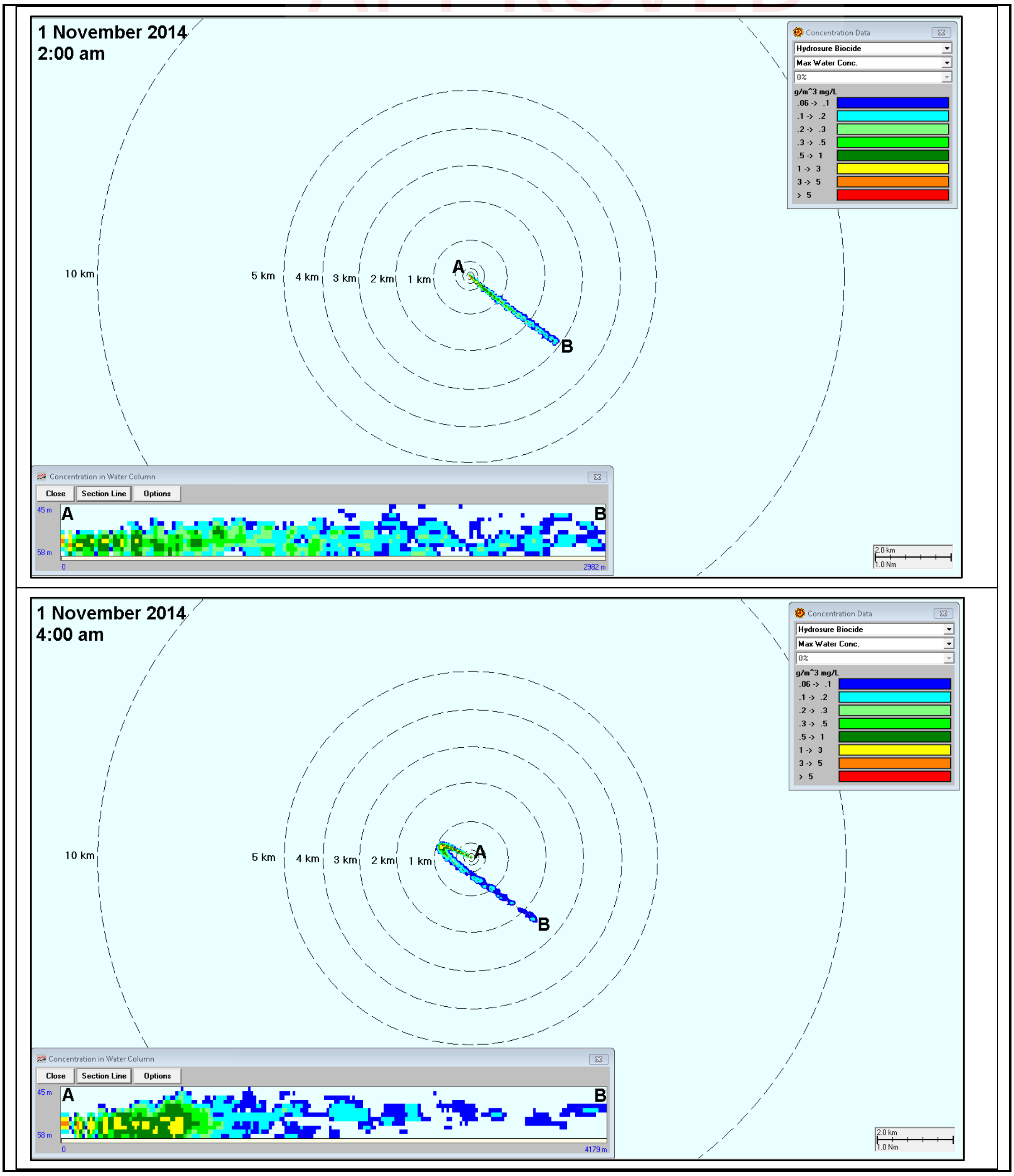
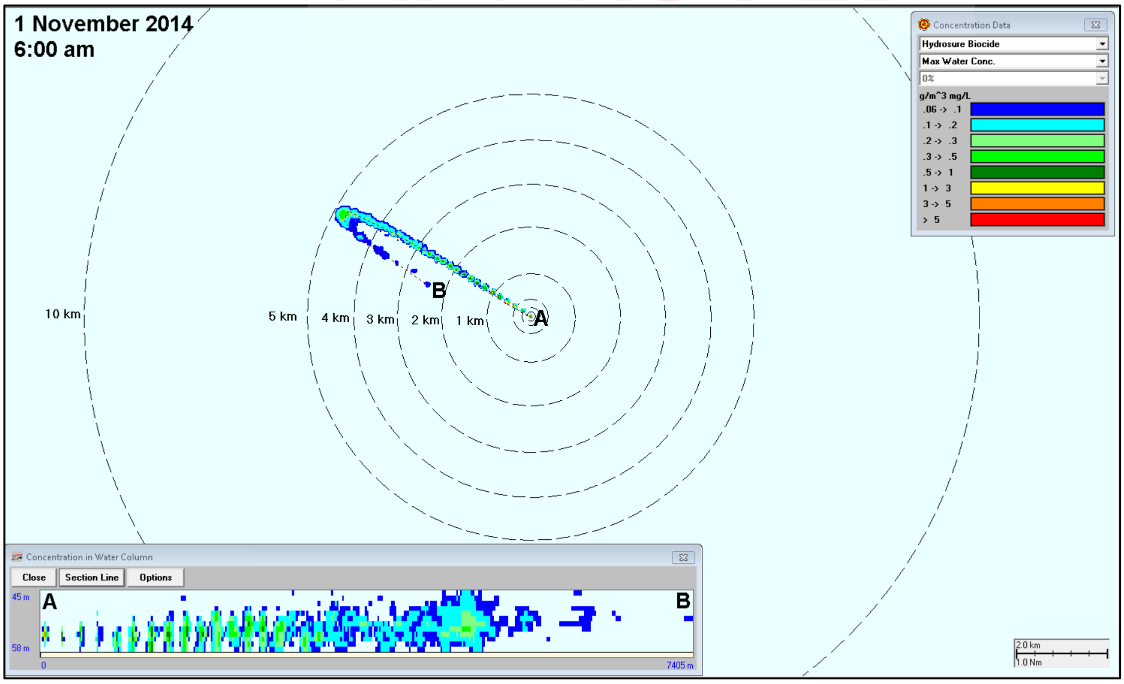
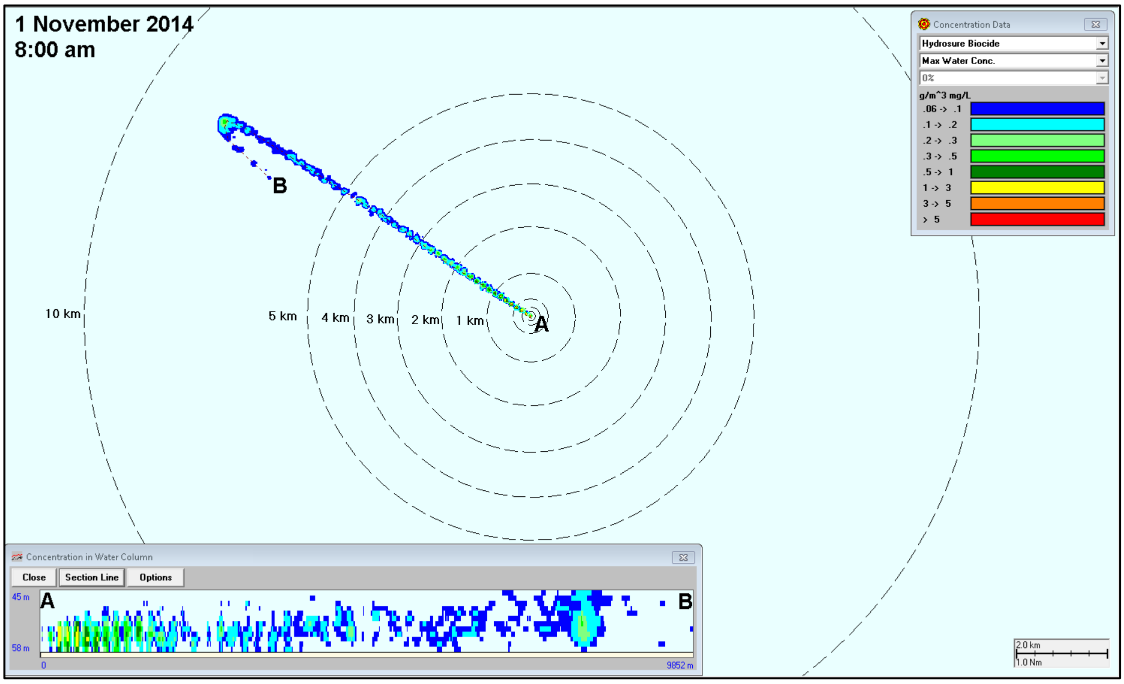


Figure 5-21: Bayu-Undan tie-in PLET bottom discharge: Predicted maximum concertation of the hydrotest chemical over the course of the simulation


1 November 2014
2:00 am
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration Data
Hydrosure Biocide
Max Water Conc.
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
Concentration in Water Column
Close
Section Line
Options
45 m
58 m
0
2982 m
2.0 km
1.0 Nm
1 November 2014
4:00 am
4179 m


1 November 2014
6:00 am
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
Concentration in Water Column
Close
Section Line
Options
45 m
58 m
0
7405 m
2.0 km
1.0 Nm


1 November 2014
8:00 am
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
Concentration in Water Column
Close
Section Line
Options
45 m
58 m
0
9852 m
2.0 km
1.0 Nm

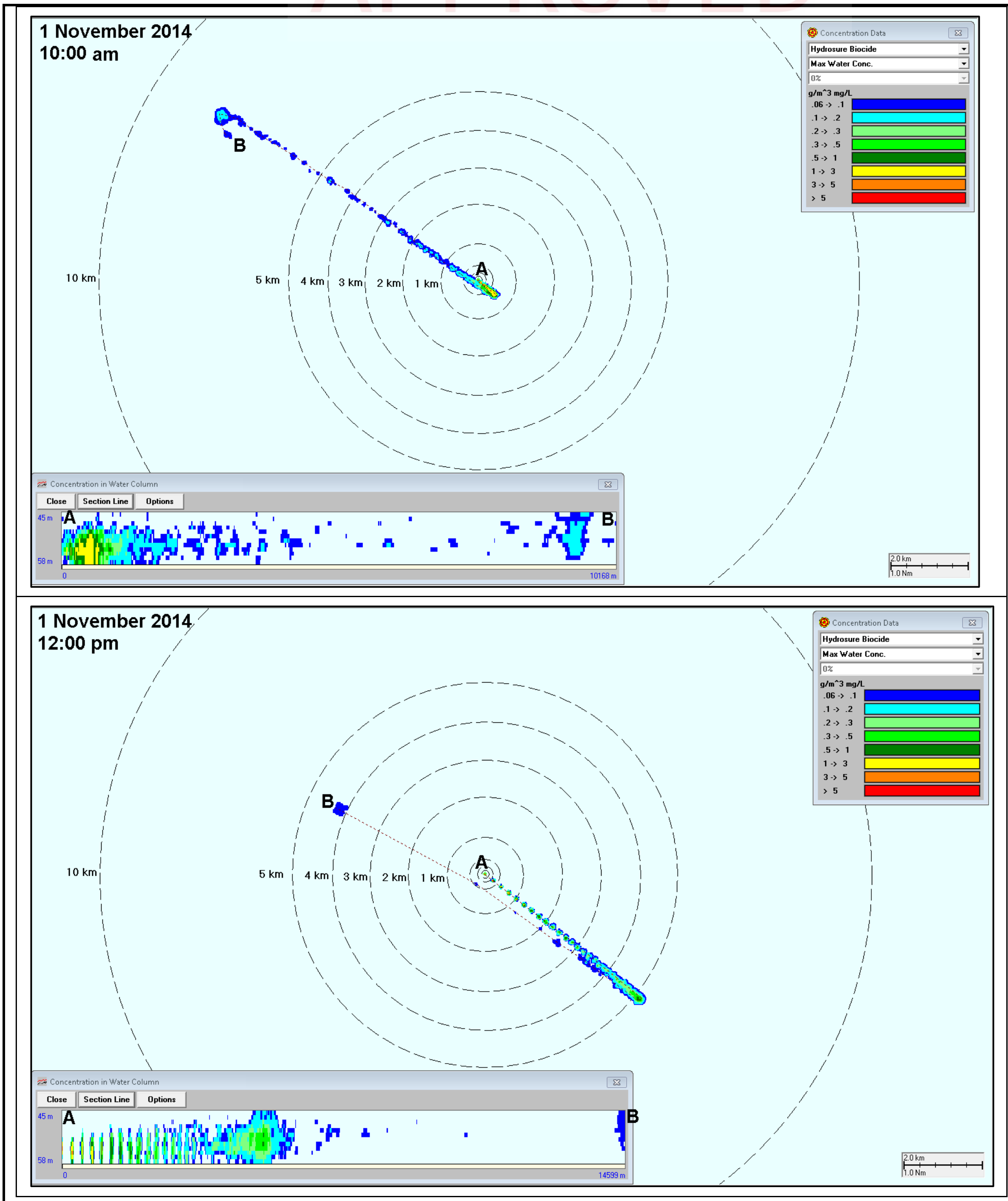
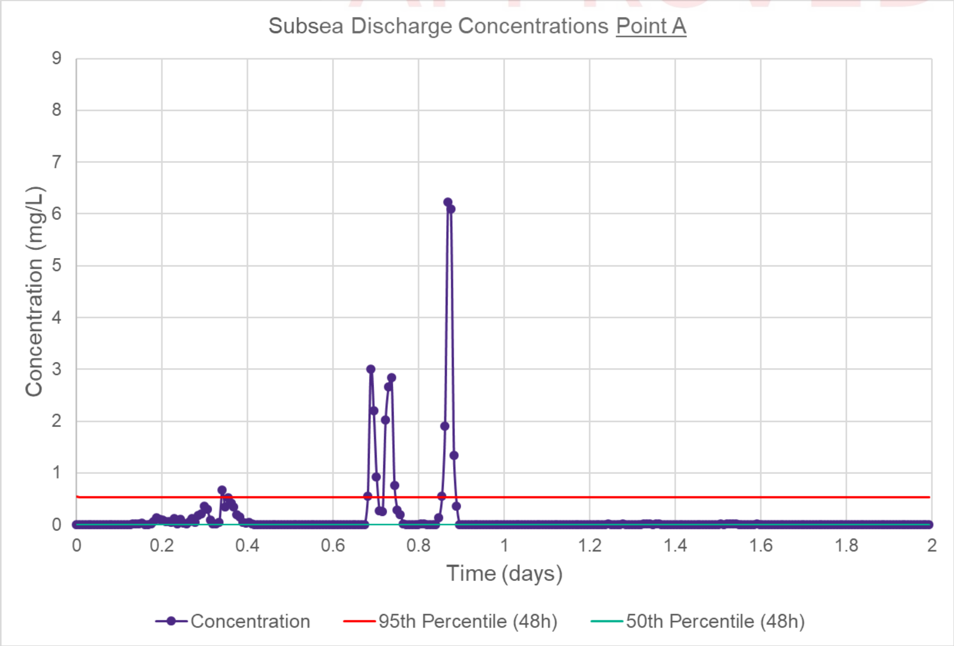


Figure 5-22: Bayu-Undan tie-in PLET seabed discharge: predicted dispersion of the hydrotest chemical



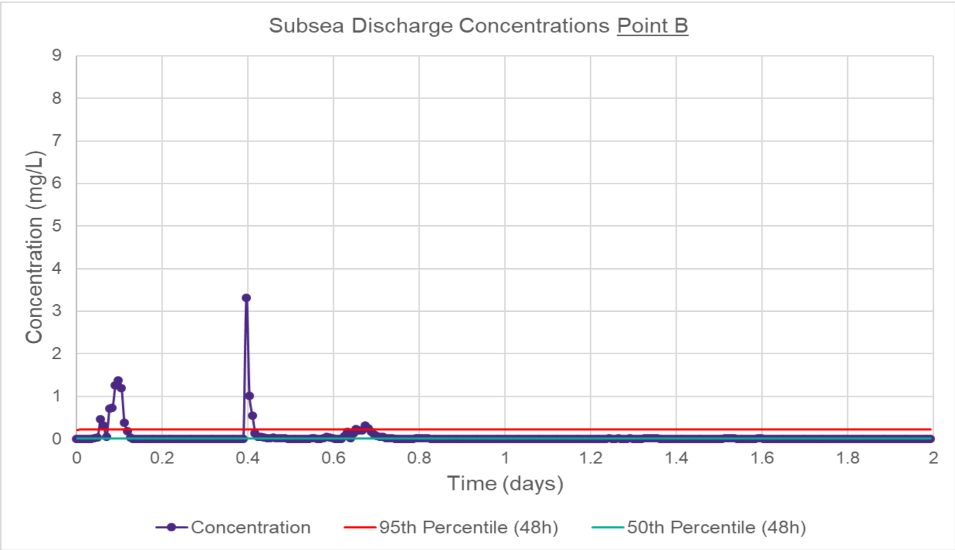
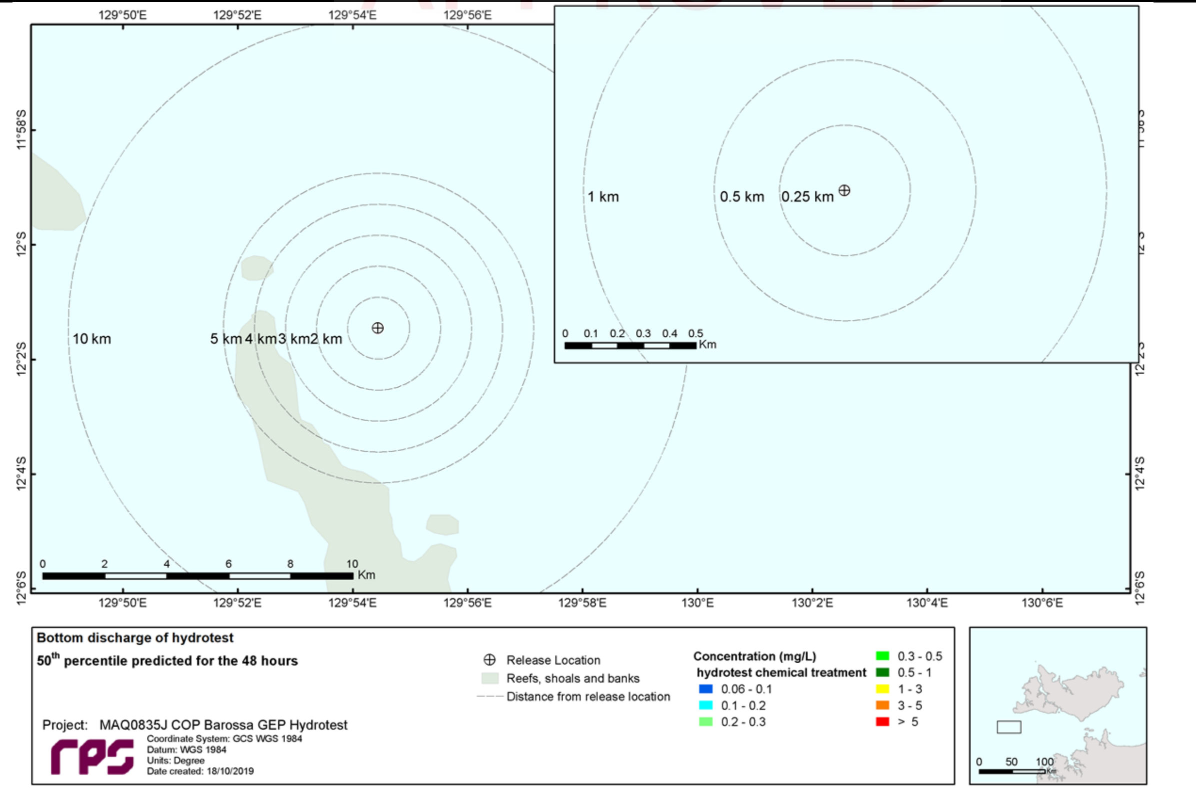


Figure 5-23: Bayu-Undan tie-in PLET seabed discharge: Time series of the hydrotest chemical concentration at 200 m from the discharge



Note: median hydrotest chemical concentration below 0.06 mg/L so below the minimum contour level which was set at the environmental criteria for the discharge.

Figure 5-24: Bayu-Undan tie-in PLET seabed discharge: median hydrotest chemical concentration

Seabed discharge at the FPSO PLET

Table 5-28 presents the modelling parameters applied for the FPSO PLET subsea discharge. 85,000 m^3 was discharged over 7 days from a four-inch orifice orientated vertically upwards 3.5 m above the seabed.

Table 5-28: Summary of model parameters used in the modelling for the FPSO PLET seabed discharge

Parameter	Value/design
Maximum discharge volume	85,000 m^3
Discharge duration	7 days
Model run duration	8 days
Discharge depth (m)	Seabed discharge: 3.5 m above the seafloor orientated vertically upwards
Outlet pipe internal diameter	4-inch
Hydrotest water temperature	As per ambient seawater
Hydrotest water salinity	As per ambient seawater
Initial chemical treatment concentrations	550 mg/L

Figure 5-25 and Figure 5-25 presents spatial results for the subsurface discharge. Tidal currents at the FPSO PLET are weak; regional currents dominate and the plume is seen to travel towards the southwest near the seabed. Concentrations peak at more than 5 mg/L. however, as can be seen in Figure 5-25**,** such increases are confined to the near vicinity of the discharge and are sporadic (Figure 5-28). At the furthest point from the discharge, the concentration peak is up to 0.1 mg/L. Median (50th percentile) concentrations reduce to below 0.06 mg/L within 100 m (**Figure 5-29**), thereby meeting the environmental criterion.

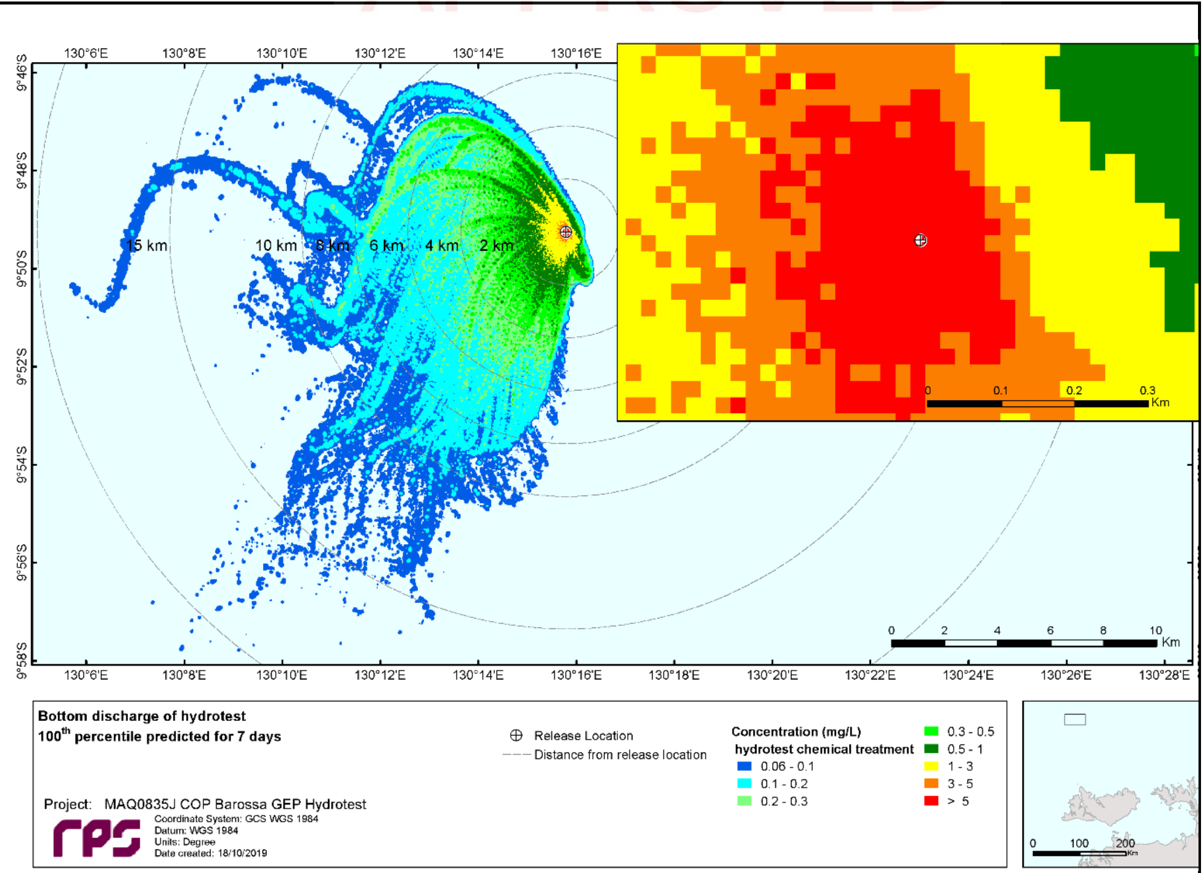
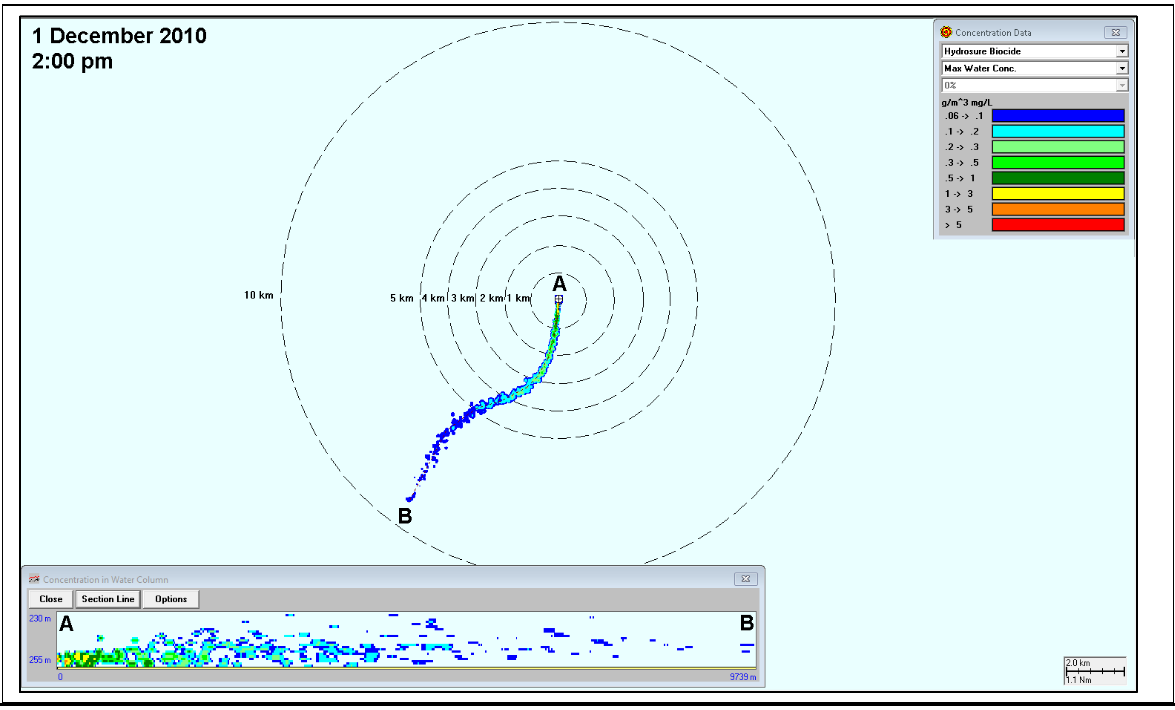
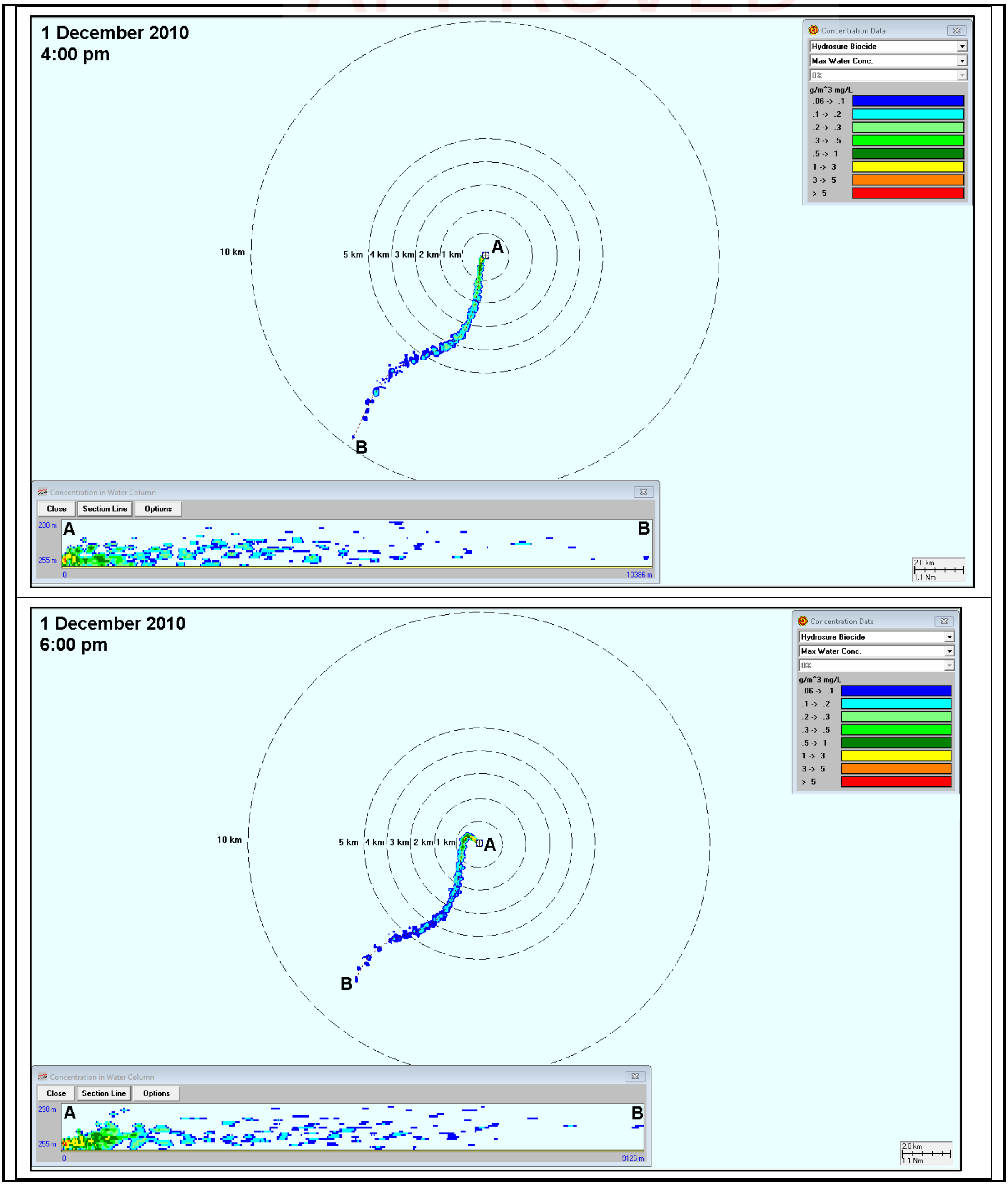
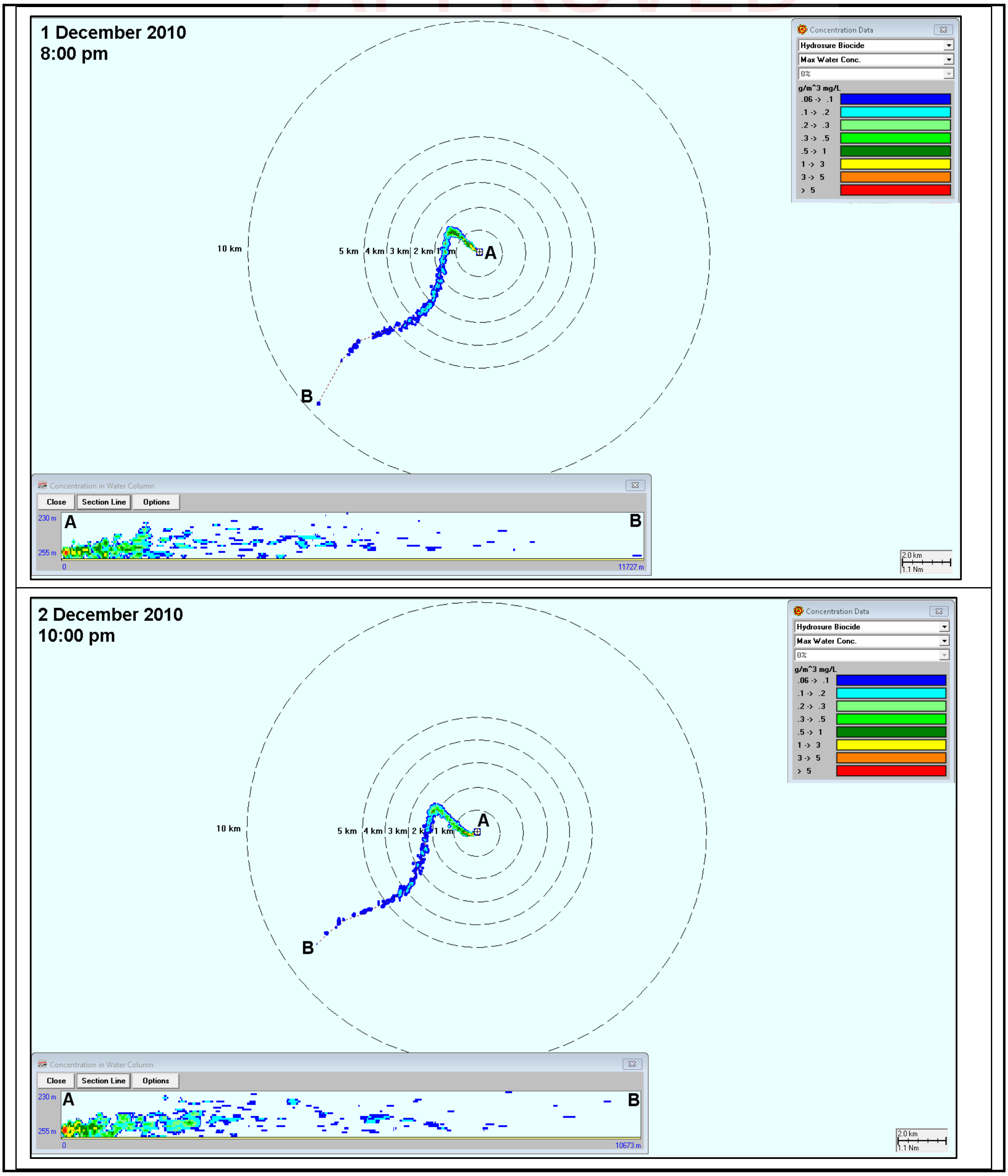


Figure 5-25: FPSO PLET bottom discharge: Predicted maximum concertation of the hydrotest chemical over the course of the simulation




1 December 2010
4:00 pm
Concentration Data
Hydrosure Biocide
Max Water Conc.
0%
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
230 m
255 m
0
10386 m
2.0 km
1.1 Nm
1 December 2010
6:00 pm
9126 m


1 December 2010
8:00 pm
Concentration Data
Hydrosure Biocide
Max Water Conc.
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
230 m
255 m
0
11727 m
2.0 km
1.1 Nm
2 December 2010
10:00 pm
Concentration Data
Hydrosure Biocide
Max Water Conc.
g/m^3 mg/L
.06 -> .1
.1 -> .2
.2 -> .3
.3 -> .5
.5 -> 1
1 -> 3
3 -> 5
> 5
10 km
5 km
4 km
3 km
2 km
1 km
A
B
Concentration in Water Column
Close
Section Line
Options
230 m
255 m
0
10673 m
2.0 km
1.1 Nm

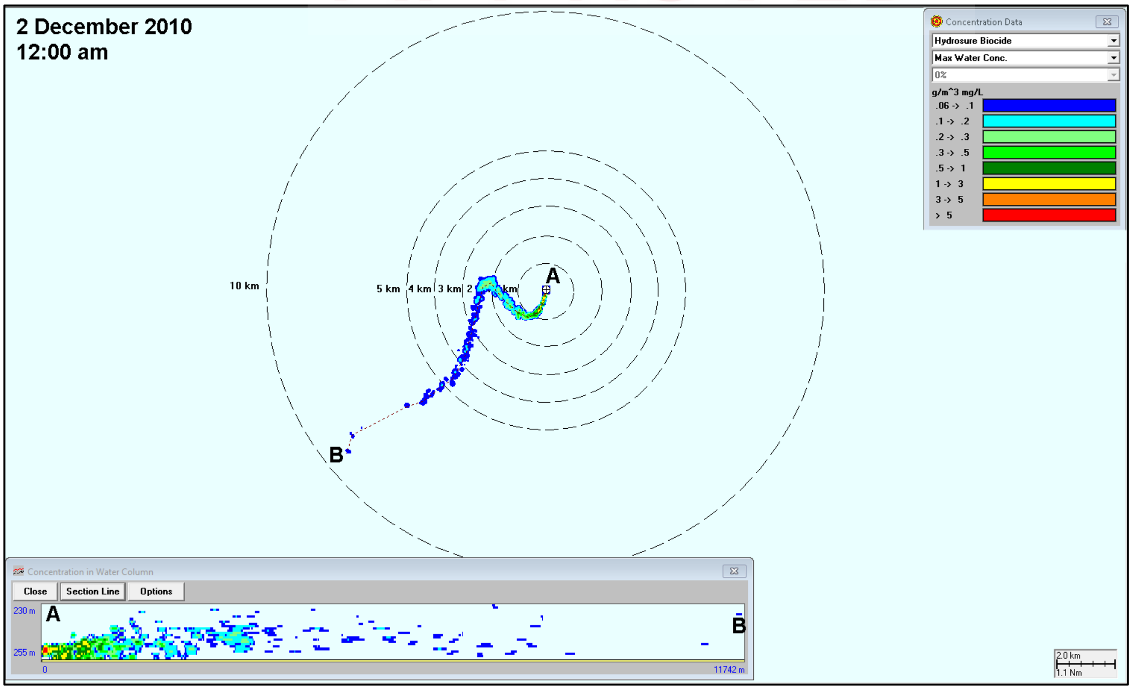


Figure 5-26: FPSO PLET seabed discharge: predicted dispersion of the hydrotest chemical

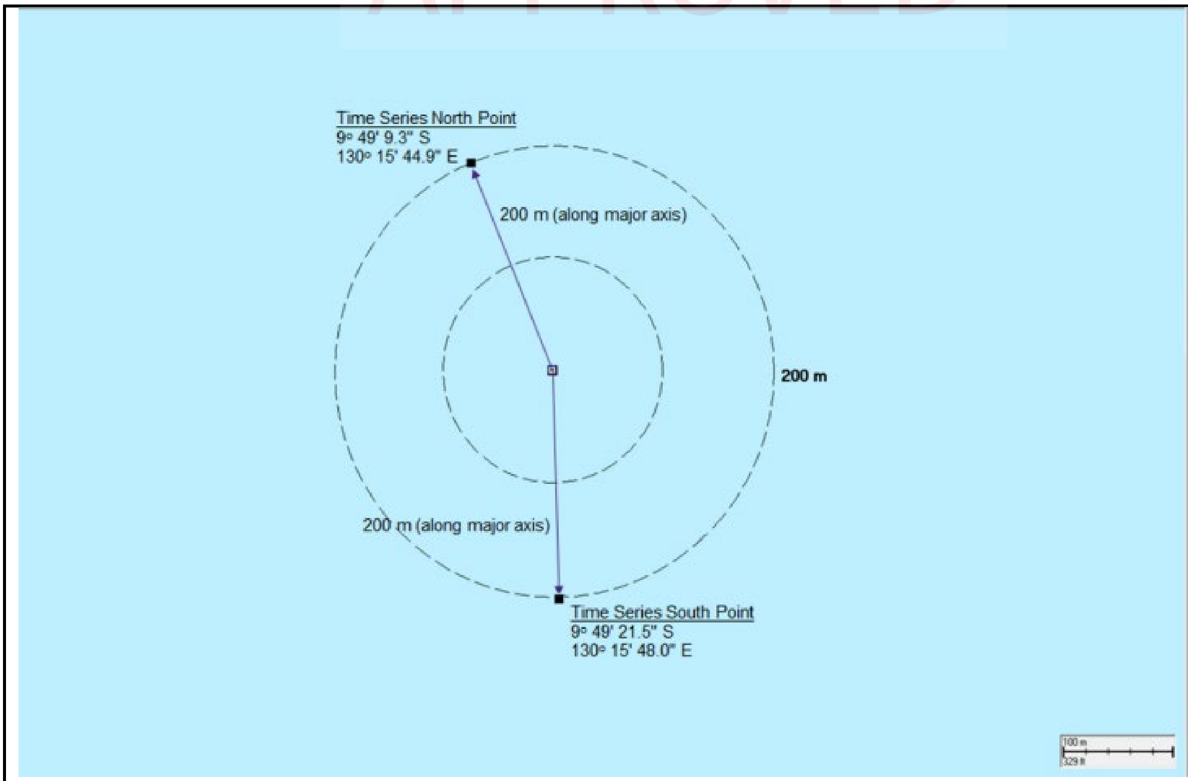
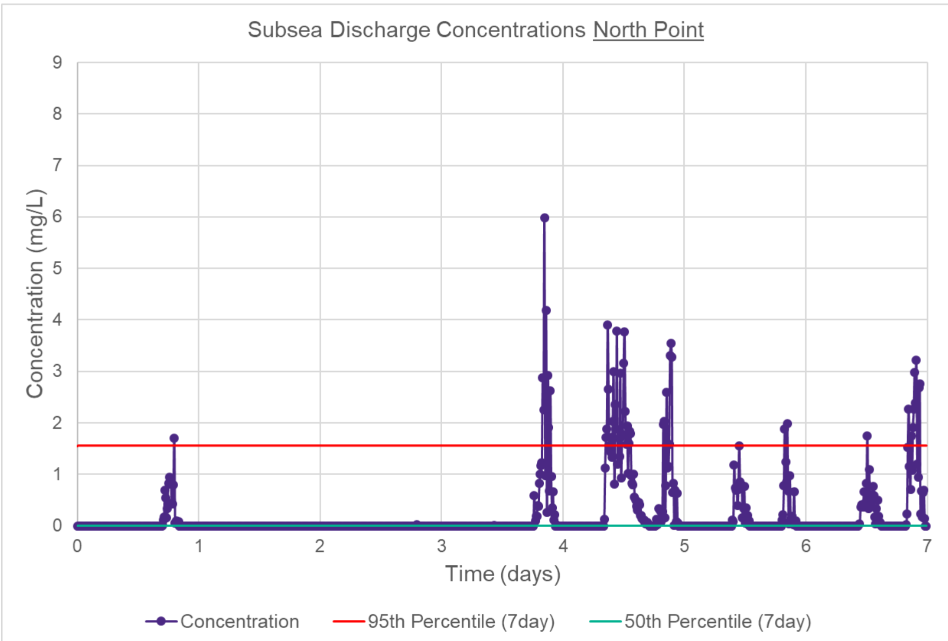


Figure 5-27: FPSO PLET seabed discharge: Time series locations at 200 m from the discharge



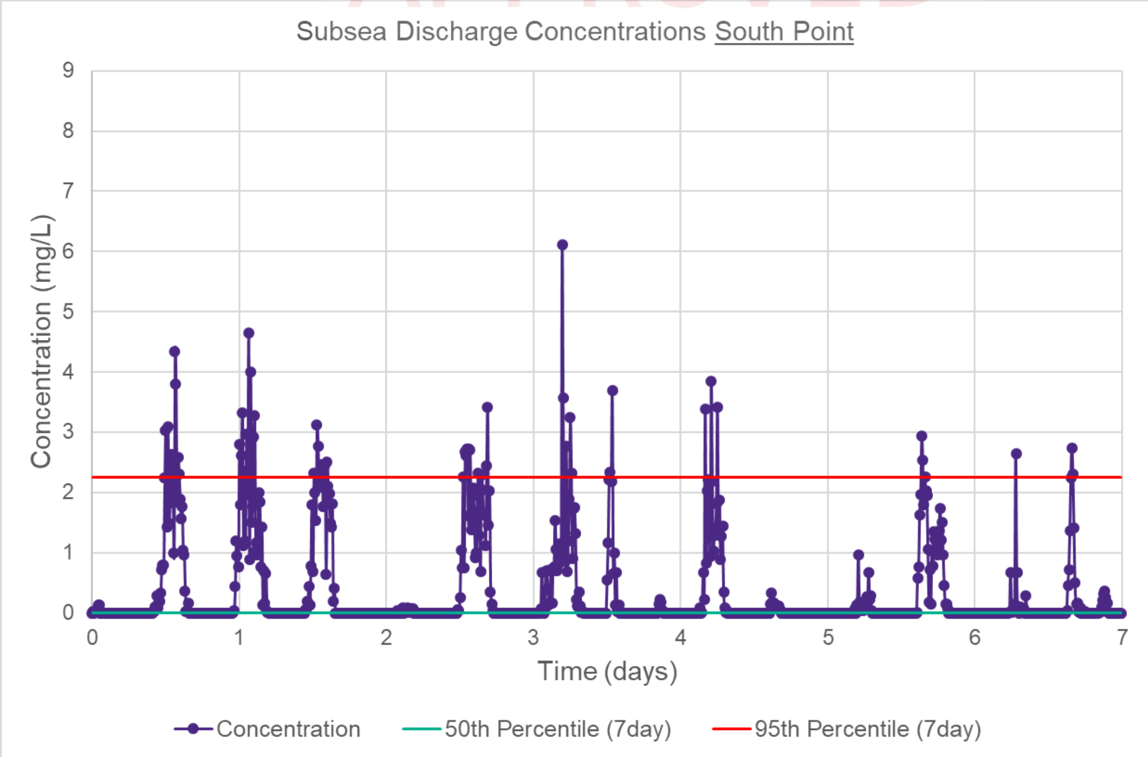


Figure 5-28: FPSO PLET seabed discharge: Time series of the hydrotest chemical concentration at 200 m from the discharge

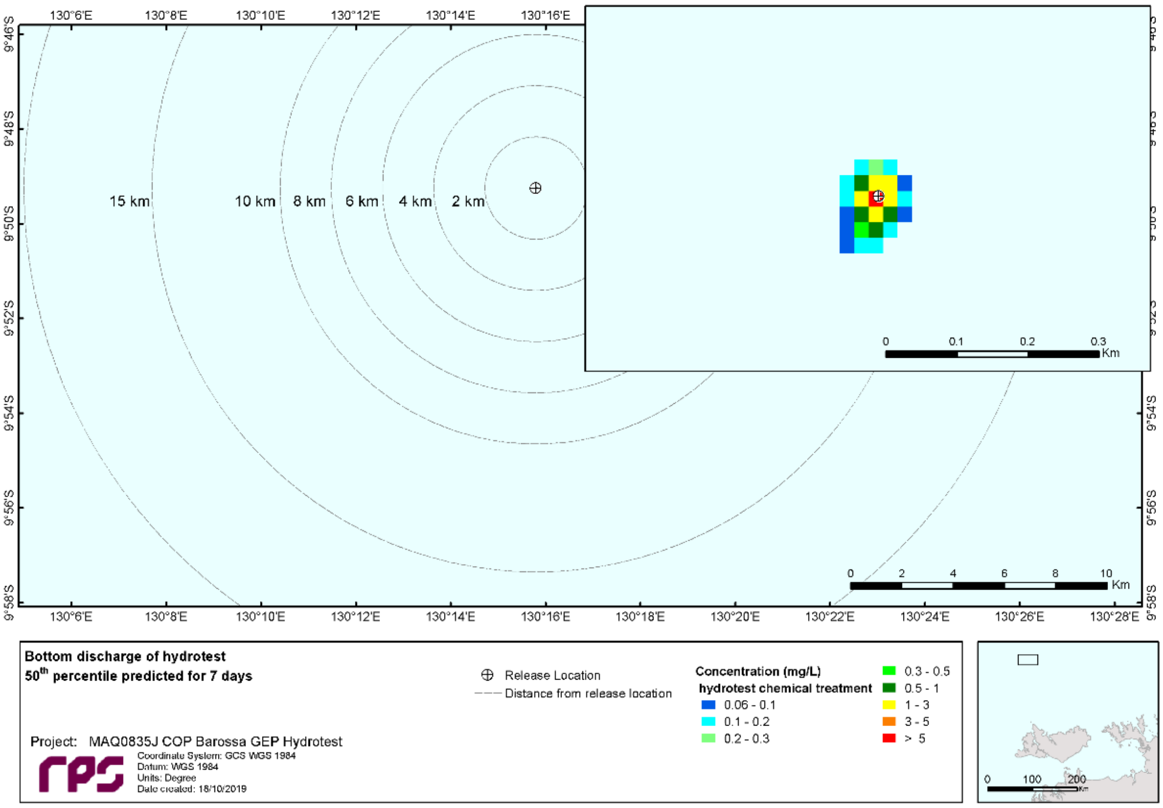


Figure 5-29: FPSO PLET seabed discharge: median hydrotest chemical concentration

Water quality

Predicitive modelling demonstrates that diluton in the receiving environment is high and the area well flushed. Chemical concentrations reduce rapidly with the median concentrations at any one point predicted to reduce below the 99% species protection concentration within close proximity to the point of discharge.

The release of treated seawater will result in localised and temporary reduction in water quality around the discharge location. Chemicals that will be used are inherently biodegrdable with low potential for bioaccumulation. For the above reasons, no substantial change in water quality is expected from dewatering and the impact is therfore deemed acceptable.

Plankton

Plankton drifting passed the outlet at the time of discharge may be exposed to concentrations above that which could elicit an effect. However, dilution of the plume is rapid and the exposure concentration travelling with the organism will continually reduce. There may be effects to some individuals, however, plankton are widely distributed in the ocean and regenerate rapidly.

Sediment quality

Sediments are unlikely to be impacted as the release will be through a vertical diffuser, three to four metres above the seabed and orientated vertically upwards.

Other communities - Benthic communities

No protected or sensitive benthic habitats have been identified with the potential to be exposed to the dewatering plume. The seabed is bare sediment at the northern PLET location(**Figure 5-30)** and consists of sparse filter feeders with small outcrops of hard coral at the southern end (**Figure 5-31**). Sensitive banks and shoals are too far away to be impacted (**Section 4.5.6.3)**.

Marine mammals, Pelagic and demersal fish, Marine reptiles, Sharks and rays

If present, motile animals could pass through the plume, however, exposure will be at low concentration and short duration. The biocide in the dewatering chemical is toxic to marine life, however, effects are greater on simpler life forms. This is illustrated in the ecotoxicological data in which the NOEC for a fish species is 12.5 mg/L compared to 1.3 mg/L for algae (**Table 5-25**). Modelling demonstrated that concentrations within the plume vary both temporally and spatially, rarely exceeding instantaneous concentrations of 10 mg/L.

There are no BIAs, breeding grounds or sensitive habitats (including habitat critical to the survival of species) for EPBC-listed species in proximity to the FPSO PLET location. Moreover, no marine mammal, pelagic fish, demersal fish, shark or ray aggregations areas have been identified within the near vicinity of either the FPSO or Undan PLET discharge locations.

The flatback internesting BIA and habitat critical to the survival of flatback turtles overlap the Bayu-Undan PLET location. Internesting flatbacks rarely frequent water depths greater than 30 m (**Section 5.2.2**) so, at the depth of the PLET (54 m), it is unlikely they will be present. Even if they were it is unlikely that they would be exposed to concentrations that would illicit an effect.

Impact acceptability summary for threatened and migratory species

There are no BIAs, breeding grounds or sensitive habitats (including habitat critical to the survival of species) for EPBC-listed species in proximity to the FPSO PLET location. Moreover, no marine mammal, pelagic fish, demersal fish, shark or ray aggregations areas have been identified within the near vicinity of either the FPSO or Bayu Undan PLET discharge locations.

The internesting BIA and habitat critical to the survival of flatback turtles overlap the Bayu-Undan PLET location. Internesting flatbacks rarely frequent water depths greater than 30 m (**Section 5.2.2**) so, at the depth of the PLET (54 m), it is unlikely they will be present. Even if they were it is also unlikely that they would be exposed to concentrations that would illicit an effect.

With controls in place, impacts to the threatened and migratory species are predicted to be negligible and impacts and risks therefore deemed acceptable.

Key Ecological Features

Bulk dewatering discharge will occur within the Shelf Break and Slope of the Arafura Shelf KEF but the discharge location is devoid of any of its values. The southern PLET is **located** about 10 km to the south of the Carbonate Bank and Terrace System of the Van Diemen Rise. Tidal currents are strong and directed along northwest – south west axis so the plume is not expected to directly impinge on this KEF.

There will be no substantial change that may modify, destroy, fragment, isolate or disturb the values of the KEFs. The impact is therefore deemed acceptable.

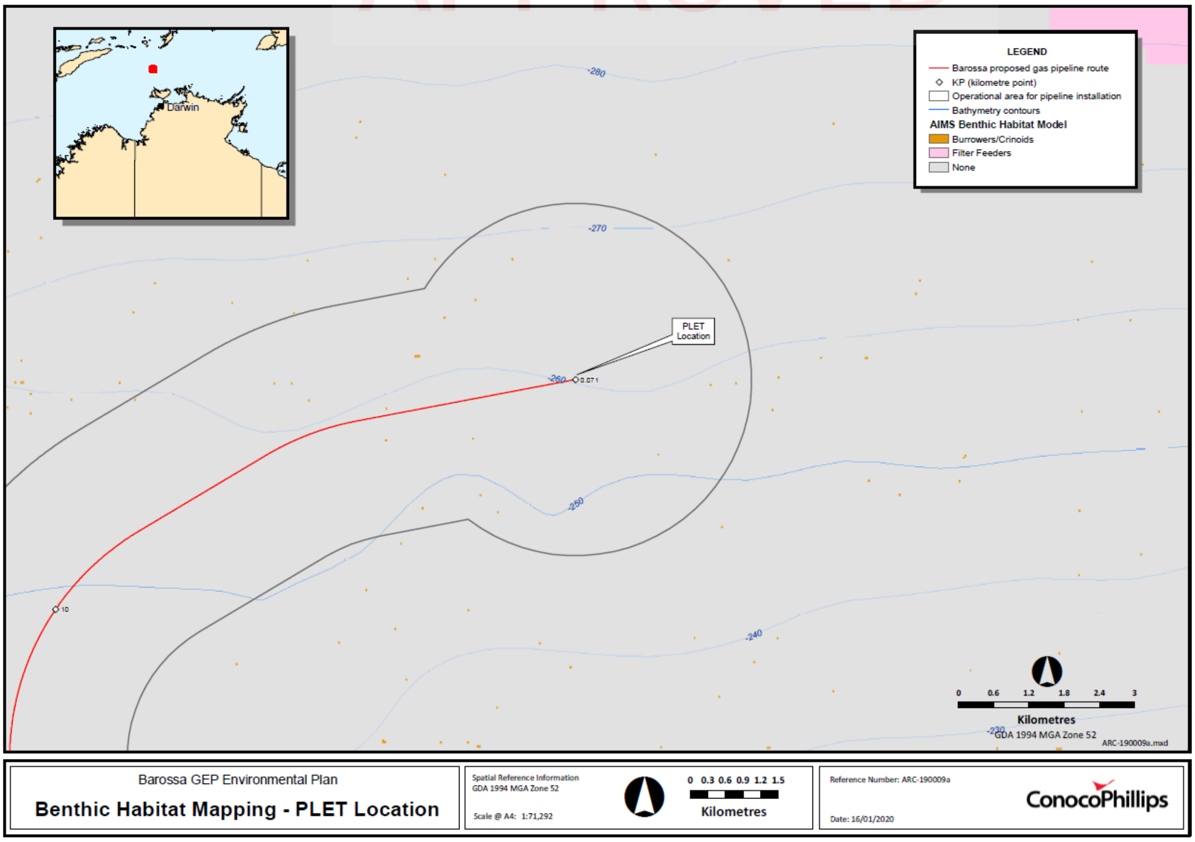


Figure 5-30: Benthic habitats at the FPSO PLET location

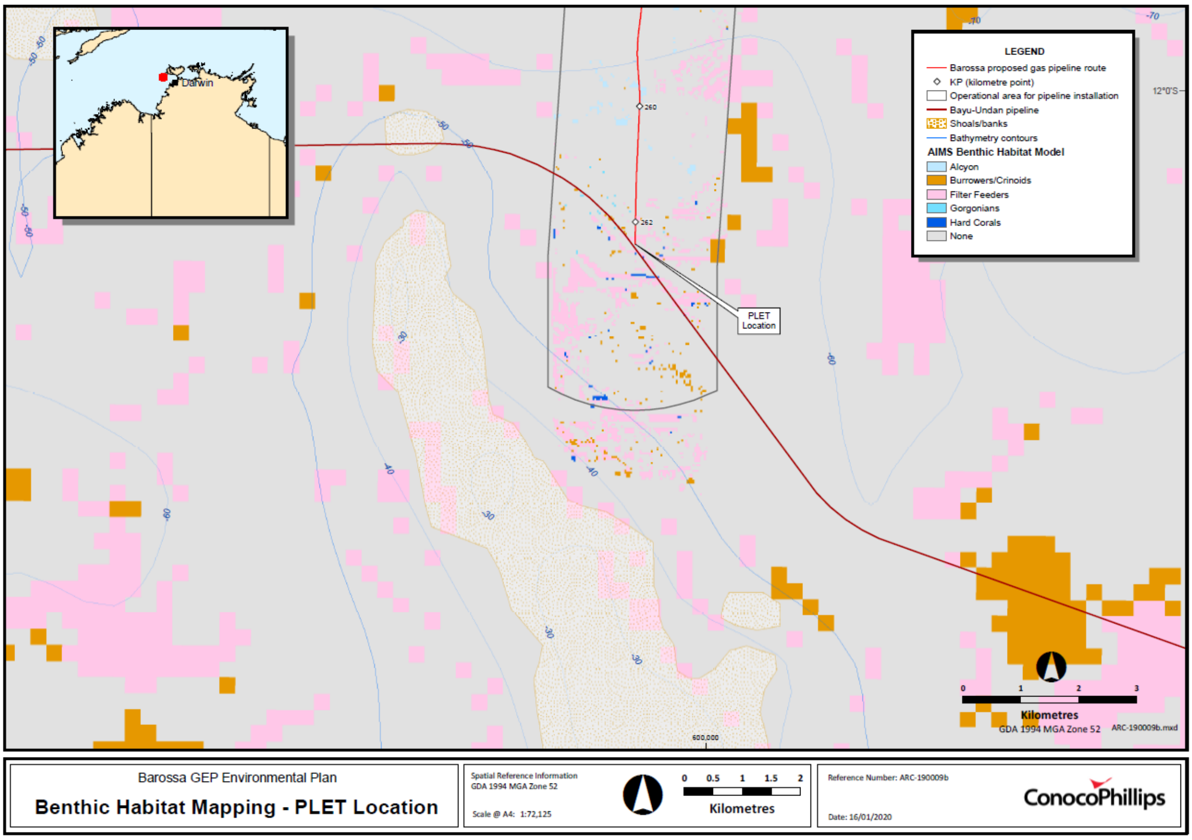


Figure 5-31:Benthic habitats at the Bayu-Undan PLET location

Risk Assessment			
	Consequence	***Likelihood***	***Risk rating***
Inherent risk	2 – Minor	2 – Remote	RRI - Low
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP			
Existing controls			
Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Chemical Selection Procedure for all chemicals planned to be released to the marine environment	A variety of chemicals could be used for pipeline preservation. Should alternative chemicals to those assessed above be required then these will be assessed in accordance with the chemical selection procedure. If the risk posed by the new chemical(s) is greater than that assessed then this will trigger a resubmission of the EP in accordance with Regulation 17 of the OPGGS(E) Regulations (**Section 7.6.5.2**).	**C 7.1**	**EPS 7.1.1** All chemicals planned to be release to the marine environment will be assessed through the chemical selection procedure.
Bulk dewatering will occur at the FPSO PLET location	This control is effective in reducing the consequence of the impacts to marine environment.	**C 7.2**	**EPS 7.2.1** The bulk dewater will occur at the FPSO PLET location.
Contractor FCGT procedures	This control is effective in reducing the consequence of the impacts to marine environment.	**C 7.3**	**EPS 7.3.1** All FCGT will be conducted in line with the Contractor FCGT procedures. These will include: • metering of chemical injection volumes during flooding and hydrotest operations • Dosing rates /optimised treatment rates for chemicals

Assessment of Additional Controls				
Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
Omission of flood, clean, gauge and testing operations.	Yes	No	(see row below)	N/A

Justification Omission of flood, clean, gauge and testing operations has been assessed and is not considered acceptable from a technical and risk perspective. The gas export pipeline carries dry gas and as such will need to be preconditioned to remove moisture and clean the pipeline internals prior to the introduction of hydrocarbons to avoid the risk of hydrate formation. Performing these preconditioning operations on an air filled pipeline from subsea to subsea (i.e. neither of the pipeline ends is onshore or connected to an above water facility) is high risk from a pig train control perspective and could result in accidental introduction of raw seawater into pipeline or incorrect preconditioning resulting in compromising the pipeline integrity. Furthermore, omitting the hydrotest alleviates the opportunity to discover pipeline leaks, which although highly unlikely would compromise the pipeline integrity if left undiscovered.				
Use of raw seawater without any chemical treatment for flood, clean, gauge and testing operations.	No	No	(see row below)	N/A
Justification The option of utilising raw seawater is not considered acceptable to prevent internal corrosion and ensure pipeline integrity. Corrosion by oxidation and microbial action will occur without the use of seawater treatment resulting in wall thickness loss.				
Use of deoxygenated fresh water for flood, clean, gauge and testing operations.	Yes	No	(see row below)	N/A
Justification The use of deoxygenated freshwater in place of seawater, while technically acceptable, is not considered practical due to the large volume of freshwater that would need to be continuously supplied offshore for the flood, clean, gauge and hydrotesting activities				
Seawater treated with oxygen scavenger and exposed to Ultraviolet (UV) light for flood, clean, gauge and testing operations.	Yes	No	(see row below)	N/A
Justification The option of seawater treated with oxygen scavenger and exposed to UV light for bacterial sterilisation is not considered acceptable to prevent internal corrosion and ensure pipeline integrity. The effectiveness of UV sterilization to kill bacteria species is affected by particulate shadowing, therefore it cannot provide an absolute sterilisation solution. Furthermore, UV sterilisation provides no 'residual' treatment and as a result corrosion causing bacteria colonies can grow during the preservation period and in the dewatered state prior to the introduction of hydrocarbons.				
Substitution				
Use alternative biocide	No	No	(see row below for justification)	N/A
Justification Gluteraldehyde and THPS are the only viable alternatives to the proposed package (**Table 5-24**). Previous analysis has shown (see OPP) that these chemicals have about the same toxicity, however, greater concentrations of both glutaraldehyde and THPS would be required to achieve the optimum microbial influence corrosion protection. In addition, glutaraldehyde has health and safety issues associated with handling, requires use of an increased equipment spread and can be incompatibility with oxygen scavenger, eliminated glutaraldehyde as a biocide chemical treatment option.				

Gluteraldehyde and THPS both react directly with oxygen scavenger and as such the oxygen scavenger must be injected considerably in advance of the biocide to ensure that the oxygen scavenger performs correctly and, in the case of Gluteraldehyde, so the biocide is not neutralised. The oxygen scavenger needs to have totally reacted before the biocide can be injected. A time range of between 15 seconds to 48 hours is noted in literature as being required for the oxygen scavenger to react before the biocide is added. This separation is impractical to implement offshore where there is limited deck space to include enough pipework or water storage to enable the oxygen scavenger to sufficiently react.				
Use alternative oxygen scavenger	No	No	(see row below for justification)	N/A
Justification No alternative oxygen scavenger has been identified. Neither Ammonium Bisulphite nor its by-products are classified as hazardous. It is listed on the Oslo and Paris Commission (OSPAR) list of substances which are considered to pose little or no risk (PLONOR) to the environment. It is therefore considered safe to discharge to the marine environment.				
Engineering				
Vertical diffuser for all subsea discharges of treated seawater	Yes	Yes **C 7.4**	This control is effective in enhancing initial dilution and protecting the seabed by elevating the discharge.	**EPS 7.4.1** All subsea discharges of treated seawater will be through a vertical diffuser.
With reference to the discharge of waters from the flooding operation, restrict the location of the discharge to the FPSO PLET location	No	No	Restricting the discharge of treated seawater to the FPSO PLET location has technical risks that could result in requirements to reflood the pipeline and therefore increase discharge volumes. As the impacts are expected to be negligible the costs are disproportionate to any benefits.	N/A
With reference to the discharge of waters from the flooding operation at the Bayu-Undan tie-in PLET, restrict the depth of discharge to either the surface waters or bottom waters	No	No	Analysis has demonstrated that impacts from either a surface or bottom waters discharge will be localised and temporary and have negligible impact on the marine environment. Restricting the location of the discharge has technical risks that could result in the need to utilise multiple vessels or specialist equipment that could extend the duration of the activities thus increasing the environmental impact.	N/A
With reference to the discharge of waters from the dewatering operation at the FPSO PLET, restrict the depth of discharge to either the surface waters or bottom waters	No	No	Analysis has demonstrated that impacts from either a surface or bottom waters discharge will be localised and temporary and have negligible impact on the marine environment.	N/A

			Restricting the location of the discharge has technical risks that could result in the need to utilise multiple vessels or specialist equipment that could extend the duration of the activities thus increasing the environmental impact.	
Administrative				
No additional controls identified				
ALARP Statement				
Relevant legislative requirements and standard industry practices have been applied to control the impacts. The controls selected for implementation are effective in reducing the impacts of planned discharges from the FCGT, hydrotesting and bulk dewatering. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts. Based on the outcomes of the risk assessment, the implementation of controls throughout the activity, and considerations outlined in **Section 5.1.4.1**. ConocoPhillips considers that the impacts to the marine environment from the discharge of treated seawater and chemicals from the pipeline are reduced to ALARP.				
Summary of alignment with EPBC Management Plans				

Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Marine mammals - Blue whale	Blue Whale Conservation Management Plan (October 2015) (DoE 2015a)	Demonstrably minimise anthropogenic threats, including habitat modification through acute/chronic chemical discharge.	• Predictive modelling demonstrates that dilution in the receiving environment is high and the area well flushed. Chemical concentrations reduce rapidly with the median concentrations at any one point predicted to reduce below the PC99% within the very near vicinity of the discharge. location • There are no significant feeding, breeding or aggregation areas for blue whales in proximity to the discharge location
Marine reptiles – loggerhead turtle green turtle leatherback turtle hawksbill turtle olive ridley turtle flatback turtle	Recovery Plan for Marine Turtles in Australia 2017- 2027 (June 2017) (DoEE 2017a)	Minimise chemical discharge.	• Predictive modelling demonstrates that dilution in the receiving environment is high and the area well flushed. Chemical concentrations reduce rapidly with the median concentrations at any one point predicted to reduce below the
		Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival of the species.	
		Manage anthropogenic activities in biologically important areas to ensure	

		that biologically important behaviour can continue.	PC99% within the very near vicinity of the discharge. location • Treated seawater discharge will be of a short duration and toxic effects for turtles are not expected • The discharges will not displace marine turtles from important habitat • Controls in place demonstrate that activities will be managed in biologically important areas for marine turtles.
Environmental Performance Outcomes (Table 6-1)			
EPO 7 No substantial change in water quality during the pipeline installation campaign that may adversely impact biodiversity, ecological integrity, social amenity or human health.			

5.3 Unplanned Activities

5.3.1 Physical Presence: Dropped Objects

Risk	Accidental dropping of objects from vessels resulting from: • Loss of control of suspended loads • Loss of equipment off vessel deck	
Aspect-receptor Reference (Table 5-5)	8F – Benthic primary producers	8G – Other benthic communities
	8O – Australian Marine Parks	8N – Key Ecological Features
Description of Source of Risk		
There is potential for objects, such as PPE, small tools and unsecured deck equipment, to be accidentally lost overboard to the marine environment during pipeline installation activities. Suspended loads (e.g. concrete mattresses for pipeline stabilisation) may also be accidentally dropped through operator error or mechanical failure. Larger objects, such as A-frames and sea containers, are secured to the vessel deck and cannot credibly be lost overboard.		
Potential Impacts		
If an object is dropped overboard, potential impacts would be limited to minor and localised disturbance of the seabed and benthic habitats near the dropped object. Benthic habitats along the gas export pipeline route consist predominantly of bare sediments, with other benthic habitat types constituting relatively small portions of the gas export pipeline route. Areas of benthic habitats, as a percentage of the gas export pipeline route surrounded by a 250 m buffer, derived from benthic habitat modelling are summarised in **Table 5-8.** Based on mapped and modelled benthic habitat classifications, the benthic habitats along the gas export pipeline route are largely bare sediments (82.1%), with relatively small areas of burrowers / crinoids (12.6%) and filter feeders (5.3%). All of these habitat types are well represented throughout the region; these habitats along the gas export pipeline route are not unique or regionally significant (**Section 4.5.3**). Given the		

activities are restricted to the Operational Area, which is primarily low sensitivity habitat (bare sediments), the potential for impact to benthic habitats from dropped objects is low.

KEFs

The gas export pipeline route partially overlaps the Carbonate Bank and Terrace System of the Van Diemen Rise KEF and the Shelf Break and Slope of the Arafura Shelf KEF. Studies and habitat mapping indicate that the benthic habitat within the KEFs is largely bare sediment with small areas of burrower/crinoid habitat. Therefore, potential impacts to the values of the KEFs (**Table 4-10**) is low.

Australian Marine Parks

The gas export pipeline route overlaps two sections of the Oceanic Shoals Marine Park (**Figure 4-33**).

- The Multiple Use Zone (IUCN Category VI) to the south of the Barossa offshore development area; and
- The Habitat Protection Zone (IUCN Category IV) to the north-west of Bathurst Island.

Any impacts to benthic habitats from a dropped object will be minor and localised and not expected to impact on the values of the Oceanic Shoals Marine Park. See **Table 5-10** for a demonstration of alignment with the North Marine Parks Network Management Plan objectives for seabed disturbance. Any impacts from a dropped object would be of a magnitude smaller than the installation of the gas export pipeline and therefore there is no change to the alignment with the management plan as described in **Section 5.2.2.**

Risk Assessment			
	Consequence	***Likelihood***	***Risk***
Inherent risk	2 – Minor	2 – Remote	RRI - Low
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing Controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Implement standards and procedures for lifting equipment	This control is effective in reducing the likelihood of a suspended load being dropped. Engineering standards for load-bearing lifting equipment are widely used in the offshore industry and well understood. Suitable lifting procedures consider a range of technical and environmental factors to reduce the risk of loss of control of a suspended load.	**C 8.1**	**EPS 8.1.1** ConocoPhillips will confirm the vessel procedures for lifting include • lifting operations to be undertaken by competent personnel • use of appropriate and certified lifting equipment and accessories • preventative maintenance will be undertaken on the key lifting equipment as per manufacturer's specifications • consideration of weather conditions (e.g. no heavy lifts undertaken in severe weather conditions)
Dropped objects recovered where safe and practicable to do so	This control may reduce the potential for ongoing disturbance to benthic habitats from a dropped object. The effectiveness of this mitigation control will depend on the nature of the dropped object and the receiving environment.	**C 8.2**	**EPS 8.2.1** All dropped object incidents to assess the environmental risk and the potential to recover the object, and objects will be recovered where safe and practicable to do so.

Assessment of additional controls

Additional control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				

No additional controls identified			
Substitution			
No additional controls identified			
Engineering			
No additional controls identified			
Administrative			
No additional controls identified			
ALARP Statement			
Based on the outcomes of the impact assessment and the implementation of controls throughout the activity, ConocoPhillips considers that the impacts from dropped objects are reduced to ALARP. Relevant standard industry practices have been applied to control the risk. The controls selected for implementation are effective in reducing impacts to a range of environmental receptors. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts.			
Summary of alignment with EPBC Management Plans			
Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Gas Export Pipeline Installation***	***Demonstration of Alignment***
Marine Parks	As per **Table 5-10.**		
Acceptability			
Risk is ALARP	Yes (See ALARP statement)		
Principles of ESD	The impacts associated with dropped objects are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate, and • taking into account the identified management measures, potential dropped objects are not considered to pose a threat of serious or irreversible environmental damage, nor are they considered to change the overall health, diversity or productivity of the environment.		
Legislative requirements	None identified		
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems		
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign. • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment. • taken into account the *North Marine Parks Network Management Plan* as detailed above and considers that the activity is in alignment with the objectives of the Plan.		
Environmental Performance Outcomes (Table 6-1)			
EPO 8			

No loss of equipment/cargo overboard from vessels resulting in a Consequence Severity greater than Minor.

5.3.2 Physical Presence: Introduction of Invasive Marine Species

Risk	Unplanned introduction of IMS from vessel ballast water discharge and biofouling on submersible infrastructure / equipment and vessels	
Aspect-receptor Reference (Table 5-5)	9F – Benthic primary producers	9G – Other benthic communities
	9N – Key Ecological Features	9O – Australian Marine Parks
	9W – Ports and shipping	

Description of Source of Risk

Vessels are the most common vector for the translocation of IMS in the marine environment. IMS can be introduced or spread when vessels are mobilised to the Operational Area, particularly if the vessels originate from international waters with similar water temperatures (e.g. south-east Asia). IMS may be present as biofouling (e.g. adult sessile organisms) on vessel hulls and submersible equipment, and in the ballast water (e.g. as larvae). IMS require suitable habitat to become established in an area; many potential IMS are sessile benthic organisms (e.g. mussels).

Potential Impacts

The establishment of IMS in the marine environment because of the gas export pipeline installation campaign requires the following:

- IMS to be present on a vector (biofouling on activity vessels and ballast water are considered credible vectors)
- IMS to be released from the vector, and
- IMS to establish in the receiving environment.

Benthic communities (including primary producers)

The introduction of IMS may result in considerable modification of the environment through out-competing native species and modifying existing habitats. Such modifications may result in significant environmental impact including decrease in biodiversity (from the reduction or loss of native marine species) and loss of commercial fishing resources. Once established, IMS may be very difficult or impossible to eradicate from an area.

The northern end of the gas export pipeline route is predominantly located in the mid-shelf region where water depths range between approximately 50 m and 240 m. The southern end of the gas export pipeline route is in shallower waters (< 50 m, with a minimum depth of approximately 33 m in some sections). Much of the habitat along the Operational Area is bare sediment, approximately 87% (**Table 5-8**). Introduction of IMS (and therefore IMS-related impacts) in deep waters or in areas of bare sediment is considered improbable.

The closest shoals and banks are Goodrich Bank, Marie Shoal and Shepparton Shoal. Goodrich Bank is 250 m from the Operational Area (approximately 2 km from the proposed pipeline route), where the water depth is 60 m. The shallowest point of Goodrich Bank, 13 m, is approximately 3 km from the Operational Area (approximately 5 km from the gas export pipeline route). The other banks/shoals are all located between 1 and 3 km from the Operational Area, with their shallowest points ranging in depth from 9 to 13 m. Therefore, there may be an increased risk of IMS colonising areas within the shallow water area of the southern section of the gas export pipeline route, where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks).

KEFs

The gas export pipeline route partially overlaps the Carbonate Bank and Terrace System of the Van Diemen Rise KEF and the Shelf Break and Slope of the Arafura Shelf KEF (**Figure 4-33**). The values of these KEFs include areas of hard substrate (including patch reefs and pinnacles) that can support ecosystems with high levels of biodiversity. Water depths are >100 m and therefore the values of the KEFs are unlikely to be affected by IMS.

Australian Marine Parks

The gas export pipeline traverses part of the Multiple Use Zone and Habitat Protection Zone of the Oceanic Shoals Marine Park. Benthic habitat modelling and mapping along the proposed pipeline route within these areas indicated that 82% of the benthic habitat is bare sediment, 12% burrowers/crinoids and 5% is filter feeders. Given the majority of the proposed pipeline route within the Oceanic Shoals Marine Park occurs in areas where seabed depths range between 50 m and 120 m and most of the areas are bare sediment, the likelihood of impacts from IMS are considered improbable.

Risk Assessment			
	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	4 – Significant	2 – Remote	RRII - Medium
Residual risk	4 – Significant	1 – Improbable	RRI - Low
Controls and Demonstration of ALARP			
Existing controls			
Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Vessels undertake ballast water management or treatment to achieve low-risk ballast water (see **Section 7.2.5**)	This control is effective in reducing the likelihood of ballast water hosting potential IMS.	**C 9.2**	**EPS 9.2.1** Ballast water discharges will comply with the requirements of the Australian Ballast Water Management Requirements, which implements the requirements of the *Biosecurity Act 2015* (Cth) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (as appropriate for vessel class), including: • No discharge of high-risk ballast water within 12 nautical miles of coastlines, including any ports; • Maintain a ballast water record system to record the management of all ballast water taken up and discharged; • Implementation of approved methods of ballast water management; • Vessel equipped with Ballast Water Management Plan; and • Vessels maintain a Ballast Water Recording System.
Vessels equipped with suitable anti-fouling coatings	This control is effective in the prevention of adverse impacts from the use of anti-fouling systems and the biocidal properties they may contain.	**C 9.1**	**EPS 9.1.1** Vessels will have a suitable anti-fouling coating in accordance with the *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* (Cth) (as applicable for vessel size, type and class), including: • Marine Order 98 (Marine Pollution – Anti-fouling Systems) including (as required by vessel class): – A valid International Anti-fouling System Certificate

	This control is effective in reducing the potential for fouling organisms to become established on vessels		**EPS 9.3.1** Activity vessels will comply with IMO Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (2012) (as appropriate to class), including: • Vessels equipped with a Biofouling Management Plan; and • Vessels maintain a Biofouling Record Book.
Apply risk-based IMS management for vessels (see **Section 7.2.6**)	The translocation of IMS is best managed through the implementation of risk-based assessments which takes into account the operational history of a vessel. The risk-based approach is effective in reducing the likelihood of IMS introduction by identifying relatively high-risk vessels and applying appropriate management. Risk-based IMS management is the current approach applied in Australian biosecurity legislation.	**C 9.3**	**EPS 9.3.2** Vessels mobilised to the Operational Area from international or domestic waters will comply with the Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Department of Agriculture, Fisheries and Forestry 2009): • Completion of IMS Risk Assessment • Implement mitigation measures commensurate with the level of risk Only vessels classified as a low-level risk shall be used on the project.

Assessment of Additional Controls				
Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No additional controls identified				
Engineering				

Marine Growth Prevention System or appropriate manual treatment system in use on relevant vessels	Yes	Yes **C 9.5**	Some internal niches on vessels are difficult to inspect and/or clean. A marine growth prevention or manual treatment system (e.g. hot water or chlorine dioxide) can be effective preventing biofouling and the presence of IMS in these vessel components.	**EPS 9.5.1** Vessels will have a marine growth prevention system
Administrative				
No additional controls identified				

ALARP Statement
Relevant legislative requirements and standard industry practices have been applied to control the risk. Additional controls have been evaluated; all additional controls considered were adopted. The controls selected for implementation are effective in reducing the risk of impact of introduction of invasive marine species. Based on the outcomes of the risk assessment and the implementation of controls throughout the activity, ConocoPhillips considers that the risks and impacts associated with the introduction or spread of IMS are reduced to ALARP.

Summary of alignment with EPBC Management Plans

Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Marine Park	North Marine Parks Network Management Plan 2018	Invasive species were identified as a pressure in the North Network	A Quarantine Management Plan will be implemented to minimise risk of invasive species being introduced to marine parks.

Acceptability

Risk is ALARP	Yes (See ALARP statement)
Principles of ESD	The impacts associated with introduction of invasive marine species are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate • taking into account the identified management measures, significant impacts on the health, diversity, productivity and ecological integrity of the environment are not expected to occur • serious or irreversible damage to environmental values or sensitivities (including socioeconomic receptors) is not expected to occur with the management measures in place.
Legislative requirements	*Biosecurity Act 2015* (Cth), The Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2008), International Convention for the Control and Management of Ships' Ballast Water and Sediments, *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* (Cth) and relevant Marine Orders
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment, and • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems.
External requirements	• ConocoPhillips has consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign.

	• Stakeholders queried the biosecurity measures that will be used for overseas vessels therefore controls and EPOs to address this query were assessed and incorporated into this EP.
Environmental Performance Outcomes (Table 6-1)	
EPO 9 Prevent the displacement of native marine species as a result of the introduction, establishment and spread of IMS via activity vessels.	

5.3.3 Physical Presence: Collision with Marine Fauna

Risk	Accidental collision between marine fauna (e.g. turtles and cetaceans) and vessels	
Aspect-receptor Reference (Table 5-5)	10J – Marine mammals	10K – Marine reptiles
	10L – Sharks and Rays	

Description of Source of Risk

There will be increased vessel traffic in the Operational Area during the gas export pipeline installation campaign. Vessels undertaking pipeline installation activities may present a hazard to marine fauna that occur at or near the water surface. Vessel speeds are generally slow during pipelay vessel activities as the pipelay vessel will typically lay ~3 km of pipe a day. Therefore, the pipelay vessel is moving at <1 knot. The other activity vessels will move at higher speeds within the Operational Area, although speeds will be low while vessels are working.

Vessel movements may result in collisions with marine fauna that swim near or at the ocean surface such as cetaceans, turtles and whale sharks. Such collisions may result in injury to, or the death of, the fauna involved.

Potential Impacts

The risk of vessel strike to marine fauna is inherent to movements of all vessel types. A review of records of vessel collisions with marine megafauna reported a higher number of collisions with whale- watching boats, naval ships and container ships (DoEE, 2017). The recovery plans and conservation advices for whales (blue, humpback, sei and fin whales) and marine turtles (flatback, olive ridley, green, loggerhead, hawksbill, leatherback) recognise vessel strikes/disturbance as a key threat to these EPBC listed species (**Table 4-6**).

Vessels associated with the gas export pipeline installation campaign may present a potential risk to marine fauna. Due to the slow speed of the pipelay vessel (< 1 knot) it is considered to be effectively immobile and therefore does not present a vessel collision risk to marine fauna. The impact from vessel interactions with marine fauna can be as minimal as temporary behavioural changes, ranging to severe impacts, such as injury or mortality resulting from vessel strikes. The potential risk of a collision with marine fauna is directly related to the abundance of marine fauna and number of vessels in the Operational Area, and the actual likelihood of a collision occurring is also influenced by vessel speed. As presented in DoEE's National Strategy for Reducing Vessel Strike on Cetaceans and Other Marine Megafauna (Commonwealth of Australia, 2016b), the majority of the reported vessel collisions have occurred along eastern or south-eastern Australia, with no reported incidences in NT waters.

Vessel speed has been demonstrated to be a key factor in relation to collision with marine fauna, particularly cetaceans and turtles, with faster moving vessels posing a greater collision risk than slower vessels (Hazel et al., 2009; Jensen and Silber, 2004; Laist et al., 2001; Commonwealth of Australia, 2017b). Laist et al. (2001) suggest that the most severe and lethal injuries to cetaceans are caused by vessels travelling at 14 knots or faster. Turtles will typically avoid vessels by rapidly diving, however, their ability to respond varies greatly depending on the speed of the vessel. Hazel (2009) reported that the number of turtles that fled vessels decreased significantly as vessel speed increases. Turtles are also adapted to detect sound in water (Popper et al. 2014) and will generally move from anthropogenic noise generating sources, including vessels, within their detection range (pers. comm. M. Guinea, CDU, 2015).

The behaviour of the individual may also influence the potential for a collision with a vessel. For example, it has been suggested that individual whales engaged in feeding, mating or nursing behaviours may be more vulnerable to vessel collision as they are distracted by these activities and consequently less aware of their surroundings (Laist et al., 2001). A study on the behavioural responses of blue whales to vessels showed limited behavioural response when being approached by ships (McKenna et al. 2015, cited in DoEE 2016).

Marine Mammals

Bryde's whales were observed to be present in the Barossa offshore development area (northern section of the gas export pipeline and the FPSO PLET location) from January to early October, with pygmy blue whales detected between late May and August (JASCO Applied Sciences, 2016a). While some species may be present in the Operational Area in greater numbers at certain times of the year, the numbers overall are low. Considering this, and the wide distribution of whale species, vessel movements are not anticipated to cause any effects at a population or migration level.

It is well understood that the primary migratory route for humpback whales is near the Kimberley coastline and up to Camden Sound (**Section 4.5.5.5**). Relatively few humpback whales have been known to travel north of Camden Sound (Jenner et al. 2001), which is located more than 580 km south-west of the Operational Area. Noise monitoring in the Barossa offshore development area (**Table 4-2**) also did not record any humpback whales. Therefore, it is highly unlikely that activity related vessels in the Operational Area will interact with this species.

Both sei and fin whales have a wide distribution throughout offshore waters and therefore may pass through the Operational Area in low numbers (**Section 4.5.5.5**). However, considering the relatively slow vessel speeds within the Operational Area, and the mobility of these species, it is highly unlikely that activity vessels will adversely interact with any individuals.

Collisions with smaller cetaceans, such as dolphins, are very infrequent due to the mobility of these smaller cetaceans, which allows them to avoid vessels. Dolphins may pass through the Operational Area, particularly along the southern end however collisions between activity vessels and dolphin species are considered remote.

While dugongs may occur in the Operational Area, dugongs spend most of their time in shallow tidal and subtidal seagrass meadows. Therefore a few individuals may travel through the Operational Area however if any vessel strikes do occur they are unlikely to threaten the overall viability of the population as the plausible number of vessels strikes is very small.

Marine Reptiles

Turtles are at risk of a vessel strike while they are resting or returning to the sea surface to breathe. However, it has been noted that turtles spend relatively limited (3–6%) time at the surface, with dive times generally lasting 15 to 60 minutes (Milton and Lutz, 2003; cited in Woodside Energy Limited, 2014). In the northern section of the gas export pipeline, at least 100 km from the Tiwi Islands, few individuals are expected and therefore risk of injury from vessel strikes to turtles which may be passing through the area is considered low.

The southern end of the gas export pipeline corridor traverses internesting habitat critical to the survival of flatback and olive ridley turtles, overlaps a portion of the internesting BIA for flatback turtles and is adjacent to the internesting BIA for olive ridley turtles. Therefore, there may be an increase in number of individuals in this area (between June to September for flatback turtles and April to August for olive ridley turtles) that are at risk from a vessel strike. The pipelay vessel will be travelling at very low speeds as it expected to lay in the order of approximately 3 km of the gas export pipeline per day. Therefore, the risk of coming into contact with turtles is low as it is expected turtles will dive or move away from the vessels. The installation of the gas export pipeline is also expected to take in the order of 5 months, with installation within the internesting habitat critical to the survival of olive ridley turtles expected to take approximately one to two months. Consequently, the likelihood of a vessel strike and the possibility of injury/mortality to individual turtles within the Operational Area is considered remote.

However, if any vessel strikes do occur they are unlikely to threaten the overall viability of the population as the plausible number of vessel strikes is small when compared to the overall population sizes for turtles. The Recovery Plan for Marine Turtles in Australia notes that while a vessel strike can be fatal for an individual turtle, vessels strikes (as a standalone threat) have not been shown to cause declines at a population or stock level and have considered vessel disturbance to be of minor consequence to turtle populations in the NT (DoEE, 2017).

Individual sea snakes may transit through the Operational Area however if any vessel strikes do occur they are unlikely to threaten the overall viability of the population as the plausible number of vessels strikes is very small.

Sharks and Rays

Most ray species identified as potentially occurring within the Operational Area are not considered at risk of vessel strike as they largely occur on or near the seabed, and are not expected to come to the surface, with the exception of the giant manta ray. The giant manta ray is oceanic and known to feed on plankton, so it may occasionally be close to the sea surface. However, ~73% of its diet is from deep water sources (Burgess et al, 2016). The giant manta ray is not expected to come to the surface within the Operational Area frequently and is highly mobile (therefore able to avoid vessels), therefore vessel collisions with giant manta rays are considered improbable.

Whale sharks are at risk from vessel strikes when feeding at the surface, or in shallow waters (where there is limited option to dive). Whale sharks are not known to aggregate in the vicinity of the gas export pipeline Operational Area, nor are there BIAs in the vicinity of the gas export pipeline corridor. Tagging studies have indicated that whale sharks may transit in waters west of the gas export pipeline (Meekan and Radford, 2010). As such, collisions between vessels and whale sharks are considered improbable.

Risk Assessment			
	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	2 – Minor	2 – Remote	RRI - Low
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP			
Existing controls			
Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Avoid activities near cetaceans and turtles.	This control is based on the requirements of the EPBC Regulations and is effective in reducing the potential for collisions and behavioural disturbance to cetaceans. ConocoPhillips also applies this control to marine turtles, while acknowledging that marine turtles are typically harder to detect at sea than cetaceans.	**C 10.1**	**EPS 10.1.1** Vessels[4], excluding those which are unable to alter path while performing operations, will comply with EPBC Regulations – Part 8 Division 8.1 Interacting with cetaceans (and applied for marine turtles), specifically: • Apply the following Caution Zones, as per the meaning of Division 8.1 of the EPBC Regulations: - 300 m for whales; - 150 m for dolphins; - 150 for turtles • When operating a vessel or equipment within a Caution Zone: - Operate the vessel or equipment at a constant speed of < 6 knots and minimise noise; - Make sure the vessel or equipment does not drift or approach closer than: ▪ 100 m for whales; ▪ 50 m for dolphins, turtles or whale sharks; - If the cetacean, turtle or whale shark shows signs of being disturbed, immediately

[4] For the purposes of implementing the requirements of Division 8.1, ConocoPhillips does not consider any vessels and equipment (including ROVs) to be Prohibited Vessels.

			withdraw (where safe to do so) from the Caution Zone at a constant speed of < 6 knots; • Post a lookout for cetaceans, turtles and whale sharks while within a Caution Zone; – Not approach, pursue or restrict the movement of cetaceans, turtles or whale sharks.
HSE inductions which will include environmental requirements	Personnel associated with vessel activities will be subject to gas export pipeline installation campaign inductions which will address the requirements for vessel operators in relation to interactions with marine fauna	**C 10.2**	**EPS 10.2.1** All crew will attend HSE inductions which will include environmental requirements as required by this Plan

Assessment of Additional Controls				
Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No additional controls identified				
Engineering				
No additional controls identified				
Administrative				
Vessel Speed restrictions within the Operational Area	Yes	Yes **C 10.3**	Vessel speed restrictions will be implemented within the Operational Area except where necessary to preserve the safety of human life at seas.	**EPS 10.3.1** Vessel speeds with the Operational Area will limited to 8 knots or less.
No pipeline installation activities will occur in the olive ridley turtles internesting BIA at any time	Yes	Yes **C 2.8**	This control is effective in avoiding the internesting BIA for olive ridley turtles, which may host turtles undertaking biologically significant behaviour. Given the behaviour of olive ridley turtles, they are unlikely to be encountered within the water depths of the gas export pipeline route when internesting.	**EPS 2.8.1** See **Section 5.2.2**
Divide the pipeline installation scope into multiple campaigns to minimise work performed during the peak internesting periods within	No	No	(see Justification below)	N/A

important habitat for listed marine turtles.				

Justification

Unlike other turtle populations (e.g. on the North West Shelf of WA), the olive ridley and flatback turtles nesting seasons on Bathurst Island do not exhibit discrete nesting seasons. Rather, there is low level nesting year-round, with a peak in nesting and internesting during winter months. A seasonal exclusion would not avoid all turtle nesting and internesting activity but may avoid the known peaks.

Should timing of pipeline installation and associated activities be scheduled to avoid peak interesting season this will impose impractically tight restrictions on the window for starting operations in order to ensure the activities can be completed outside of the peak internesting season, without the risk of the activities having to be split over multiple seasons. The start date for the pipelay operations is driven by the limited availability of pipelay vessels in region, prior commitments of pipelay vessels and the availability of associated equipment such as linepipe materials and PLET structures to support the activities. Due to the uncertainty on these elements it is standard practice to negotiate a large window for commencement of pipelay operations with a mechanism to reduce the window as the project progresses and the factors detailed above become more certain. The call down window is initially under the control of ConocoPhillips before passing to the pipelay vessel operator in order that they can manage their prior vessel commitments. As a result of the call down mechanism for the pipelay vessel and the uncertainty on the pipelay start date it is impractical to guarantee that pipelay activities can be fully completed in a given season.

If seasonal exclusions are imposed and activities cannot be completed in a single season then this will require the activities to be split over multiple seasons. This will result in an overall extension in the duration of the activity, additional vessel mobilisations and demobilisations and will considerably increase the cost of pipelay.

If the campaign extends over two seasons there is a risk that spans are left unrectified in the intervening period which may markedly increase the number of span corrections required or could result in unacceptable fatigue damage to the pipeline resulting in the need to replace a section of pipeline. It may also be counterproductive as multiple vessel mobilisations could increase the overall environmental impact.

It may also raise the risk of simultaneous operations (SIMOPS), where the pipelay vessel ends up interacting with other Barossa construction activities (spool installations, drilling or FPSO mooring installation). SIMOPS is highly undesirable mode of operation as it means vessels either being stood down for a period of time or operating in close proximity to one another. Apart from the additional cost, this could increase collision risk and result in enhanced cumulative environmental impact for aspects such as light and noise.

ConocoPhillips has assessed if certain activities associated with the pipelay operations, such as pre-lay and post-lay span correction, can be performed outside of peak internesting periods. However, the construction vessels used to support pipelay operations are also required throughout the full pipelay campaign and as such the sequence of pre-lay activities, pipelay and post-lay activities is more effectively performed in a single campaign in order to avoid the requirement to perform multiple mobilisations/demobilisations of the construction vessel(s). As highlighted above it is also necessary to ensure spans are corrected as soon as practicable and as such post-lay work cannot practically be separated from the pipelay activity. Performing the work in a single continuous campaign also enables pre-lay and post-lay activities to be performed in parallel with pipelay where practicable to further reduce the schedule, optimise the offshore campaign and minimise the extent of span correction required thus reducing the seabed footprint and environmental impact.

Given the likely low impact to turtles, implementing seasonal control for elements of the activity and the whole activity was discounted.

ALARP Statement

Relevant legislative requirements and standard industry practices have been applied to control the risk. The controls selected for implementation are effective in reducing the risk of impact to marine fauna from the physical presence of the gas export pipeline installation campaign. The risk to marine fauna from vessel strike is considered low given the controls outlined above including speed limits within the Operational Area.

Based on the outcomes of the risk assessment and the implementation of controls throughout the activity, ConocoPhillips considers that the risks and impacts of collision with marine fauna are reduced to ALARP.

Summary of alignment with EPBC Management Plans

Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Marine Mammals	Blue Whale Conservation Management Plan (October 2015) (DoE 2015a)	Minimising vessel collisions.	

	Humpback Whale Conservation advice (October 2015) (DoE 2015b	Consider the risk of vessel strikes on blue / humpback whales when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, implement appropriate mitigation measures.	Controls (mitigation measures) have been identified, and will be implemented, that will minimise the likelihood of vessel collisions.
	Sei Whale Conservation Advice (October 2015) (DoE 2015c)	Minimise vessel collisions.	
	Fin Whale Conservation advice (October 2015) (DoE 2015d)		
Marine reptiles	Recovery Plan for Marine Turtles in Australia 2017-2027 (June 2017) (DoEE 2017a)	Manage infrastructure and coastal development to ensure ongoing biologically important behaviours for marine turtle stocks continue. Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival of the species. Manage anthropogenic activities in biologically important areas to ensure that biologically important behaviour can continue.	There is no evidence to suggest that the proposed activity will result in marine turtles being displaced from habitat critical to their survival nor important biological behaviour interrupted. Pipelay is short duration taking approximately three months to complete. Time within the habitat critical areas adjacent to Bathurst Island is expected to be approximately 23 days, representing approximately 25% of the peak nesting/internesting period. Pipelay is a slow and highly managed process so physical impact to marine turtles is highly unlikely. The footprint of the pipeline on the seabed is a fraction of the available habitat The pipeline itself will form suitable habitat for colonisation by native biota. This EP summarises the most up-to-date information on turtle nesting, internesting and foraging habitat.
Marine mammals, marine reptiles and whale sharks	National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (Commonwealth of Australia, 2017b)	Identify and adopt best-practice mitigation measures and emerging technologies and encourage the development of new mitigation measures. Adaptive management principles, including the use of regular reviews are used during the implementation of mitigation measures.	Controls (mitigation measures) have been identified, and will be implemented, that will manage vessel activity within the Operational Area.
Acceptability			
Risk is ALARP	Yes (See ALARP statement)		
Principles of ESD	The impacts associated with marine fauna collisions are considered to align with the principles of ESD based on the following:		

	• long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate • taking into account the identified management measures, the interactions with marine fauna is not considered to pose threats of serious or irreversible damage to socioeconomic receptors • marine fauna collisions are not expected to reduce overall long-term, broad-scale health, diversity and productivity of the environment, and • biological diversity and ecological integrity are not expected to be significantly impacted by marine fauna collisions.
Legislative requirements	EPBC Regulations – Part 8 Division 8.1
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment, and • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign • assessed all controls and EPOs against outcomes from stakeholder consultation to verify alignment, and • considered relevant fauna recovery plans, management plans and conservation advices
Environmental Performance Outcomes (Table 6-1)	
EPO 10 Zero incidents of injury/mortality of cetaceans/marine reptiles from collision with activity vessels operating within the Operational Area.	

5.3.4 Unplanned Discharges: Subsea Release from an Unplanned Pipeline Event

Risk	Contingency dewatering (e.g. a wet buckle event) to the marine environment from planned treated seawater	
Aspect-receptor Reference (Table 5-5)	11B – Water quality	11C – Sediment Quality
	11F – Benthic primary producers	11G – Other communities
	11H – Plankton	11I – Pelagic and demersal fish communities
	11J – Marine mammals	11L – Sharks and rays
	11K – Marine reptiles	11N – KEF
	11O – Australian Marine Parks	
Description of Source of Risk		
During installation, in the event of a wet buckle or stuck pig, contingency dewatering may be required. Treated seawater will be needed to displace raw seawater that has entered a buckled pipeline in order to preserve the pipeline if pipelay operations cannot safely recommence for more than nominally 30 days. If pipelay operations can recommence in a timely manner then the raw seawater will be displaced with compressed air. Similarly treated seawater will be required to push stuck pigs out of the pipeline during flood/gauge/cleaning operations. Treated seawater used for wet buckles or stuck pigs would then need to be dewatered to facilitate continued installation of the pipeline. The seawater will be treated with the same chemicals as the planned discharges (**Section 5.2.7**). For the removal of stuck pigs the same chemical concentrations as detailed in **Section 5.2.7** shall be used. However, for the wet buckle scenario the chemical concentration may be able to be lowered from that detailed in **Section 5.2.7** subject to the required preservation period before pipelay operations can recommence. The assessment of the required preservation period will be impacted by what caused the wet buckle and when any control measures and actions from the wet buckle incident investigation will be satisfactorily implemented. The volume of treated seawater required to dewater will vary depending on the amount of pipeline installed prior to the wet buckle, the location of the wet buckle or location of the stuck pig. Dewatering due to wet buckles or stuck pigs may occur anywhere along the pipeline route at the surface or seabed. As a worst-case example, if installation of the pipeline was close to finishing, complete dewatering of the gas export pipeline and discharge of up to approximately 85,000 m^3 of chemically-treated seawater may be required to safely recover the pipeline and continue installation. However, the volume is likely to be less than the planned discharge volume discussed in **Section 5.2.7.** Dewatering discharges will not occur within the Habitat Protection Zone of the Oceanic Shoals Marine Park.		
Potential Impacts		
Impacts from an unplanned release of hydrotest water would be similar to the planned discharge presented in **Section 5.2.7**, that is, a localised and temporary reduction in water quality. Tidal currents along the pipeline route increase towards the south and dilution rates for the discharge are high. Environmental criteria are therefore met within the near vicinity of the release. The only sensitive habitat along the pipeline route requiring further analysis is Goodrich Bank (), which is located 300 m to the east of KP105. Goodrich Bank supports low density filter feeders, dominated by sponges, with limited partial hard corals at 25m depth (). Should dewatering be necessary at this location, direct impact from the hydrotest discharge plume is not expected due to the strong tidal currents and high dilution rates. In addition, should the water be discharged at the surface, the extent of the plume remains in the surface 15 m, which is above the minimum depth of the bank. If it is discharged at the seabed (approximately 90 m depth), the extent of the plume remains in the bottom waters. There may be direct impact at the base, however concentrations will be low and away from any sensitivities on the top of the bank. **KEFs** The gas export pipeline route overlaps two KEFs (**Table 4-10; Figure 4-33).** The dewatering discharge is not expected to diminish the value of the KEFS in an appreciable way due to the following: • Shelf break and slope of the Arafura shelf KEF is not expected to be impacted as the unique seafloor features of the KEF were not observed in the Barossa offshore development area (northern section of the gas export pipeline route) during surveys and studies undertaken across this area (**Section 4.2**); and • Carbonate Bank and Terrace System of the Van Diemen Rise KEF values are the geomorphic feature that provide habitat for sponges, soft corals and other sessile filter feeders; epifauna and infauna such as polychaetes and ascidians; and olive ridley turtles, sea snakes and sharks. However, habitat mapping and modelling indicated that the benthic habitats in the gas export pipeline corridor within the KEF are largely bare sediment, with small areas of burrower/crinoid habitat.		

Australian Marine Parks

The gas export pipeline route overlaps two sections of the Oceanic Shoals Marine Park (**Figure 4-35**):

- The Multiple Use Zone (IUCN Category VI) to the south of the Barossa offshore development area; and
- The Habitat Protection Zone (IUCN Category IV) to the north-west of Bathurst Island.

There will be no unplanned dewatering in the Habitat Protection Zone (See ALARP demonstration and Control 11.3 (EPS 11.3.1)). Within the Multiple Use Zone dewatering may occur however any impacts are expected to be temporary, as habitat is largely comprised of unconsolidated sediments and sparse filter feeder, and therefore the values of the marine park are not expected to be impacted.

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent	2 – Minor	2 – Remote	RRI - Low
Residual	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Chemical Selection Procedure for all chemicals planned to be release to the marine environment	This control is effective in reducing the consequence of the impacts to marine environment.	**C7.1**	**EPS 7.1.1** Refer **Section 5.2.7**
Contractor FCGT Procedures	This control is effective in reducing the consequence of the impacts to marine environment.	**C7.3**	**EPS 7.3.1** Refer **Section 5.2.7**
Pipeline designed with buckle arrests in deep water	This control is effective in reducing the likelihood of a wet buckle occurring and therefore preventing chemically treated seawater being released to the marine environment	**C11.1**	**EPS 11.1.1** Buckle arresters installed as per design specifications.

Assessment of Additional Controls

Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No discharge of chemically treated seawater in the Habitat Protection Zone of the Oceanic Shoals Marine Park	Yes	Yes **C 11.2**	This control will protect the habitats with the Habitat Protection Zone of the Oceanic Shoals Marine Park thereby maintaining the parks values.	**EPS 11.2.1** No discharge of chemically treated seawater in the Habitat Protection Zone of the Oceanic Shoals Marine Park
Substitution				
No additional controls identified				

Engineering				
DGPS for pipelay vessel to maintain accurate vessel position during installation	Yes	Yes **C 2.4**	This control is effective in reducing the likelihood of a wet buckle occurring and therefore preventing chemically treated seawater being released to the marine environment	**EPS 2.4.1** Refer **Section 5.2.2**
Pipeline Installation Procedures	Yes	Yes **C 11.3**	This control is effective in reducing the likelihood of a wet buckle occurring and therefore preventing chemically treated seawater being released to the marine environment	**EPS 11.3.1** The contractor will have an installation procedure which will include: • Alarm systems for dynamic positioning to indicate loss of vessel position • Minimum tensioner alarms to ensure pipeline catenary is maintained • Visual monitoring of pipeline relative to stinger • ROV touchdown monitoring • Pipelay rollerbox load monitoring
Administrative				
No additional controls identified				
ALARP Statement				
Relevant legislative requirements and standard industry practices have been applied to control the risk. The controls selected for implementation are effective in reducing the risks of unplanned discharges from contingency dewatering. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts. Based on the outcomes of the risk assessment, the implementation of controls throughout the activity, and considerations outlined in **Section 5.1.4.1,** ConocoPhillips considers that the impacts to the marine environment from the discharge of treated seawater are reduced to ALARP.				

Summary of alignment with EPBC Management Plans

Relevant Receptors	**Relevant Plan / Conservation Advice**	**Specific Requirements Relevant to gas export pipeline Installation**	**Demonstration of Alignment**
Marine reptiles – loggerhead, green, leatherback, hawksbill, olive ridley and flatback turtles	Recovery Plan for Marine Turtles in Australia 2017-2027 (June 2017) (DoEE 2017a)	Minimise chemical discharge.	The discharge extent is localised and rapid dilution is predicted to occur, reaching levels below those that may cause harm to marine species within 1 to 3 km of the discharge location Treated seawater discharge will be of short duration and toxic effects for turtles are not expected
		Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival of the species.	
		Marine anthropogenic activities in BIAs to ensure that biologically important behaviour can continue.	
Marine Park	North Marine Parks Management Plan	Conditions from the Class Approval – Mining Operations and Green House Gas Activities for the North Marine Parks Network Management Plan 2018	See **Table 2-1**

		Conditions from the Commercial Activity Licence for the installation of the gas export pipeline within the Habitat Protection Zone	See **Table 2-2**
		The objective of the Habitat Protection Zone is to provide for the conservation of ecosystems, habitats and native species in as natural a state as possible while allowing activities that do no harm or cause destruction of seafloor habitats.	Any impacts from the contingency dewatering are expected to be localised and brief with recovery expected thereby conserving the ecosystems, habitats and native species within the marine park.
		The objective of the Multiple Use Zone is to provide for ecologically sustainable use and the conservation of ecosystems, habitats and native species.	

Acceptability	
Risk is ALARP	Yes (See ALARP statement)
Principles of ESD	The impacts associated with the discharge of contingency treated seawater are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate • discharge of treated seawater is not considered to pose threats of serious or irreversible environmental damage. • it is considered that discharge of treated seawater will not change the overall health, diversity and productivity of the environment. Chemicals used to treat the seawater are biodegradable and do not bioaccumulate; affected populations are expected to recover through natural recruitment, and • the conservation of biological diversity and ecological integrity is incorporated into ConocoPhillips chemical selection process.
Legislative requirements	No legislative requirements are applicable
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment, and • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment, and • considered relevant fauna recovery plans, management plans and conservation advices

Environmental Performance Outcomes (Table 6-1)
EPO 11 Zero unplanned discharge of chemicals to the marine environment as a result of contingency dewatering.

5.3.5 Unplanned Discharges: Minor Spills

<table>
<tr><th>Risk</th><td colspan="3">Chemical or hydrocarbon release from incidental spill (e.g. minor deck spill)</td></tr>
<tr><th>Aspect-receptor Reference (Table 5-5)</th><td colspan="3">12B – Water quality</td></tr>
<tr><th colspan="4">Description of the Source of Risk</th></tr>
<tr><td colspan="4">Vessels undertaking activities will routinely have a range of chemicals and hydrocarbons onboard, including:
• fuel for portable / deck equipment
• hydraulic fluid
• paints and lubricants, and
• miscellaneous chemicals (e.g. cleaning fluids).
Small spills of these may occur when the chemicals/hydrocarbons are in use or from leaks in storage areas. If spilled these liquids may be lost to the marine environment.
Chemicals and hydrocarbons (other than vessel fuel) are generally stored in relatively small isolated containers (typically < 200 L), with bunding in place to retain substances in the event of a leak. Operational experience indicates typical incidental spill volumes are < 10 L.
Hydraulic fluid is used in a range of equipment, such as A-frames, cranes, ROVs and winches. Failure of hydraulic lines may result in the loss of hydraulic fluid to the environment. Operational experience indicates typical volumes released due to hydraulic line failure are < 20 L.
In the event of a fire emergency, firefighting foam will be used, which would then be discharged directly overboard or through deck drainage systems.</td></tr>
<tr><th colspan="4">Potential Impacts</th></tr>
<tr><td colspan="4">Accidental spills of hydrocarbons or chemicals from vessels undertaking gas export pipeline installation activities will decrease the water quality in the immediate area of the spill. Given the nature and small volumes of chemicals and hydrocarbons that may be released, along with the open water environment, impacts to water quality will be temporary and highly localised. Spilled hydrocarbons or chemicals will be rapidly mixed and diluted in the water column.
The water foaming agents in AFFF may be harmful to marine organisms. Most of these foams have high oxygen demand and the toxicity of the detergents, solvents and other components in the foams may result in adverse effects to marine organisms. However, these effects are greatly diminished in the offshore marine environment due to the natural dilution from wind, wave and currents. The release of these foams is restricted to an emergency event.
Potential impacts to biological receptors will be limited to planktonic biota in the immediate vicinity of the spill; no impacts to fauna such as fishes, turtles, cetaceans or birds are expected to occur. No impacts to socio-economic receptors (e.g. fishers) will occur.</td></tr>
<tr><th colspan="4">Risk Assessment</th></tr>
<tr><td></td><td>Consequence</td><td>Likelihood</td><td>Risk Rating</td></tr>
<tr><td>Inherent risk</td><td>1 – Negligible</td><td>4 – Probable</td><td>RRI - Low</td></tr>
<tr><td>Residual risk</td><td>1 – Negligible</td><td>3 – Rare</td><td>RRI - Low</td></tr>
<tr><th colspan="4">Controls and Demonstration of ALARP</th></tr>
<tr><th colspan="4">Existing controls</th></tr>
<tr><th>Control</th><th>Effectiveness</th><th>Reference (Table 6-1)</th><th>Environmental Performance Standard</th></tr>
</table>

Chemical and hydrocarbon storage areas designed to contain leaks and spills	This control is effective in reducing the likelihood of a leak or spill reaching the marine environment by containing spilled material. Spills can then be recovered and disposed of accordingly.	**C 12.1**	**EPS 12.1.1** Selection of vessel contractor is subject to ConocoPhillips local and global marine vessel vetting processes, specifically: • appropriate procedures for storage (e.g. bunding), labelling (including Safety Data Sheet (SDS) available) and handling of chemicals and hydrocarbons; • completion of vessel OVID inspection and report; • implementation of a Permit to Work (PTW) or equivalent authorisation process (e.g. JSA) for transfers of hydrocarbon / chemicals (refer to bunkering for bunkering-specific controls).
Chemicals and hydrocarbons will be managed in accordance with standard maritime practices	This control is consistent with standard maritime practices which have been developed through international consensus. The control is consistent with relevant requirements, including the MARPOL convention and Australian Marine Orders.	**C 12.2**	**EPS 6.1.1** **Refer Section 5.2.6** **EPS 12.2.1** • Marine Order 93 (Marine Pollution Prevention – Noxious Liquid Substances) including (as required by vessel class): - International Pollution Prevention (IPP) Certificate.
Spill clean-up kits available in high risk areas	This control is effective in reducing the likelihood of spilled hydrocarbons or chemicals reaching the environment. Spill kits are required as part of vessel SOPEPs. Contaminated material from used spill kits is disposed of accordingly.	**C 12.3**	**EPS 12.3.1** Selection of vessel contractor is subject to ConocoPhillips local and global marine vessel vetting processes, specifically: • spill kits stocked and ready for use by trained personnel.
Inspection and maintenance for all equipment using hydrocarbons and/or chemicals	This control is effective in reducing the likelihood of leaks from equipment if equipment is maintained in good working order	**C 12.4**	**EPS 12.4.1** Selection of vessel contractor is subject to ConocoPhillips local and global marine vessel vetting processes, specifically: • planned maintenance system in place on vessels

ROV operations undertaken in accordance with good industry practice	Using good industry practice to maintain and operate ROVs reduces the likelihood of leaks of hydraulic fluids to the marine environment.	**C 12.5**	**EPS 12.5.1** Procedures for ROV operations including: • ROV inspections and maintenance • pre-mobilisation audit for all ROV systems
Chemical Selection procedure for chemicals planned to be released to the marine environment	This control is effective in reducing impacts to marine receptors if chemicals are spilled the marine environment by selecting chemicals that considering environmental impacts.	**C 7.1**	**EPS 7.1.1** **Section 5.2.7**

Assessment of Additional Controls				
Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No Perfluorinated Chemicals (PFAS)/ Perfluorooctane sulfonate (PFOS) will be used in fire fighting foam.	Yes	Yes **C 12.6**	PFAS and PFOS have been shown to be toxic to fish and invertebrates, do not readily break down and are known to bioaccumulate in biota. Therefore, this control is effective in reducing impacts to the marine environment.	**EPS 12.6.1** Fire fighting foams shall be free of PFAS and PFOS
Engineering				
No additional controls identified				
Administrative				
No additional controls identified				

Summary of alignment with EPBC Management Plans			
Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Marine Turtles	Recovery Plan for Marine Turtles in Australia (June 2017)	Minimise chemical discharges	As described above a number of controls will be implemented to reduce the likelihood (minimise) of an unplanned discharge and any release is not expected to impact on turtles.

<table>
<tr><td>Marine parks</td><td>North Marine Parks Network Management Plan 2018</td><td>Marine pollution was identified as a pressure in the North Network.
The Director of National Parks must be notified in the event of an oil pollution incident that occurs within or may impact upon, an Australian Marine Park.</td><td>A comprehensive suite of well-defined engineering controls will be implemented to minimise risks of a spill occurring
Notifications are included in Table 7-4.</td></tr>
<tr><th colspan="4">ALARP Statement</th></tr>
<tr><td colspan="4">Based on the outcomes of the risk assessment and through the implementation of controls throughout the gas export pipeline installation campaign, ConocoPhillips considers the risks from incidental spills of fluids, chemicals and lubricants to the environment are reduced to ALARP.
Relevant legislative requirements and standard industry practices have been applied to control the risk. The controls selected for implementation are effective in reducing the risk of incidental spills of fluids, chemicals and lubricants to the environment. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts. No credible additional controls were identified.</td></tr>
<tr><th colspan="4">Acceptability</th></tr>
<tr><td>Risk is ALARP</td><td colspan="3">Yes (See ALARP statement)</td></tr>
<tr><td>Principles of ESD</td><td colspan="3">The impacts associated with incidental spills are considered to align with the principles of ESD based on the following:
• long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate
• taking into account the identified management measures and the small volume of chemicals or hydrocarbons that may enter the ocean, incidental spills are not considered to pose threats of serious or irreversible damage to socioeconomic receptors or the environment
• incidental spills are not expected to reduce overall long-term, broad-scale health, diversity and productivity of the environment, and
• biological diversity and ecological integrity are not expected to be significantly impacted by incidental spills</td></tr>
<tr><td>Legislative requirements</td><td colspan="3">Navigation Act 2012 (Cth), the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth), Marine Order 91, Marine Order 93</td></tr>
<tr><td>Internal requirements</td><td colspan="3">• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied
• all controls and EPOs have been assessed against internal requirements to verify alignment, and
• the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems</td></tr>
<tr><td>External requirements</td><td colspan="3">ConocoPhillips has:
• consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign; and
• assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment.
• pollution, such as could occur from a hydrocarbon spill, is identified as a threat in conservation advice for several marine species that may occur in the Operational Area and as a threat in the North Marine Parks Network Management Plan 2018. ConocoPhillips considers the selected controls are effective in managing the risk to these species and the Oceanic Shoals Marine Park to a level that is acceptable</td></tr>
</table>

Environmental Performance Outcomes (Table 6-1)
EPO 12 Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of gas export pipeline installation activities.

5.3.6 Unplanned Discharges: Loss of hazardous and Non-hazardous Waste

Risk	Inappropriate management of non-hazardous or hazardous waste	
Aspect-receptor Reference (Table 5-5)	13B – Water quality	13C – Sediment quality
	13J – Marine mammals	13K – Marine reptiles
	13L – Sharks and rays	13M - Birds

Description of Source of Risk

Vessels undertaking gas export pipeline installation activities will generate a range of wastes, some of which are routinely disposed of overboard in accordance with relevant requirements (such as sewage). Wastes that are not discharged overboard are retained and disposed of onshore. These wastes can include domestic wastes, packaging, batteries, etc.

Wastes are required to be securely stored onboard such that they cannot easily be accidentally released into the environment. This may be achieved by having lids on bins, which are secured to the deck, or by storing wastes in sealed containers.

Solid wastes are typically offloaded from vessels in port and handled by a waste management service (and hence this activity is beyond the scope of this EP), however operational circumstances may require the back loading of wastes from vessels undertaking gas export pipeline installation activities.

Potential Impacts

The potential impacts of solid wastes accidentally discharged to the marine environment will depend on the nature and amount of waste, and the sensitivity of the receiving environment. Potential impacts may include:

- decreases to water quality
- decreases in sediment quality, and
- impacts to fauna from entanglement and / or ingestion.

Given the nature and scale of the source of risk, the potential impacts to water and sediment quality are expected to be localised and temporary given the types of wastes that may credibly be lost overboard.

Impacts to fauna may result in injury or mortality through entanglement and / or ingestion, however while this would reasonably be expected to impact upon individual animals; no population-scale impacts would credibly occur.

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	2 – Minor	2 – Remote	RRI - Low
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
All wastes managed in accordance with vessel waste management plan	This control is effective in reducing the likelihood of wastes being lost to the environment. It is consistent with MARPOL requirements and standard maritime practices.	**C 13.1**	**EPS 13.1.1** Vessels will be suitably equipped and crewed in accordance with the Navigation Act 2012 (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 95 (Marine Pollution Prevention – Garbage) including: - Garbage management plan in place. - Types of wastes that will be generated onboard and will

			require containment, transport and disposal at a licensed facility onshore - Procedures for handling, storage segregation and disposal of wastes - Maintenance of Garbage Record Book, recording the types and volumes of waste incinerated or disposed onshore - Garbage record book maintained onboard.
			EPS 13.1.2 Vessels will be suitably equipped and crewed in accordance with the *Navigation Act 2012* (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 94 (Marine Pollution Prevention – Packaged Harmful Substances) including (as required by vessel class): - no disposal of harmful substances (identified as marine pollutants in the IMDG Code) overboard - packaged harmful substances to be properly packed, marked, labelled, stowed and secured - any loss or discharge to sea of harmful materials will be reported to the AMSA RCC via a marine pollution report (POLREP).
HSE inductions – cover requirements e.g. label and cover waste skips and bins	This control is effective in reducing the likelihood of wastes being lost to the environment as all crew are aware of the waste management plan requirements	**C13.2**	**EPS 13.2.1** All crew will attend HSE inductions which will include requirements of the vessel waste management plan

Assessment of Additional Controls

Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No additional controls identified				
Engineering				
No end caps on pipes	Yes	Yes **C 13.3**	This control is effective in reducing the waste from thousands of plastic end caps.	EPS 13.3.1 No end caps on pipe lengths that arrive in the Operational Area

Administrative			
No additional controls identified			
ALARP Statement			
Based on the outcomes of the risk assessment and through the implementation of the control throughout the activity, ConocoPhillips considers the risks from loss of wastes overboard are reduced to ALARP. Relevant legislative requirements and standard industry practices have been applied to control the risk. The control selected for implementation is effective in reducing the impacts and risks from loss of wastes overboard. ConocoPhillips considers the control adopted is commensurate to the nature and scale of the risk. No credible additional controls were identified.			
Summary of alignment with EPBC Management Plans			
Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to gas export pipeline Installation***	***Demonstration of Alignment***
Dwarf sawfish, green sawfish, freshwater sawfish, narrow sawfish, northern river shark, speartooth shark	Sawfish and River Sharks Multispecies Recovery Plan (November 2015) Conservation Advice: for dwarf sawfish (October 2009), green sawfish (2008), *Pristis pristis* (freshwater sawfish) (April 2014), speartooth shark (April 2014), and northern river shark (April 2014) Threat Abatement Plan: for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018)	Reduce and, where possible, eliminate any adverse impacts of marine debris.	As described above – controls will be implemented including good housekeeping practices to minimise the risk of waste being released to the marine environment
Marine reptiles	Recovery Plan for Marine Turtles in Australia 2017-2027 (June 2017) (DoEE, 2017)	Reduce the impacts from marine debris. Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival. Manage anthropogenic activities in BIAs to ensure that biologically important behaviour can continue.	
Acceptability			
Risk is ALARP	Yes (See ALARP statement)		
Principles of ESD	The impacts associated with solid waste lost overboard are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate • taking into account the identified management measures and the small amount of solid waste that may enter the ocean, solid waste not considered to pose threats of serious or irreversible damage to the environment • incidental spills are not expected to reduce overall long-term, broad-scale health, diversity and productivity of the environment • biological diversity and ecological integrity are not expected to be significantly impacted by solid waste		
Legislative requirements	*Navigation Act 2012* (Cth), the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), Marine Order 94, Marine Order 95		
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied		

	• all controls and EPOs have been assessed against internal requirements to verify alignment, and • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign; and • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment. • Pollution, such as could occur from loss of wastes overboard, is identified as a threat in conservation advice for several marine species that may occur in the Operational Area. ConocoPhillips considers the selected controls are effective in managing the risk to these species to a level that is acceptable.
Environmental Performance Outcomes (Table 6-1)	
EPO 13 Zero unplanned discharge of hazardous and non-hazardous solid wastes into the marine environment as a result of gas export pipeline installation activities.	

5.3.7 Unplanned Hydrocarbon Discharges: Marine Diesel Release from Vessel Collision

Risk	Loss of marine diesel fuel containment resulting from vessel collision	
Aspect-receptor Reference (Table 5-5)	14B – Water quality	14E – Intertidal primary producers
	14H – Plankton	14I – Pelagic and demersal fish communities
	14J – Marine mammals	14K – Marine reptiles
	14L – Sharks and rays	13M – Seabirds and migratory shorebirds
	14O – Australian Marine Parks	14P – Reef protection areas
	14U – Traditional fishing	14T – Commercial fishing
Description of the Source of Risk		

Description of Vessel Activities

A vessel collision resulting in a hydrocarbon spill can credibly occur from KP 0 to KP 262 (**Figure 3-1**).

All vessels used to undertake activities within the scope of this EP will be fuelled using marine diesel oil (MDO) or lighter (e.g. marine gas oil (MGO), automotive diesel). Heavier fuel types, such as intermediate fuel oil (IFO) or heavy fuel oil (HFO) will not be used.

MDO Releases from Vessel Collisions

A number of prerequisite conditions must exist for a vessel collision to result in the loss of fuel to the environment:

- The vessel must be involved in a collision: Collisions involving offshore support vessels, comparable to those that will undertake gas export pipeline installation activities, are very uncommon. Statistics compiled by the ATSB indicated that offshore support vessels were involved in only one collision-related incident between 2011 and 2012, and no pollution-related incidents from offshore support vessels were recorded in the same time period.
- The collision must occur with sufficient force to rupture a fuel tank: fuel tanks are typically located at various positions around a vessel within the hull.
- The rupture must be of such a nature that the fuel can be released into the environment: A tank rupture must be above or near the fuel level within the tank to result in a loss of containment from the tank. Once lost from the tank, fuel may leak to the environment or drain into the vessel hull. Fuel from ruptured tanks may be transferred to other tanks onboard, reducing the volume in the ruptured tank. Fuel transfer measures are typically detailed in vessel SOPEPs.

A range of controls, based on Australian maritime requirements, are selected for implementation in this EP to reduce the potential for interactions with other marine users. These controls reduce the likelihood of a collision occurring (refer to **Section 5.2.1**). Additional controls that reduce the potential consequence of a vessel collision resulting in a release of MDO are detailed in the OPEP (BAA-100 0330).

Credible Spill Scenario

Table 5-29 presents the worst-case credible spill scenario for a vessel collision.

Table 5-29: Summary of characteristics of worst-case credible spill scenario from a vessel collision

Release Parameter	Parameter Characteristic	Justification
Hydrocarbon Type	MDO	MDO is the most persistent fuel, being considered for this activity, that may be used by vessels. All other fuels (e.g. automotive diesel, MGO) are less persistent in the environment (and hence, may have reduced potential for impacts if released)
Release Location	**(see Figure 5-32)**	Modelling was undertaken at three locations (**Figure 5-32**). These locations were chosen to represent different hydrodynamic conditions along the pipeline route and for their proximity to sensitive receptors.
Release Volume	700 m^3	Guidance from AMSA on spill contingency planning for vessel-based activities (Australian Maritime Safety Authority, 2013a) suggests 50% of the volume of the single largest tank on a vessel is appropriate to inform the risk assessment of a MDO release from a vessel collision. This is based on the scenario of a non-major collision of an oil tanker to

		take credit for the fact that the pipelay vessel has all fuel tanks internally located and protected by water ballast compartments. ConocoPhillips has considered vessel specifications for all vessels that could be contracted; No fuel tank onboard the vessels considered exceeded 1,400 m^3, hence, the 700 m^3 volume is considered suitable to inform the risk assessment.
Release Duration	6 hrs	This is considered a conservative timeframe over which the release may occur.
Release Timing	All seasons	Activities may credibly occur at any time of the year.

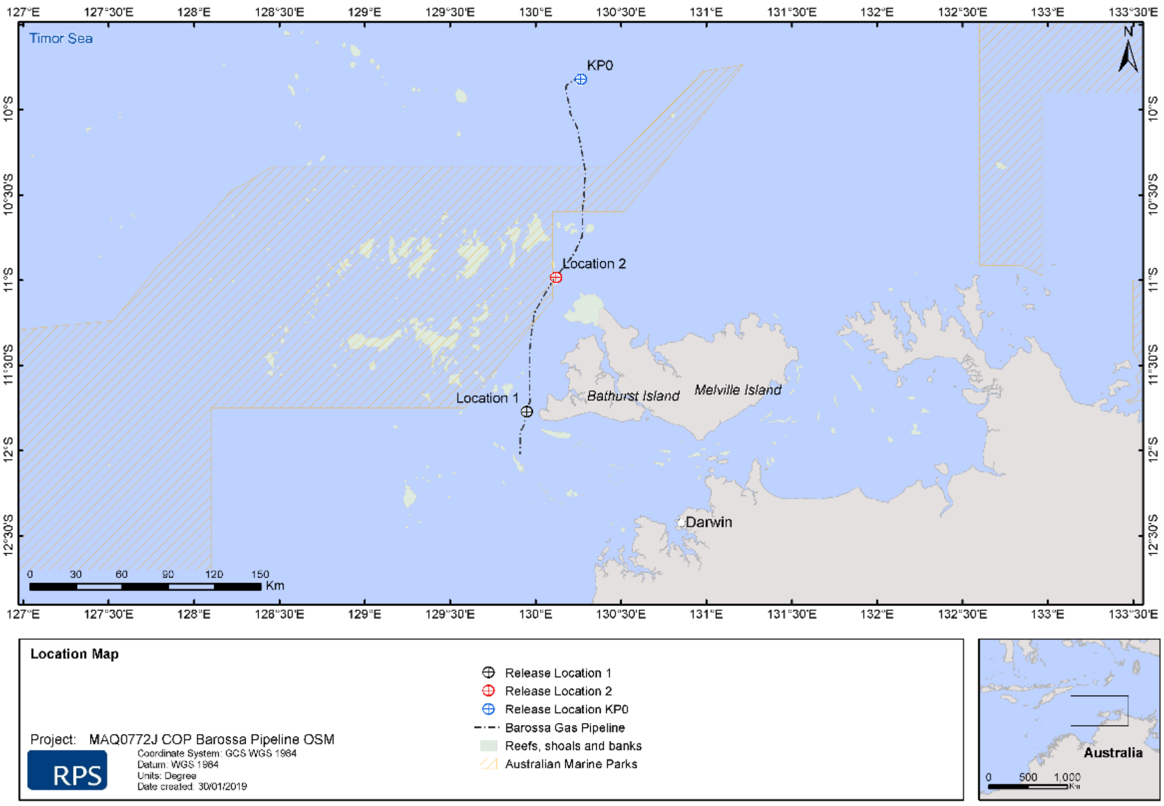


Figure 5-32: Vessel collision MDO release locations for spill modelling

Hydrocarbon Spill Modelling

ConocoPhillips commissioned RPS to complete MDO spill modelling to assess the impact and fate to the environment. The below sections summarise the findings of the modelling.

Modelled Hydrocarbon Types

MDO is a medium grade non-persistent fuel used in the maritime industry. It has a low viscosity (4 cP), which indicates that this hydrocarbon will spread quickly when spilt at sea. MDO will have a thin to low thickness level on the sea surface thereby increasing the rate of evaporation. Characteristics of MDO used in the modelling studies are provided in **Table 5-30**.

Table 5-30: Characteristics of MDO

Density at 25 °C (kg/m^3)	Viscosity at 25 °C (cP)	Component Boiling Point (°C) % of Total			
		Volative (%) <180	Semi-volatile (%) 180-265	Low Volatility (%) 265-380	Residual (%) >380
829	4.0	6	35	54	5

Hydrocarbon Fate and Weathering

MDO is a mixture of volatile, semi-volatile and low volatility hydrocarbons (**Table 5-30**) approximately 60% to 80% of the MDO is predicted to evaporate within 24-48 hours, depending upon the prevailing conditions (**Figure 5-33**).

The heavier components of MDO tend to become entrained into the upper water column as oil droplets in the presence of waves but can re-float to the surface if wave energies abate. Entrained MDO is largely concentrated in surface waters (0-10 m).

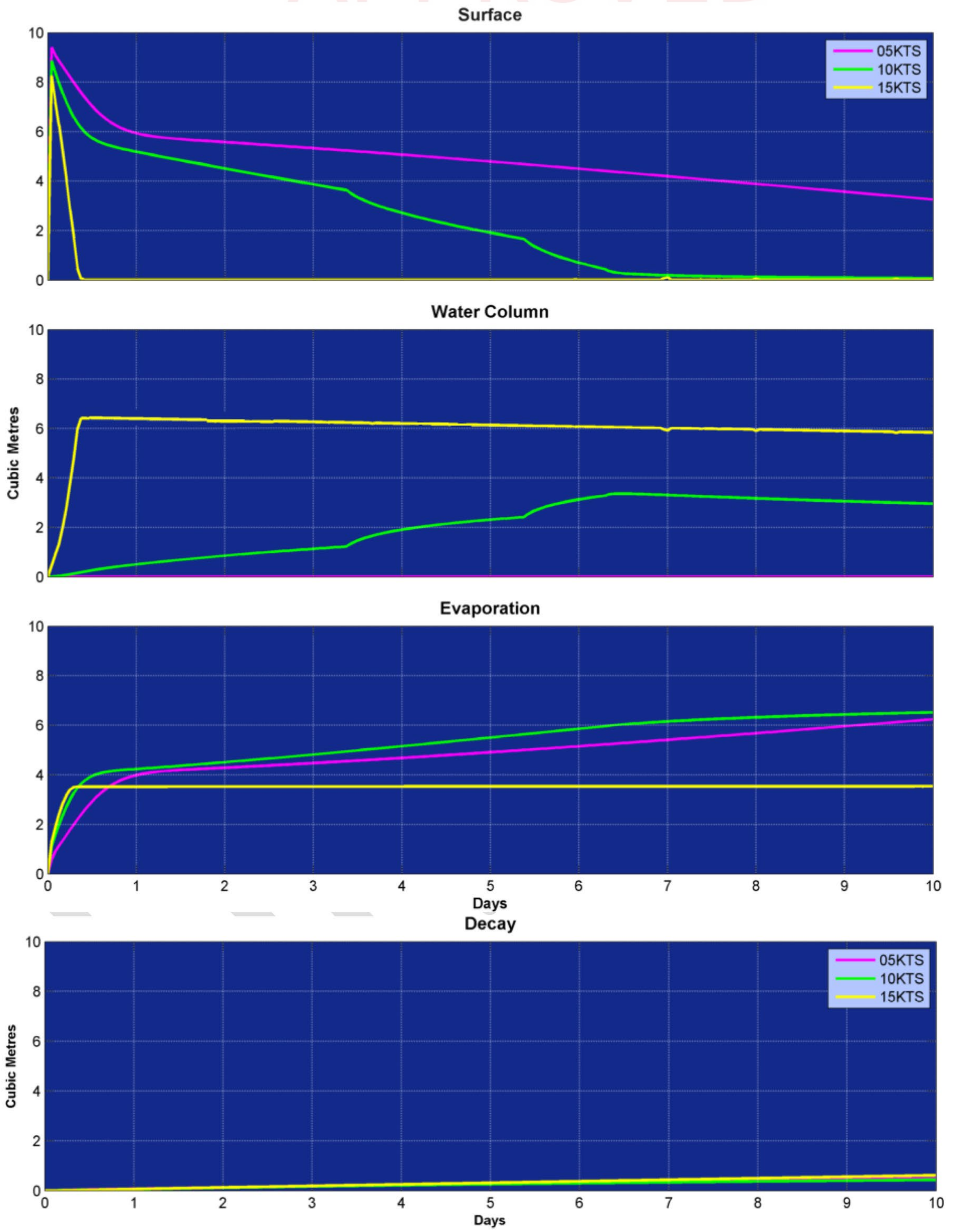


Figure 5-33: Weathering and fates graph, as a function of volume, for an instantaneous 10 m^3 surface release of MDO tracked over 10 days, under 5, 10 and 15 knots constant wind speeds

Modelling Methods

The modelling study was carried out in several stages. Firstly, the tidal currents for the region were generated using RPS' ocean/coastal model, HYDROMAP. Secondly, large scale ocean currents were obtained from a large-scale ocean model for the same region and combined with tidal currents. The hybrid ocean/coastal model was used to describe the total water movement within the region. Finally, the currents and local winds were used as inputs in the oil spill model (SIMAP) to simulate the drift, spread, weathering and fate of the spilled hydrocarbon. The model considered the fates described above in ***Hydrocarbon Fate and Weathering***.

Exposure probabilities were determined using a stochastic modelling approach, which aggregates the behaviour of multiple random spill simulations undertaken for three representative seasons (summer, winter and a transitional period). Each of the simulated spills are started at a different time of day to ensure that the predicted transport and weathering of each spill trajectory was subjected to varying wind and current conditions. A total of 100 model runs were conducted for each season, with the total stochastic data set comprising 300 model runs for each release location.

The model results were combined to provide a summary of each season. This output does not represent the potential behaviour of a single spill (which would have a much smaller area of effect) but provides an indication of the probability of any given area of the sea surface being contacted by hydrocarbons at a particular concentration (See **Hydrocarbon Exposure Thresholds** below). **Table 5-31** provides a summary of the model settings and assumptions.

Table 5-31: Summary of model settings and assumptions used for spill modelling of vessel collision scenario

Parameter	Scenario
Scenario description	Vessel collision at three locations
Number of randomly selected spill start times per season	100
Oil Type	MDO
Spill Volume	700 m^3
Release duration	6 hours
Simulation length	50 days

Hydrocarbon Exposure Thresholds

Sea-surface, sub-surface (entrained and dissolved hydrocarbon) and shoreline accumulation thresholds were defined based on available scientific literature and applied to the hydrocarbon spill modelling to show the EMBA in the event of a spill, both in terms of contact and impact. The thresholds for the surface and sub-surface hydrocarbons are presented in **Table 5-32**.

Table 5-32: Sea surface and sub-surface thresholds

Exposure Zone	Threshold	Justification
Sea Surface Film Threshold		
Moderate exposure (10 g/m^2–25 g/m^2)	10 g/m^2	Ecological impact has been estimated to occur at 10 g/m^2 (a film thickness of approximately 10 µm or 0.01 mm) as this level of oiling has been observed to mortally impact birds and other wildlife associated with the water surface (French et al. 1996; French-McCay 2009). Contact within this exposure zone may result in impacts to the marine environment and has therefore been used to define the EMBA.
Entrained Hydrocarbon Threshold		
Moderate exposure (100 ppb–500 ppb)	100 ppb / over 96 hours	The 100 ppb threshold is considered conservative in terms of potential for toxic effects leading to mortality for sensitive mature individuals and early life stages of species. This threshold has been defined to indicate a potential zone of acute exposure, which is more meaningful over shorter exposure durations (RPS 2018). The 100 ppb threshold contact within this exposure zone may result in impacts to the marine environment. The moderate exposure for entrained hydrocarbons has been used to define the EMBA.
Dissolved Aromatic Hydrocarbon Threshold		
Moderate exposure (50 ppb–100 ppb)	50 ppb / over 96 hours	A conservative threshold of 50 ppb was chosen as it is more likely to be indicative of potentially harmful exposure to fixed habitats over short exposure durations (French 2002). French-McCay (2002) indicates that an average 96-hour LC50 of 50 ppb could serve as an acute lethal threshold to 5% of biota.

		Contact within this exposure zone may result in impacts to the marine environment.
Shoreline Accumulation Threshold		
Moderate accumulation (100-1,000 g/m^2)	100 g/m^2	Accumulated hydrocarbons above 100 g/m^2 may coat an animal in the intertidal range and likely impact its survival and reproductive ability (including invertebrates, furbearing aquatic mammals, marine reptiles and shorebirds). This threshold is the minimum thickness that can be cleaned up, which does not inhibit the potential for recovery. The 100 g/m^2 threshold has been selected to define the moderate accumulation zone and threshold for adverse shoreline accumulation. Accumulation on shorelines above this threshold may result in impacts to the marine environment.

Modelling Results

The currents in the Joseph Bonaparte Gulf are dominated by tidal and wind driven currents which are dependent on the season. These will influence the direction that the hydrocarbons (entrained and floating) travel in a particular season.

Location 1 (closest to Bathurst Island)

Modelling results indicate that floating hydrocarbons, above threshold 10 g/m^2, may extend up to 41.3 km west during winter and up to 32.5 km south-south west during summer. Modelling predicted shoreline accumulation above 100 g/m^2 along the western shoreline of Bathurst Island, with the maximum accumulation predicted to be ~7396 g/m^2. The maximum length of shoreline contact, above the thresholds, is ~19 km.

Modelling results indicate that entrained hydrocarbons will travel north / south from the release location traveling around the southern end of Bathurst Island. During the winter months the entrained hydrocarbons travel further in a western direction. Entrained hydrocarbons above the moderate threshold (<100 ppb) extend up to ~45 km from the release location.

No dissolved aromatics above impact thresholds were predicted to occur in this scenario.

Location 2 (closest to Melville Island)

Modelling results indicate that floating hydrocarbons may extend up to 35.8 km south west during winter and up to 77.7 km south west during the transitional seasons. Modelling predicted shoreline accumulation above 100 g/m^2 at the tip Cape Van Diemen of Melville Island, with the maximum accumulation predicted to be 133 g/m^2.

Modelling results indicate that entrained hydrocarbons will travel north and south during winter and east during the transition and summer months. Entrained hydrocarbons above the moderate threshold (<100 ppb) extend up to ~65 km from the release location.

No dissolved aromatics above impact thresholds were predicted to occur in this scenario.

Location 3 (KP0 – offshore development area)

Modelling results indicate that floating hydrocarbons may extend up to 92.2 km west-northwest during the transitional season and up to 62.0 km west northwest during the winter seasons. No shoreline accumulation was predicted for this location.

Modelling results indicate that entrained hydrocarbons will move in all directions however during winter months the hydrocarbons travel in an east west direction. Entrained hydrocarbons above the moderate threshold (<100 ppb) extend up to ~60 km from the release location.

No dissolved aromatics above impact thresholds were predicted to occur in this scenario.

EMBA

The outputs from the modelling at the three identified locations were used to develop the EMBA for a vessel spill resulting in the release of MDO (**Figure 5-34)** based on the extent of floating and entrained (at threshold levels) hydrocarbons travelled in all seasons.

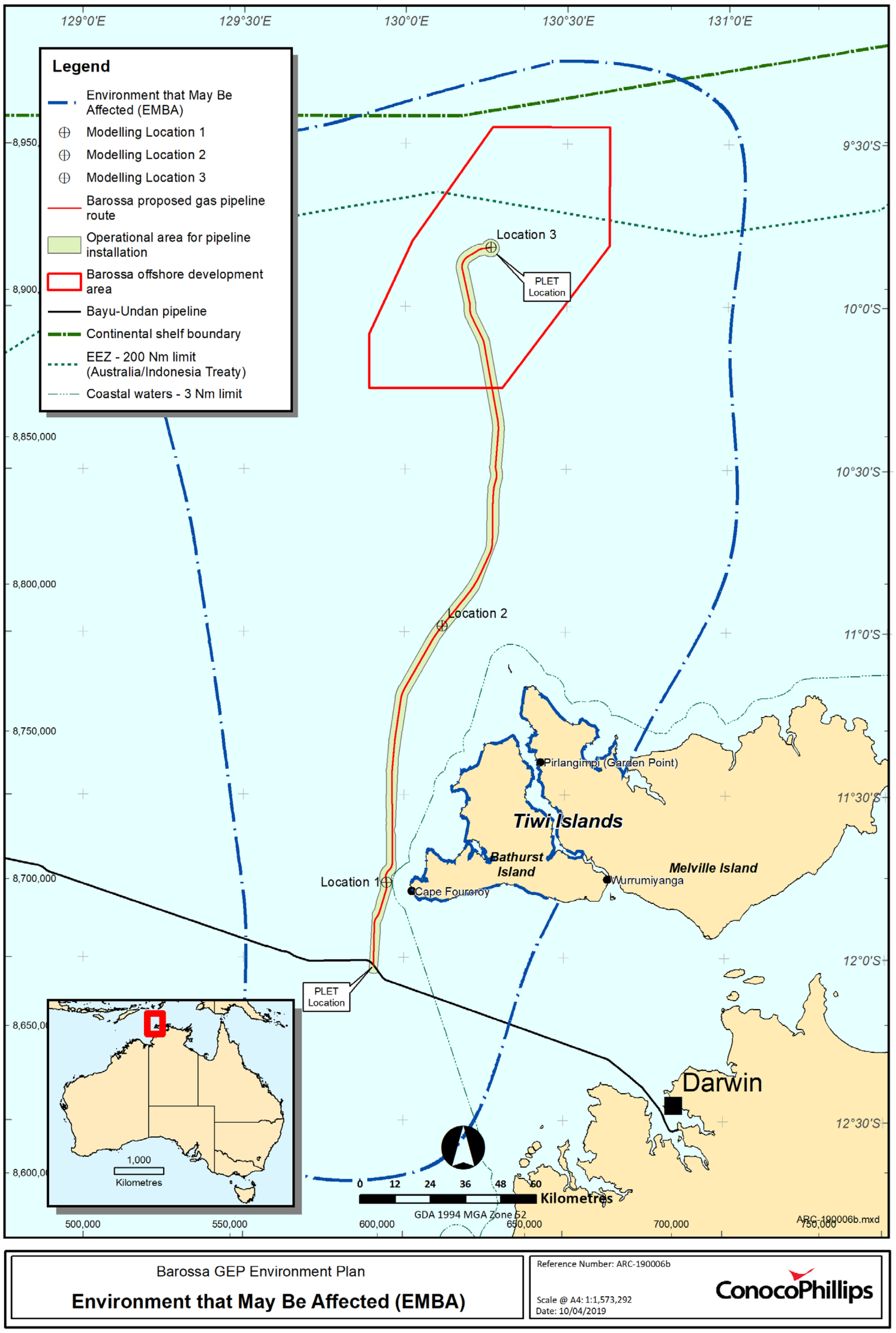


Figure 5-34: The EMBA for a vessel spill resulting in the release of MDO.

Potential Impacts

Water Quality

It is likely that water quality will be reduced at the location of the spill due to hydrocarbon contamination, however, such impacts would be temporary and highly localised in nature due to the small spill volume and rapid weathering of the released MDO (**Figure 5-33**). Stochastic modelling results indicated entrained oil concentrations exceeding 100 ppb may occur up to approximately 65 km from the release location.

Benthic Communities and Habitats

Benthic communities, such as macrofauna and infauna (e.g. filter feeders, brittle starts, crustaceans, polychaetes and molluscs) and benthic primary producers (e.g. macroalgae, seagrass and corals) are vulnerable to hydrocarbons (surface and entrained) however as entrained hydrocarbons above threshold levels are only predicted to remain in the top 10 m of the water column a few shallow shoals/banks may be impacted.

Shoals and Banks

Shallow shoals (e.g. the top of the shoal is within the top 10 m of the water column) within the EMBA that may be impacted include Marie Shoal, Moss Shoal and Mesquite Shoal. It is expected that these shoals would be characteristed by sparse to medium density filter feeders based on surveys of similar inshore banks and shoals (**Section 4.5.6.3**). Lethal and/or sub-lethal effects to filter feeders from hydrocarbons include mortality and changes in population recruitment, growth and reproduction leading to changes in community composition and structure (Wei et al., 2012***)***. Filter feeders are particularly susceptible as they are likely to directly ingest hydrocarbons while feeding. This may cause mortality or sub-lethal impacts such as alteration in respiration rates, decreases in filter feeding activity and reduced growth rates, biochemical effects (Keesing and Edgar 2016). However, as the hydrocarbon concentration decreases and weathers, the communities are expected to recover.

Intertidal Primary Producers

There is the potential for intertidal primary producers such as mangroves, seagrasses and corals to be impacted by spilled hydrocarbons. These are present along much of the coastline. Worst case deterministic modelling indicated location 1 (close to Bathurst Island) had the greatest potential for shoreline contact. The greatest length of shoreline contacted above the moderate shoreline accumulation threshold was approximately 19 km; the total shoreline length of Bathurst and Melville islands are approximately 308 km and 613 km respectively. Hence a worst case spill may only credibly impact upon a relatively small portion of the coastline, including any associated primary producer habitats.

Mangroves

Mangrove habitat and associated mud flats are widely represented along the Tiwi Islands coastline. Hydrocarbons coating prop roots of mangroves can occur from surface hydrocarbons when they are deposited on the aerial roots. Hydrocarbons deposited on the aerial roots can block the pores used by the plants to breathe or interfere with the trees' salt balance resulting in sub-lethal and potential lethal effects. Mangroves can also be impacted by entrained aromatic hydrocarbons that may adhere to sediment particles. In low energy environments such mangroves, deposited sediment-bound hydrocarbons are unlikely to be removed naturally by wave action and may be deposited in layers by successive tides (National Oceanic and Atmospheric Administration, 2014). Given the low portion of persistent hydrocarbon in MDO, hydrocarbons in mangrove environments are not expected to persist long-term.

Tidal mudflats

Tidal mudflats, like mangroves, are a low energy environment and are, therefore, susceptible to potential impacts from persistent surface or stranded hydrocarbons. Hydrocarbons in contaminated sediments can persist for years and result in significant impacts, particularly on benthic infauna, and their dependent migratory shorebird populations (Duke and Burns, 2003). Saenger (1994) noted that mudflats were the most severely affected habitat two years after the Gulf War spill, with no sign of living epibiota. However the hydrocarbon type in the Gulf was a crude oil which has a larger fraction, compared to MDO, of persistent components. Given the low peristent hydrocarbons in MDO persitent of hydrocarbons is not expected to be long term.

Seagrass

Seagrass in the subtidal and intertidal zones have different degrees of exposure to hydrocarbon spills. Subtidal seagrass is generally considered much less vulnerable to surface hydrocarbon spills than intertidal seagrass, primarily because freshly spilled hydrocarbons float under most circumstances. Dean et al. (1998) found that hydrocarbons mainly affect flowering, therefore, species that are able to spread through apical meristem growth (growth at the roots tips) are not as affected (such as *Zostera*, *Halodule* and *Halophila* species).

Potential impacts may include smothering or coating (more commonly associated with IFO-180/HFO which is not being used for gas export pipeline installation activities), reduced photosynthesis (due to direct contact or through absorption of the water soluble fraction, which is most commonly associated with MDO and condensate spills as they entrain within the water column) and a reduction in tolerance to other stress factors (Runcie et al., 2010; Taylor and Rasheed, 2011). Seagrass in the intertidal zone, such as that of the Tiwi Islands, is particularly vulnerable as it may come into direct contact with surface hydrocarbons, as well as entrained components, which can smother and kill seagrasses if it coats their leaves and stems (Taylor and Rasheed, 2011). This conclusion is supported by Howard et al. (1989) who noted that surface hydrocarbon spills which become stranded on the seagrass and smother it during the rise and fall of the tide can result in reduced growth rates, blackened leaves and mortality. Wilson and Ralph (2011) concluded that long-term impacts to seagrass are unlikely unless hydrocarbon is retained within the seagrass meadow for a sustained duration.

Only a portion of the shoreline (19 km based on the worst-case deterministic model run) is expected to be affected and therefore impacts at regional benthic community distribution or population level are considered unlikely. As the hydrocarbon disperses over time the shoreline habitats are expected to recover.

Corals

Water soluble hydrocarbon fractions associated with surface slicks are also known to cause high coral mortality (Shigenaka, 2001) via direct physical contact of hydrocarbon droplets to sensitive coral species (such as the branching coral species). Hydrocarbons in the water column resulting from a surface release (e.g. from a vessel collision or bunkering incident) will be concentrated in surface waters. Entrained hydrocarbons are expected to be found in the top 0-10 m of water. On this basis, benthic primary producer habitats, such as corals, are unlikely to be affected as they typically do not occur near surface waters.

Inter-tidal and shallow water corals may be impacted by floating and entrained hydrocarbons. Impacts may include increased mortality and sub-lethal effects such changes in feeding, bleaching (loss of zooxanthellae), increased mucous production resulting in reduced growth rates and impaired reproduction (Negri and Heyward, 2000). Habitat around the Tiwi Islands is restricted to areas of coastal reef and inter-tidal platforms. Given the patchy distribution of inter-tidal and shallow water corals, along with the non-persistent nature of the hydrocarbon, impacts to corals in the event of an MDO release are expected to be restricted to sub-lethal impacts.

Marine Fauna

Plankton

Plankton communities may be impacted in the event of a hydrocarbon spill, particularly entrained fractions. Toxic effects from exposure to entrained hydrocarbons may cause impacts such as blocked filter feeding organs and impacts resulting from ingestion of hydrocarbons. Modelling of the credible release scenarios indicates that entrained hydrocarbons above impact thresholds are expected to be highly localised around the release location. Given the high productivity of planktonic communities and the nature and scale of the credible spill, these impacts are expected to be highly localised to the release location and temporary in nature.

Pelagic and Demersal Fish Communities (including Sharks and Rays)

Fish mortalities are rarely observed to occur as a result of hydrocarbon spills (International Tanker Owners Pollution Federation, 2011). This has generally been attributed to the possibility that pelagic fish are able to detect and avoid surface waters underneath hydrocarbon spills by swimming into deeper water or away from the affected areas. Fish that have been exposed to dissolved aromatic hydrocarbons are capable of eliminating the toxicants once placed in clean water, hence, individuals exposed to a spill are likely to recover (King et al., 1996). Where fish mortalities have been recorded, the spills (resulting from the groundings of the tankers Amoco Cadiz in 1978 and the Florida in 1969, which were significantly bigger than the worst-case credible spill scenario considered in this EP) have occurred in sheltered bays which limited the ability of fish to access clean water and eliminate toxicants. Given the nature and scale of the credible spill scenario and the open ocean environment of the credible release locations, impacts to pelagic and demersal fishes are expected to be highly localised and temporary.

Marine Mammals

Cetaceans are highly mobile and are known to transit through the region, though no known migration routes are known within the EMBA. Studies and field observations suggest that cetaceans may be able to detect and avoid hydrocarbon slicks (Geraci and St Aubin, 1988). Cetaceans are vulnerable to the effects of surface hydrocarbons due to the need to surface and breathe. Direct contact with surface slicks and inhalation of vapours may irritate eyes, airways and lungs. Lethal or sub-lethal effects will depend on the concentration of the hydrocarbons and the duration of exposure. Potential impacts to dugongs are expected to be similar to cetaceans given their sensitivity to hydrocarbon exposure is likely to be similar.

Given spilled MDO is expected to disperse and weather rapidly, the potential for impacts to cetaceans will be concentrated around the release location and limited to individuals. No impacts at the population level are expected.

Marine Reptiles

Marine turtles are susceptible to the effects of hydrocarbon spills during all life stages (National Oceanic and Atmospheric Administration, 2010). They are in frequent contact with the sea surface and show little avoidance behaviour in response to the presence of surface hydrocarbons, which makes them vulnerable to coating and inhalation of toxic vapours.

A number of BIAs and habitats critical to the survival of a species have been identified for marine turtles within the EMBA (**Section 4.5.5.3).** A hydrocarbon spill above impact thresholds in these areas may result in impacts to biologically important behaviours.

Turtle nesting in the region occurs year-round, with a peak during winter months. A spill during winter months may result in impacts to a portion of the population, however the protracted nature of the breeding season means that a spill will not credibly impact upon a large portion of the population. Approximately 260 km of sandy beaches surround the Tiwi Islands, many of which are documented to host turtle nesting. Deterministic modelling indicated the worst-case maximum length of shoreline impacted above the moderate shoreline accumulation threshold is approximately 19 km. Hence, a worst-case spill will not affect a significant portion of the nesting turtle population at any given time.

Internesting BIAs and nesting habitat critical to the survival of flatback and olive ridley turtles overlap the EMBA. An MDO release from a vessel collision in these areas may result in exposure of flatback and olive ridley turtles to hydrocarbons above impact thresholds. Turtle nests are typically made above the high water mark, which is typically the highest point along the shoreline that stranded oil will reach. As such, direct contact between turtle eggs and the stranded hydrocarbons are very unlikely. Nesting females and hatchlings emerging from nests may be exposed to stranded hydrocarbons when moving on nesting beaches, potentially resulting in contamination. Exposure may result in light oiling of nesting females and hatchling that may subsequently lead to sub-lethal effects such as skin irritation; no mortality is expected to occur. Given the non-persistent nature of MDO and low levels of hydrocarbons potentially stranding on shorelines, the potential for impacts to nesting turtles, egg clutches and hatchlings on beaches is considered to be low.

Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon spills (National Oceanic and Atmospheric Administration, 2010). Contact with surface slicks or entrained hydrocarbon can therefore result in hydrocarbon adherence to body surfaces (Gagnon and Rawson, 2010) causing irritation of mucous membranes in the nose, throat and eyes leading to inflammation and infection (National Oceanic and Atmospheric Administration, 2010). Oiling can also irritate and injure skin which is most evident on pliable areas such as the neck and flippers (Lutcavage et al., 1995). Given the non-persistent nature of the hydrocarbon, along with the expected rapid weathering of surface hydrocarbons in the tropical environment, the timeframe during which turtles may be exposed to hydrocarbons above impact thresholds is low. The spatial extent of the EMBA, along with the wide distribution of turtle species in the region, indicates population-scale impacts are unlikely.

Sea snakes may be vulnerable to hydrocarbon spills due to their need to surface to breathe and may spend time at the sea surface to bask in the sun however little information is available to describe the effects of hydrocarbon spills on sea snakes. Sea snakes are expected to be distributed around shallow banks and shoals which are limited within the EMBA and therefore only low numbers are expected to be impacted.

Seabirds and Migratory Shorebirds

Seabirds and migratory shorebirds birds are particularly vulnerable to contact with floating hydrocarbons, which may mat feathers. This may lead to hypothermia from loss of insulation and ingestion of hydrocarbons when preening to remove hydrocarbons; both impacts may result in mortality (Hassan and Javed, 2011). Seabirds generally do not exhibit avoidance behaviour to floating hydrocarbons. Physical contact of seabirds with surface slicks is by several exposure pathways, primarily immersion, ingestion and inhalation. Contact with hydrocarbons may result in plumage fouling and hypothermia (loss of thermoregulation), decreased buoyancy and potential to drown, inability to fly or feed, anaemia, pneumonia and irritation of eyes, skin, nasal cavities and mouths (Australian Maritime Safety Authority, 2013b; International Petroleum Industry Environmental Conservation Association, 2004) and result in mortality due to oiling of feathers or the ingestion of hydrocarbons. Longer term exposure effects that may potentially impact seabird populations include a loss of reproductive success (loss of breeding adults) and malformation of eggs or chicks (Australian Maritime Safety Authority, 2013b).

A hydrocarbon spill may result in surface slicks above impact thresholds in foraging habitat for seabirds. Seabird distributions are typically concentrated around islands and hydrocarbons in proximity to nesting / roosting areas may result in increased numbers of seabirds being impacted. Nesting / roosting areas in the vicinity of the EMBA include Bathurst and Melville Islands. Given the nature and scale of the credible hydrocarbon spill, the potential for impacts to birds is expected to be temporary (hours to days) and restricted to the area covered by sea surface hydrocarbons above impact thresholds. Stranded hydrocarbons may come into contact with wading shorebirds, potentially resulting in oiling. Given the relatively low likelihood of shoreline accumuation above the moderate impact threshold, contact of this nature is considered very unlikely to occur. As seabirds nest above the high water mark, direct contact to nests, eggs or hatchlings by stranded hydrocarbons is not expected to occur.

Australian Marine Parks

As outlined above, a hydrocarbon spill has the potential to impact upon water quality and a range of biological receptors. These environmental values are contained with the Oceanic Shoals Marine Park in Commonwealth waters. Impacts to environmental values within these protected areas may diminish the value of these protected areas, however given the nature and scale of the credible spill scenario such impacts are improbable.

Fishing (Traditional, Commercial and Recreational)

A hydrocarbon spill may impact upon fish species targeted by fishers (refer to the discussion on pelagic and demersal fish communities above), potentially reducing fish numbers available for capture within the EMBA. A hydrocarbon spill may also temporarily displace traditional, commercial and recreational fishers from the EMBA. This displacement would be localised and short-term (days). A hydrocarbon spill may result in tainting of commerially fished species resulting in fishers being unable to sell their catch, which may result in a loss of income for commercial fishers. Additionally, spilled hydrocarbons may contaminate fishing gear, which may require cleaning.

KEFS

The open waters above the seabed KEFs of the shelf break and slope of the Arafura Shelf and carbonate bank and terrace system of the Van Diemen Rise may be contacted by hydrocarbons above thresholds. Impacts to these seabed KEFs are considered to be minimal given their location on the seabed and the surface nature of the majority of the spills (e.g. vessel collisions in which the concentration of the entrained hydrocarbons is highest in the upper water column (RPS 2017).

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	3 – Moderate	2 – Remote	RRII - Medium
Residual risk	3 – Moderate	1 – Improbable	RR1 - Low

Controls and Demonstration of ALARP

Existing Controls

Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Activity vessels equipped and crewed in accordance with Australian maritime requirements	This control is effective in avoiding unplanned interactions with other marine users. Crew qualifications and experience, along with communication and navigation equipment, allows activity vessels to detect, communicate with, and avoid interaction with other marine users.	**C 1.1** Refer to **Section 5.3.1**	**EPS 1.1.1** Refer to **Section 5.3.1**
Undertake consultation with relevant persons (including applicable notifications) to support gas export pipeline installation campaign	This control is effective in avoiding unplanned interactions with other vessels. Consultation with relevant persons allows all parties to be aware of activities associated with the gas export pipeline and its location. This allows ConocoPhillips and other users to undertake activities in such a way to minimise the potential for adverse interactions.	**C 1.2** Refer to **Section 5.3.1**	**EPS 1.2.1** Refer to **Section 5.3.1** **EPS 1.2.2** Refer to **Section 5.3.1** **EPS 1.2.3** Refer to **Section 5.3.1**
Implement the vessel SOPEP	This control is effective in reducing the potential impacts of an MDO release from a vessel collision. Each vessel has a SOPEP that details the immediate response to a spill	**C14.1**	**EPS 14.1.1** Implement the vessel SOPEP in the event of an MDO spill
Implement tiered spill response in the event of an MDO spill	This control is effective in reducing the potential impacts of an MDO release from a vessel collision. ConocoPhillips had developed a tiered response strategy (described in the OPEP (BAA-100 0330 - **Appendix H**)) that scales to the needs of the spill.	**C 14.2**	**EPS 14.2.1** Implement tiered spill response in the event of an MDO spill

Assessment of Additional Controls				
Additional control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No IFO or HFO will be used in activity vessels	Yes	Yes **C 14.3**	This control is effective in reducing the potential impacts from a vessel collision as IFO and HFO are heavier fuels which will persistent longer which may result in a greater environment impact.	**EPS 14.3.1** No IFO or HFO in any activity vessel tanks.
Engineering				
One vessel will act as a surveillance vessel within the Operational Area during gas export pipeline installation.	Yes	Yes **C 1.4**	A vessel will be in the immediate vicinity of the pipelay vessel at all times to act as a surveillance and intervention vessel. The vessel will mitigate potential interactions between the pipelay vessel and other marine users	**EPS 1.4.1** Refer to **Section 5.3.1**
Administrative				
No additional controls identified				
ALARP statement				
Based on the outcomes of the risk assessment and the implementation of controls throughout the activity, ConocoPhillips considers that the impacts and risks from an MDO release from vessel collisions are reduced to ALARP. EPOs, EPSs and MCs applicable to undertaking the spill response are detailed in **5.3.10.** Relevant legislative requirements and standard industry practices/guidelines have been applied to control the risk. Additional controls have been evaluated; all additional controls considered were rejected as the reduction in risks was considered to be grossly disproportionate to the cost of implementation. The controls selected for implementation are effective in reducing the risk of an MDO release from a vessel collision. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the risks.				

Summary of alignment with EPBC Management Plans			
Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Marine parks	North Marine Parks Network Management Plan 2018	Marine pollution was identified as a pressure in the North Network The Director of National Parks must be notified in the event of an oil pollution incident that occurs within or may impact upon, an Australian Marine Park	A comprehensive suite of well-defined engineering controls will be implemented to minimise risks of a spill occurring Notifications are included in the OPEP (BAA-100 0330 - **Appendix H)**
Marine Turtles	Recovery Plan for Marine Turtles in Australia (June 2017)	Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to	A comprehensive suite of well-defined engineering controls will be implemented to minimise risks of a spill occurring

		'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival. Manage anthropogenic activities in BIAs to ensure that biologically important behaviour can continue.	Individuals may be affected in the area of influence, considering the large area utilised by internesting turtles (including internesting habitat critical to the survival and BIAs), the potential for impacts at a population level are unlikely. An OPEP will be implemented which details the response strategies (BAA-100 0330 - **Appendix H)**
Seabirds and shorebirds	See **Table 4-5**	Oil pollution was identified as a threat to a number of birds	A comprehensive suite of well-defined engineering controls will be implemented to minimise risks of a spill occurring In the event of a spill, impacts to birds is expected to be temporary (hours to days) and restricted to the area covered by sea surface hydrocarbons above impact thresholds. An OPEP will be implemented which details the response strategies (BAA-100 0330 - **Appendix H)**

Acceptability	
Risk is ALARP	Yes (See ALARP statement)
Principles of ESD	The impacts associated with vessel collision resulting in the release of MDO are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate.
Legislative requirements	The controls implemented are consistent with the requirements of relevant legislation including COLREGS, SOLAS, STWC Convention and related Marine Orders
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment • oil spill preparedness and response strategies are considered applicable to the nature and scale of the risk and associated impacts of the response are reduced to ALARP, and • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems
External requirements	ConocoPhillips has:

	• consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign. Consultation in support of the EP has identified other users that may potentially be affected and provided sufficient opportunity to provide feedback. A number of stakeholders sought information on the OPEP process in general, but no claims or objections were raised in relation to an MDO release from a vessel collision. Information regarding the OPEP process is included in **Section 7.10**. • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment. • Pollution, such as could occur from a hydrocarbon spill, is identified as a threat in conservation advice for several marine species that may occur in the Operational Area and as a threat in the North Marine Parks Network Management Plan 2018. ConocoPhillips considers the selected controls are effective in managing the risk to these species and the Oceanic Shoals Marine Park to a level that is acceptable.
Environmental Protection Outcomes (Table 6-1)	
EPO 14 No marine diesel releases to the marine environment as a result of a vessel collision	

5.3.8 Unplanned Hydrocarbon Discharges: Hydrocarbon Release from Refuelling

Risk	Hydrocarbon release from a refuelling	
Aspect-receptor Reference (Table 5-5)	15B – Water quality	15H – Plankton
	15I – Pelagic and demersal fish communities	15J – Marine mammals
	15K – Marine reptiles	15L – Sharks and rays
	15M – Seabirds and migratory shorebirds	15O – Australian Marine Parks
	15T – Commercial fishing	

Description of the Source of Risk

Bunkering of MDO at sea between the support vessels and the pipelay vessel will occur within the Operational Area. Additionally, refuelling of helicopters with aviation fuel may take place on the pipelay vessel.

Credible Spill Scenario

A release of MDO as a result of hose break or coupling failure during vessel refuelling was considered the worst case scenario for refuelling incidents. Failure of the transfer hose during helicopter refuelling could result in a maximum credible spill volume of <1 m^3 which is less than 10 m^3 considered for vessel bunkering. The physical and chemical properties of MDO and aviation fuel are similar therefore the MDO scenario is considered more conservative and therefore representative of an aviation fuel scenario.

Spill volumes were determined from transfer hose inventory and spill prevention measures including 'dry break' or 'break away' couplings, rapid shutdown of fuel pumps and spill response preparedness, with 10 m^3 considered to be the maximum volume that could escape from the hose prior to shut down. This scenario was modelled by APASA using the methodology outlined below. The scenario parameters used in the modelling study are presented in **Table 5-33.**

Table 5-33: Summary of model settings and assumptions used for spill modelling of bunkering incident scenario

Parameter	Scenario
Scenario description	Bunkering incident
Number of randomly selected spill start times per site per scenario	100 per season
Oil Type	MDO
Spill Volume	10 m^3
Release duration	Instantaneous
Simulation length	10 days
Release location	Barossa Offshore Development Area, as per OPP. This is ~1 km from the Operational Area.

Hydrocarbon Spill Modelling

As with the MDO release from a vessel collision scenario, ConocoPhillips commissioned RPS to complete hydrocarbon spill modelling to determine the risk of exposure to environmental receptors from an MDO release from a bunkering incident. The bunkering release modelling was undertaken for the OPP and close to the Operational Area and therefore is considered relevant for this activity. The below sections summarise the findings of the modelling.

Modelled Hydrocarbon Types

A description of MDO, including physical characteristics, is provided in **Section 5.3.7**

Hydrocarbon Fate and Weathering

A description of MDO, including weathering, is provided in **Section 5.3.7**

Modelling Methods

A description of modelling methods is provided in **Section 5.3.7**. **Table 5-33** provides a summary of the model settings and assumptions.

Hydrocarbon Thresholds

The same sea surface hydrocarbon thresholds were applied to the bunkering incident scenario as the MDO release form a vessel collision scenario. Refer to **Section 5.3.7** for information on the impact thresholds. No shoreline contact was predicted during any season for the bunkering incident scenario.

Modelling Results

The modelling results show:

- No probability of shoreline contact for any season.
- When the 10 g/m^2 spill was tracked, the maximum distance travelled was during winter with the surface hydrocarbons extending up to 3 km from the release location.
- There was no entrained or dissolved hydrocarbons predicted in the model.

Potential Impacts

The potential impacts for an MDO release during a bunkering incident are similar to those described in **Section 5.3.7** although the significantly smaller credible release volume constrains the receptors that may be impacted. Potential receptors include: water quality, marine fauna (particularly those associated with the surface such as cetaceans and marine turtles) and plankton within the upper water column only.

Water quality in the area affected by the bunkering incident will decline due to the presence of floating hydrocarbons. The decrease in water quality is expected to be short-lasting (hours) as MDO has a high portion of volatile hydrocarbons that will evaporate quickly. The low viscosity of MDO indicates a surface slick will spread rapidly, which will facilitate evaporation and entrainment within the water column.

The decrease in water quality may result in acute toxic effects to plankton around the release location. However, given the rapid turnover of plankton communities these impacts will be temporary (e.g. days)

Marine fauna may be exposed to hydrocarbons, particularly fauna associated with the sea surface such as birds and air-breathing animals such as cetaceans and turtles. Given the relatively small area that would be affected, and the low persistence of MDO in the environment, the potential for marine fauna to be impacted is considered to be very low.

If bunkering within the Oceanic Shoals marine park, a hydrocarbon spill has the potential to impact upon water quality and marine fauna (as detailed above). Impacts to environmental values within these protected areas may diminish the value of these protected areas, however given the nature and scale of the credible spill scenario such impacts are improbable.

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	2 – Minor	3 – Rare	RRII - Medium
Residual risk	2 – Minor	2 – Remote	RRI - Low

Controls and Demonstration of ALARP

Existing Controls

Control	***Effectiveness***	Reference (***Table 6-1***)	***Environmental Performance Standard***
Vessel equipped and crewed in accordance with Australian maritime requirements	This control is effective in avoiding MDO releases from bunkering incidents. Crew qualifications and experience reduce the likelihood of an incident occurring.	**C 15.1**	**EPS 6.1.1** Refer to **Section 5.2.6**
Spill clean-up kits available in high risk areas	This control is effective in reducing the likelihood of spilled hydrocarbons or chemicals reaching the environment. Spill kits are required as part of vessel SOPEPs. Contaminated material from used spill kits is disposed of accordingly.	**C 12.3**	**EPS 12.3.1** Refer to **Section 5.3.5**
Vessel-specific bunkering procedures and equipment	This control effective in avoiding MDO releases from bunkering incidents.	**C 15.2**	**EPS 15.2.1**

consistent with ConocoPhillips marine vessel vetting requirements	Suitable vessel-specific procedures and communications, reduces the likelihood of an incident occurring.		ConocoPhillips will confirm vessel bunkering procedures include: • defined roles and responsibilities – bunkering to be undertaken by trained staff • use of bunkering hoses that have quick connection couplings • Visual inspection of hose prior to bunkering to confirm they are in good condition and correct valve line up • Assessment of weather and sea state • Testing emergency shutdown mechanism on the transfer pumps • Established communication protocols between vessel master and personnel responsible for monitoring tank levels, leaks and overflows during bunkering operations. • Continual visual monitoring during diesel transfers of hoses, connections and tank levels to detect leaks and prevent overflows during bunkering operations.
Implement tiered spill response in the event of an MDO spill	This control is effective in reducing the potential impacts of an MDO release from a bunkering incident. ConocoPhillips had developed a tiered response strategy (described in the OPEP - BAA-100 0330) that scales to the needs of the spill.	**C 14.2**	**EPS 14.2.1** Refer to **Section 5.3.5**
No bunkering within 20 km of the Tiwi Islands whilst in the Operational Area	This control is effective in reducing the potential impacts of an MDO release from a bunkering incident.	**C 15.3**	**EPS 15.3.1** All bunkering undertaken more than 20 km form the Tiwi Islands when vessel in the Operational Area
Procedures for helicopter refuelling	Suitable procedures and communications, reduces the likelihood of an incident occurring.	**C 15.4**	**EPS 15.4.1** Refuelling procedures to include: • a completed PTW and/or JSA for the activity. • continual visual monitoring of gauges, hoses, fittings and the sea surface during the activity.

			• hose and fittings checks prior to commencement of the activity. • weather conditions to be assessed prior to the activity.

Assessment of Additional Controls				
Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No bunkering of fuel during the pipeline installation activity	No	No	Vessels will routinely bunker when in port, as this is the safest and most cost effective means to refuel vessels. However due to the gas export pipeline installation method, the pipelay vessel cannot bunker in port and requires bunkering within the Operational Area to undertake the activity. Following implementation of the selected existing controls, the risk reduction associated with eliminating bunkering at sea is considered to be negligible. The potential impacts to schedule and associated cost of implementing the control is considered to be grossly disproportionate to the reduction in risk. The control has not been adopted.	N/A
Substitution				
No additional controls identified				
Engineering				
No additional controls identified				
Administrative				
No bunkering during night hours during the petroleum activity	No	No	Bunkering only during daylight hours increases the likelihood of detecting a leak, as surface hydrocarbon sheens are typically more visible under sunlight. Bunkering operations are typically completed during daylight hours, however circumstances may occur where bunkering is required during darkness (e.g. large volume transfers at slow rates or when bunkering is safer to perform at night due	N/A

			to prevailing metocean conditions). Following implementation of the selected existing controls, the risk reduction associated with prohibiting bunkering during darkness is considered to be negligible. The cost of implementing the control is considered to be grossly disproportionate to the reduction in risk. The control has not been adopted.	

ALARP Statement

Based on the outcomes of the risk assessment and through the implementation of controls throughout the activity, ConocoPhillips considers that the risks to the marine environment from a refuelling incident are reduced to ALARP. EPOs, EPSs and MCs applicable to undertaking the spill response are detailed in **Section 5.3.10.**

Relevant legislative requirements and standard industry practices have been applied to control the risk. Additional controls have been evaluated; all additional controls considered were rejected as the reduction in risks was considered to be grossly disproportionate to the cost of implementation. The controls selected for implementation are effective in reducing the risk of a hydrocarbon release from a refuelling incident. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the risks.

Summary of alignment with EPBC Management Plans

Relevant Receptors	***Relevant Plan / Conservation Advice***	***Specific Requirements Relevant to Pipeline Installation***	***Demonstration of Alignment***
Pollution, such as could occur from a hydrocarbon spill, is identified as a threat in conservation advice for several marine species that may occur in the Operational Area and as a threat in the North Marine Parks Network Management Plan 2018 as detailed in **Section 5.3.7.** Refer to **Section 5.3.7** for discussion on alignment with the relevant plans.			

Acceptability Statement	
Risk is ALARP	Yes (See ALARP statement)
Principles of ESD	The impacts associated with bunkering are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate • small spills are not expected to reduce overall long-term, broad-scale health, diversity and productivity of the environment
Legislative requirements	The controls implemented are consistent with the requirements of relevant legislation including *Navigation Act 2012* (Cth), the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), Marine Order 94, Marine Order 95
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment • oil spill preparedness and response strategies are considered applicable to the nature and scale of the risk and associated impacts of the response are reduced to ALARP • aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign; and • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment. • pollution, such as could occur from unplanned release of hydrocarbon from bunkering, is identified as a threat in conservation advice for several marine species that may occur in the Operational Area. ConocoPhillips considers the selected controls are effective in managing the risk to these species to a level that is acceptable.
Environmental Protection Outcomes (**Table 6-1**)	
EPO 15 No marine diesel releases to the marine environment as a result of refuelling	

5.3.9 Atmospheric Emissions: Dry Natural Gas Release from Bayu-Undan Pipeline Loss of Containment

<table>
<tr><th>Risk</th><td colspan="4">Loss of Bayu-Undan pipeline containment resulting in dry gas release</td></tr>
<tr><th rowspan="4">Aspect-receptor Reference (Table 5-5)</th><td colspan="2">17D – Air quality</td><td colspan="2">17J – Marine mammals</td></tr>
<tr><td colspan="2">17K – Marine reptiles</td><td colspan="2">17M – Seabirds and migratory shorebirds</td></tr>
<tr><td colspan="2">17T – Commercial fishing</td><td colspan="2">17U – Traditional fishing</td></tr>
<tr><td colspan="2">17V – Tourism and recreational activities</td><td colspan="2">17W – Port and commercial shipping</td></tr>
<tr><th colspan="5">Description of Source of Risk</th></tr>
<tr><td colspan="5">The proposed gas export pipeline will be tied into the Bayu-Undan pipeline; therefore, activity vessels will be operating in the vicinity of the Bayu-Undan pipeline. Activities will include lifting, the PLET foundation and the PLET, and pipeline initiation structure (if pipeline installation commences at the Bayu-Undan PLET). ConocoPhillips has identified a rupture of the Bayu-Undan pipeline may be caused by damage to the pipeline for initiation structure impact/drag or dropped object. A pipeline rupture will result in a release of dry gas to the environment.

The scale of the Bayu-Undan pipeline leak is dependent on the nature of the rupture. Small 'pinhole' leaks will result in a stream of bubbles which may dissolve before reaching the surface. A major rupture (e.g. catastrophic failure) would result in the discharge of a volume 151,000m^3 of dry gas forming a large plume in the water column and dispersing into the atmosphere. A catastrophic failure is considered to be the worst-case credible release from the Bayu-Undan Pipeline.

The Bayu-Undan Pipeline transports dry gas (i.e. no liquid phase hydrocarbons) from the Bayu-Undan field to the DLNG Plant. Given the contents of the Bayu-Undan Pipeline consists entirely of dehydrated gas, no liquid phase hydrocarbons will be released to the environment as a result of a Pipeline loss of containment. Given the pressure and temperature differential between the contents of the Bayu-Undan Pipeline and the receiving environment, condensation of gas phase components of the dry gas will not occur upon release.</td></tr>
<tr><th colspan="5">Potential Impacts</th></tr>
<tr><td colspan="5">A gas plume would be released from the Bayu-Undan Pipeline in the event of a rupture. The plume would move towards the surface, with some of the gas becoming dissolved in seawater as the plume rises. A worst-case rupture would lead to the formation of a large gas cloud, which would rapidly disperse in the atmosphere. Methane (the main component of the dry gas) is lighter than air and would rise into the atmosphere, away from the release location.

The gas cloud may result in impacts to air-breathing fauna, such as marine mammals, marine reptiles and birds. Animals breathing in the immediate vicinity of the release may be asphyxiated, potentially resulting in mortality. Given the dispersion of gas into the atmosphere, this potential effect would be highly localised to the release location.

The gas cloud poses a risk to the health and safety of other users, such as fishers (traditional and commercial), tourism and recreational users. A gas cloud could potentially form an explosive mix which, if ignited, result in injury / death and damage to property. However, all other marine users will be excluded from the exclusion zone and therefore will not be within 500 m of an event, if it occurs.</td></tr>
<tr><th colspan="5">Risk Assessment</th></tr>
<tr><td></td><td>Consequence</td><td colspan="2">Likelihood</td><td>Risk Rating</td></tr>
<tr><td>Inherent risk</td><td>2 – Minor</td><td colspan="2">2 – Remote</td><td>RRI - Low</td></tr>
<tr><td>Residual risk</td><td>2 – Minor</td><td colspan="2">2 – Remote</td><td>RRI - Low</td></tr>
<tr><th colspan="5">Controls and Demonstration of ALARP</th></tr>
<tr><th colspan="5">Existing controls</th></tr>
<tr><th>Control</th><th>Effectiveness</th><th colspan="2">Reference (Table 6-1)</th><th>Environmental Performance Standard</th></tr>
<tr><td>Implement standards and</td><td>This control is effective in reducing the likelihood of a</td><td colspan="2">C 8.1</td><td>EPS 8.1.1</td></tr>
</table>

procedures for lifting equipment	suspended load being dropped. Engineering standards for load-bearing lifting equipment are widely used in the offshore industry and well understood. Suitable lifting procedures consider a range of technical and environmental factors to reduce the risk of loss of control of a suspended load.		
Implement procedures for lifting over live infrastructure	This control is effective in reducing the likelihood of a suspended load being dropped. Engineering standards for load-bearing lifting equipment are widely used in the offshore industry and well understood. Suitable lifting procedures consider a range of technical and environmental factors to reduce the risk of loss of control of a suspended load	**C 16.1**	**EPS 16.1** ConocoPhillips will confirm the vessel procedures for lifting over live infrastructure include • The vessel is offset from the Bayu-Undan pipeline • Then objects are slowly 'walked' to the target location at a reduced height above the seabed
Emergency response implemented to mitigate impacts in the event of a loss of containment from the Bayu-Undan Pipeline	This control is effective in mitigating the impact of a leak from the from the Bayu-Undan Pipeline. The emergency response has been developed based on the safety case for the Bayu-Undan Pipeline.	**C 16.2**	**EPS 16.2.1** The Bayu-Undan Emergency Response Plan (ALL/HSE/ER/003) and the Pipeline Emergency Repair Management Plan (H8-10000005136) to be followed in the event of an impact to the Bayu-Undan Pipeline.

Assessment of Additional Controls

Additional Control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No additional controls identified				
Engineering				
No additional controls identified				
Administrative				
No additional controls identified				

ALARP Statement

Based on the outcomes of the risk assessment and the implementation of controls throughout the activity, ConocoPhillips considers that the impacts and risks to the environment and other users from a dry gas release from a Pipeline loss of containment are reduced to ALARP.

Relevant legislative requirements and standard industry practices have been applied to control the risk. The controls selected for implementation are effective in reducing the risk of a dry gas release from a Pipeline loss of containment. ConocoPhillips considers the controls adopted are commensurate to the nature and scale of the potential impacts. No credible additional controls were identified.

Summary of alignment with EPBC Management Plans

Relevant Receptors	Relevant Plan / Conservation Advice	Specific Requirements Relevant to gas export pipeline Installation	Demonstration of Alignment
No relevant management plans identified			
Acceptability			
Risk is ALARP	Yes (See ALARP statement)		
Principles of ESD	The impacts associated with a dropped object/initiation structure drag resulting in the release of dry natural gas are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate.		
Legislative requirements	No legislative requirements are applicable		
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment • emergency response plans are considered applicable to the nature and scale of the risk and associated impacts of the response are reduced to ALARP, and • the installation campaign aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems		
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign. Consultation in support of the EP has identified other users that may potentially be affected and provided sufficient opportunity to provide feedback. • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment. • pollution, such as could occur from a hydrocarbon spill, is identified as a threat in conservation advice for several marine species that may occur in the Operational Area and as a threat in the North Marine Parks Network Management Plan 2018. ConocoPhillips considers the selected controls are effective in managing the risk to these species and the Oceanic Shoals Marine Park to a level that is acceptable.		
Environmental Performance Outcomes (Table 6-1)			
EPO 16 No releases of gas from the Bayu-Undan Pipeline to the environment			

5.3.10 Response Strategy Implementation

Risk	Implementation of inappropriate response strategies in response to Significant hydrocarbon spill.	
Aspect-receptor Reference (Table 5-5)	16B – Water quality	16J – Marine mammals
	16K – Marine reptiles	16L – Sharks and rays
	16M – Seabirds and migratory shorebirds	
Description of the Source of Risk		
Accidents or emergencies during the gas export pipeline installation campaign may warrant implementation of emergency response activities. ConocoPhillips has identified the following risk events that may warrant implementation of an emergency response:		

- hydrocarbon spill warranting the implementation of spill response tactics.

Further description of the hydrocarbon spill response is provided below. Refer to the OPEP (**Appendix H**) for additional information on response tactics.

Hydrocarbon Spill Response Tactics

In the event of a hydrocarbon spill during the gas export pipeline installation campaign, ConocoPhillips may implement a spill response to maintain situational awareness or reduce the potential impacts. Two credible worst-case spill scenarios were identified for the installation of the pipeline:

- an MDO release from vessel collision, resulting in up to 700 m^3 released to the marine environment (**Section 5.3.7**); and
- an MDO release from a bunkering incident, resulting in up to 10 m^3 released to the marine environment (**Section 5.3.8**).

ConocoPhillips has undertaken a Net Environmental Benefit Analysis (NEBA) assessment of response options (**Appendix C**: Pre-spill NEBA Assessment and ALARP Assessment of Response Strategies), which resulted in a suite of primary and secondary response options being selected for use in the OPEP. Primary response options are implemented for all scenarios triggering Tier 1 or greater incident response. Secondary response options may be implemented if determined to result in a net environmental benefit during the spill response. The suite of response options considered in the OPEP are:

- Primary response options:
  - Monitor and evaluate.
- Secondary response options:
  - Wildlife response – hazing;
  - Pre-emptive capture/post-contact wildlife response;

All response options were assessed using a pre-operational NEBA. Given some response options have the potential to result in environmental damage, all secondary response options will be subject to an operational NEBA prior to implementation. Refer to the OPEP (Appendix H) for additional information and **Section 7.10** for relevant EPOs, EPSs and MCs.

Potential Impacts

Monitor and Evaluate

The monitor and evaluate option for the credible spill scenarios during the gas export pipeline installation campaign will typically be conducted from deployment of oil spill tracking buoys and vessels. Aerial platforms may supplement observations from vessels. The environmental risks and impacts from vessel operations have been considered elsewhere in this EP. Vessels implementing the monitor and evaluate response option will comply with the requirements for vessels in this EP.

Wildlife Response – Hazing

Implementation of the wildlife hazing secondary response option relies on behavioural disturbance to encourage animals to avoid areas where hydrocarbons above impact thresholds may be present. Methods used will depend on the fauna at risk (e.g. acoustic deterrents for birds). The behavioural disturbance may interfere with normal animal behaviours, such as foraging. MDO from the credible spill scenarios is expected to disperse rapidly in the marine environment, as such the window of opportunity for this response option is in the order of hours to days. As such, the potential behavioural impacts of this response option are temporary.

Pre-emptive Capture/Post-contact Wildlife Response

The capture of wildlife (either pre-emptive or post-contact) may result in considerable stress on animals, particularly when oiled animals are cleaned. MDO from the credible spill scenarios is expected to disperse rapidly in the marine environment, as such the window of opportunity for this response option is in the order of hours to days. Given the non-persistent nature of the hydrocarbon, the potential for oiled wildlife requiring cleaning is considered to be very low.

Cleaning of oiled wildlife will result in the generation of wastes which may be contaminated with hydrocarbons. Oily wastes may result in secondary contamination if not handled and disposed of effectively.

Risk Assessment

	Consequence	***Likelihood***	***Risk Rating***
Inherent risk	1 Negligible	1 Improbable	RR1 - Low
Residual risk	1 Negligible	1 Improbable	RR1 - Low

Controls and Demonstration of ALARP			
Existing Controls			
Control	***Effectiveness***	***Reference (Table 6-1)***	***Environmental Performance Standard***
Undertake operational NEBA during implementation of OPEP	This control is effective in reducing the potential of implementation of response options with no net environmental benefit. Several of the secondary response options may result in environmental impacts, which warrant consideration prior to implementation. The operational NEBA framework provides the Incident Management Team (IMT) implementing the OPEP with the means to undertake as assessment of the environmental benefit of the secondary response options	**C 17.1**	**EPS 17.1.1** IMT to undertake spill response (operational) NEBA to determine applicable response strategies, initiation and termination of response options

Assessment of Additional Controls				
Additional control	***Practicable?***	***Will it be applied?***	***Justification***	***Environmental Performance Standard***
Elimination				
No additional controls identified				
Substitution				
No additional controls identified				
Engineering				
No additional controls identified				
Administrative				
No additional controls identified				

ALARP Statement
Based on the outcomes of the risk assessment and through the implementation of controls throughout the activity, ConocoPhillips considers that the impacts and risks to the marine environment from emergency response to be ALARP, with EPOs, EPSs and MCs applicable to undertaking the oil spill response detailed in **Section 5.3.10**. Standard industry practices have been applied to control the risk. The control selected for implementation is effective in reducing the risks to the marine environment from emergency response. ConocoPhillips considers the control adopted is commensurate to the nature and scale of the risk. No credible additional controls were identified.

Summary of alignment with EPBC Management Plans			
Relevant Receptors	**Relevant Plan / Conservation Advice**	**Specific Requirements Relevant to Pipeline Installation**	**Demonstration of Alignment**
Marine Parks	North Network Management Plan 2018	The Director of National Parks should be notified in the event of an oil pollution incident that occurs within, or may impact upon, an Australian Marine Park.	The OPEP (Appendix H) details how Conoco will respond in the event of a spill and includes notification to the Director of National Parks.

Acceptability	
Risk is ALARP	Yes (See ALARP statement)
Principles of ESD	The impacts associated with the implementation of the response strategies are considered to align with the principles of ESD based on the following: • long term and short term social, economic and environmental factors have been considered and management measures identified where appropriate • biological diversity and ecological integrity are not expected to be significantly impacted by the implementation of the identified response strategies
Legislative requirements	The controls implemented are consistent with the requirements of relevant legislation including: OPGGS Act
Internal requirements	• relevant corporate requirements to the gas export pipeline installation campaign, including the Communication and Stakeholder Engagement plans have been applied • all controls and EPOs have been assessed against internal requirements to verify alignment • oil spill preparedness and response strategies are considered applicable to the nature and scale of the risk and associated impacts of the response are reduced to ALARP • aligns with ConocoPhillips ABU-W HSEMS, ABU-W HSE and SD policy, culture and company standards and systems
External requirements	ConocoPhillips has: • consulted with relevant stakeholders and considered all statements and claims made during this process when assessing impacts and risks of the gas export pipeline installation campaign; and • assessed all controls and EPOs against outcomes from stakeholder consultation to ensure alignment. • Consultation in support of the EP has identified relevant and interested persons, such as wildlife management agencies and non-government organisation, that may have functions, interests and activities that relate to marine fauna. No claims or objections were raised in relation to the risk of response strategies options to marine fauna.
Environmental Performance Outcomes (Table 6-1)	
EPO 17 In the event of a hydrocarbon spill, ConocoPhillips will manage the risks of implementing appropriate response strategies to reduce the potential impacts to the environment.	

6 ENVIRONMENTAL PERFORMANCE OUTCOMES, STANDARDS AND MEASUREMENT CRITERIA

For each environmental aspect (risk) and the associated impacts, as identified and assessed in **Section 5**, specific EPO(s), EPSs and MC have been developed. The EPSs are related to the control measures that will be implemented to achieve the relevant EPO(s). The MC provide the evidence base to demonstrate that the EPOs and EPSs are being achieved.

This section details the EPOs, EPSs, and MC that have been developed as part of a systematic approach to the management of the environmental risks (**Section 5**) to ALARP and acceptable levels. The EPOs, EPSs and MC detailed in this EP are consistent with relevant legislation and other requirements (e.g. international conventions, guidelines etc.) and ConocoPhillips internal standards and procedures.

The 'Aspect-receptor reference' and EPO numbering have been included to provide a clear link to the environmental risk assessment (**Section 5**) and demonstrate that all risks have relevant EPOs and standards. The tables also identify key responsible and accountable personnel who will confirm that the records/documents required by the MC are captured and reflected in the appropriate internal and external environmental performance reports.

EPOs, EPSs and MCs applicable to oil pollution response are detailed separately in **Table 7-8.**

Table 6-1: Compiled list of Environmental Performance Outcomes, Standards and Measurement Criteria

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
Physical Presence					
Interactions between activity vessels, the gas export pipeline and other marine users	**EPO 1** No adverse interactions[5] between other marine users and activity vessels or the gas export pipeline	**C 1.1** Activity vessels equipped and crewed in accordance with Australian maritime requirements	**EPS 1.1.1** Vessels will be equipped and crewed in accordance with the *Navigation Act 2012* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 21 (Safety and emergency procedures) including: – safety measures such as manning and watchkeeping • Marine Order 27 (Safety of navigation and radio equipment) including: – radio equipment and communications, – navigation safety measures and equipment – danger, urgency and distress signals and messages. • Marine Order 30 (Prevention of Collisions) including: – Lights and signals as applicable to vessel class per COLREGS requirements • Marine Order 71 (Masters and Deck Officers) including: – All master, mate and watchkeeper officer duties undertaken by crew certified as applicable to vessel class per STWC requirements.	**MC 1.1.1.1** Records of ConocoPhillips Marine Vessel Vetting Process demonstrate compliance with SOLAS, COLREGS, STWC Convention and applicable Marine Orders **MC 1.1.1.2** Non-compliance with relevant Marine Orders 21, 27, 30 and 71 during the gas export pipeline installation campaign and corrective action undertaken documented	ConocoPhillips Marine Director

[5] Examples of adverse interactions may include substantiated complaints by other marine users to ConocoPhillips or NOPSEMA, vessel collisions, or damage to unsupervised fishing equipment (e.g. traps).

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 1.2 Undertake consultation with relevant persons (including applicable notifications) to support gas export pipeline installation campaign	**EPS 1.2.1** Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan.	**MC 1.2.1.1** Consultation records demonstrate implementation of a stakeholder consultation plan	ConocoPhillips External Relations Advisor
			EPS 1.2.2 Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities	**MC 1.2.2.1** Consultation records demonstrate AHS and AMSA MSI provided sufficient information to generate Notice to Mariners prior to relevant gas export pipeline installation activities	Vessel Master
			EPS 1.2.3 Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the AHO	**MC 1.2.3.1** Inspection of nautical charts confirms subsea infrastructure and gas export pipeline is marked appropriately.	ConocoPhillips HSE Manager
		C 1.3 PLET at the Bayu-Undan tie-in location has been designed with anti-snag protection.	**EPS 1.3.1** PLET at the Bayu-Undan tie-in Location is designed with anti-snag protection	**MC 1.3.1.1** Design drawings and as built surveys demonstrate PLET at the Bayu-Undan tie-in location designed and installed with anti-snag protection	ConocoPhillips Gas Export Pipeline Package Lead
		C 1.6 Anti-snag protection for mechanical support structures	**EPS 1.6.1** Anti-snag protection for any mechanical support structures installed shall be considered in detailed engineering and potential snagging mitigated accordingly.	**MC 1.6.1.1** Design drawings and as built surveys demonstrate snagging risk considered and mitigated accordingly.	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 1.4 One vessel will act as a surveillance vessel within the Operational Area during gas export pipeline installation.	**EPS 1.4.1** An activity vessel will act as a surveillance vessel within the Operational Area during gas export pipeline installation.	**MC 1.4.1.1** Vessel daily reports record activities.	ConocoPhillips Gas Export Pipeline Package Lead
		C 1.5 Communications plan will be implemented for engagement with marine users.	**EPS 1.5.1** Communications plan will be implemented for engagement with marine users.	**MC 1.5.1.1** Consultation records demonstrate implementation of a communication plan	ConocoPhillips External Relations Advisor
		C.1.7 Pipeline installation activities undertaken in accordance with ConocoPhillips's HSE Management and Marine Vessel vetting processes.	**EPS1.7.1** Pipeline installed in accordance with ConocoPhillips's HSE Management and Marine Vessel Vetting process, including the establishment of a 500 m exclusion zone.	**MC 1.7.1.1** Daily operational reports demonstrate the implementation of the 500 m exclusion zone around the pipelay and construction vessels	
Seabed disturbance	**EPO 2** Direct impacts to benthic habitats will be restricted to the footprint of the pipeline and supporting structures. Beyond the footprint of the pipeline and supporting structures impact will be limited to	**C 2.2** Confirmation of gas export pipeline route prior to and during installation	**EPS 2.2.1** Gas export pipeline route to be surveyed and confirmed prior to installation.	**MC 2.2.1.1** Records confirm pre-lay gas export pipeline route surveys completed	ConocoPhillips Gas Export Pipeline Package Lead
			EPS 2.2.2 Gas export pipeline position to be continuously verified during installation.	**MC 2.2.2.1** Records confirm gas export pipeline route surveys completed during installation	
		C 2.3 DP pipelay vessel will be used for installation of the pipeline	**EPS 2.3.1** Pipelay vessel will use DP at all times during pipelaying operations.	**MC 2.3.1.1** Records confirm DP pipelay vessel is contracted for gas export pipeline installation campaign.	

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
	localised, short term disturbance associated with suspension and deposition of surface sediment.	**C 2.4** DGPS for pipelay vessel to maintain accurate vessel position during installation	**EPS 2.4.1** Pipelay vessel will use DGPS at all times during pipelaying operations.	**MC 2.4.1.1** Contract specifies that pipelay installation vessel required to have DGPS.	ConocoPhillips Gas Export Pipeline Package Lead
		C 2.5 Survey technology used to ensure that all structures are installed within designed tolerances	**EPS 2.5.1** Checks prior to PLET installation to confirm: • DGPS used to confirm initiation structure position during installation • Underwater positioning system (USBL / LBL) and ROV to confirm PLET installation location and positioning (within required location accuracy to reduce disturbance to the seabed	**MC 2.5.1.1** Procedures require location of PLETs checked prior to installation. As installed records confirm pipeline location.	ConocoPhillips Gas Export Pipeline Package Lead
		C 2.6 Placement of initiation structure for pipelay initiation to avoid sensitive benthic habitats and mitigate initiation structure dragging	**EPS 2.6.1** Initiation structure plan developed based on pre-lay survey information and include: • Requirement for trained and experienced vessel crews • Continuous monitoring of initiation wire tensions to prevent drag on seabed during pipelay • Review of initiation structure plan to verify initiation structure location avoids sensitive habitat	**MC 2.6.1.1** Records confirm initiation structure plan is implemented and includes relevant requirements.	ConocoPhillips Gas Export Pipeline Package Lead
		C 2.7 No planned anchoring in the Habitat Protection Zone (IUCN	**EPS 2.7.1** All anchoring restricted to the areas beyond named banks and shoals.	**MC 2.7.1.1** Project documentation states no anchoring areas around banks and shoals	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		IV) -zone 2 of the Oceanic Shoals Marine Park or on named Shoals and Banks, unless it is required in an emergency	**EPS 2.7.2** Activity vessels shall not anchor in the Habitat Protection Zone (IUCN IV) -zone 2 of the Oceanic Shoals Marine Park, unless it is required in an emergency.	**MC 2.7.2.1** Project documentation states no anchoring within the Habitat Protection Zone of the Oceanic Shoals Marine Park	
		C 2.8 No pipeline installation activities within olive ridley turtles internesting BIA	**EPS 2.8.1** All gas export pipeline installation activities restricted to areas beyond the olive ridley turtle internesting BIA.	**MC 2.8.1.1** Pipeline alignment sheets demonstrate that pipeline route avoids olive ridley BIA	ConocoPhillips Gas Export Pipeline Package Lead
		C2.10 Sequence activities to minimise the time pipelay, and associated activities, are performed within peak internesting periods in important habitat for listed marine turtles.	**EPS 2.10.1** Planning for pipelay installation (including span rectification) shall consider turtle internesting season and activities shall be sequenced to avoid with peak periods where the pipeline integrity is not compromised as a result.	**MC 2.10.1.1** Pipelay installation schedule considers turtle peak internesting season and the direction of pipelay is selected to minimise the time pipelay, and associated activities, are performed within peak internesting periods in important habitat for listed marine turtles.	ConocoPhillips Gas Export Pipeline Package Lead
		C 2.11 Pre-lay and post-lay surveys at pipeline initiation structure location	**EPS 2.11.1** The pipeline initiation structure shall be placed on a bare area of seabed. **EPS 2.11.2** Pre and post-lay surveys of pipeline initiation location will be undertaken.	**MC 2.11.1.1** Records confirm pre-lay surveys of initiation structure location completed, and pipeline initiation structure placed on a bare area of seabed	ConocoPhillips Senior Client Site Representative

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C2.12 Span-specific rectification plans developed that include: • Pre-span method selection • Real-time monitoring of span rectification • Post-rectification inspections	**EPS 2.12.1** Span-specific procedures developed for all span rectifications that include: • Provision for real-time monitoring of span rectification activities • Post-rectification inspection of spans	**MC 2.12.1.1** Records confirm span rectification procedures developed	ConocoPhillips Gas Export Pipeline Package Lead
		C2.13 Limiting duration for continuous mass flow excavation at any one location.	**EPS 2.13.1** Mass flow excavation procedures, shall include the requirement to limit mass flow excavation at any one location to no greater than 12 hours within a 24-hour period.	**MC 2.13.1.1** Mass Flow Excavation procedures contain the requirement for limiting the duration of mass flow exaction to 12 hours within a 24 hour period.	ConocoPhillips Gas Export Pipeline Package Lead
Dropped objects	**EPO 8** No loss of equipment/cargo overboard from vessels resulting in a Consequence Severity greater than Minor	**C 8.1** Implement standards and procedures for lifting equipment	**EPS 8.1.1** ConocoPhillips will confirm the vessel procedures for lifting include • lifting operations to be undertaken by competent personnel • use of appropriate and certified lifting equipment and accessories • preventative maintenance will be undertaken on the key lifting equipment as per manufacturer's specifications • consideration of weather conditions (e.g. no heavy lifts undertaken in severe weather conditions)	**MC 8.1.1.1** Records demonstrate lifting procedures in place	Contractor Project Manager

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 8.2 Dropped objects recovered where safe and practicable to do so	**EPS 8.2.1** All dropped object incidents to assess the environmental risk and the potential to recover the object, and objects will be recovered where safe and practicable to do so.	**MC 8.2.1.1** Incident documentation details considerations and outcomes of recovery of dropped objects.	Contractor Project Manager
Introduction of invasive marine species	**EPO 9** Prevent the displacement of native marine species as a result of the introduction and establishment of IMS via activity vessels.	**C 9.1** Vessels equipped with effective anti-fouling coatings	**EPS 9.1.1** Vessels will have a suitable anti-fouling coating in accordance with the *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* (Cth) (as applicable for vessel size, type and class), including: • Marine Order 98 (Marine Pollution – Anti-fouling Systems) including (as required by vessel class): – A valid International Anti-fouling System Certificate	**MC 9.1.1.1** Non-compliances with Marine Order 98 during gas export pipeline installation activities and corrective action undertaken documented **MC 9.1.1.2** Records of valid vessel's International Anti-fouling Systems Certificates documented and saved on file	Vessel Master
		C 9.2 Vessels undertake ballast water management or treatment to achieve low-risk ballast water	**EPS 9.2.1** Ballast water discharges will comply with the requirements of the Australian Ballast Water Management Requirements, which implements the requirements of the *Biosecurity Act 2015* (Cth) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (as appropriate for vessel class), including:	**MC 9.1.2.1** Records of ballast water discharge logs to confirming no discharge within 12 nautical miles of coastlines including any ports and Ballast Water Management Plan documented and saved on file.	Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
			• No discharge of high-risk ballast water within 12 nautical miles of coastlines, including any ports; • Maintain a ballast water record system to record the management of all ballast water taken up and discharged; • Implementation of approved methods of ballast water management; • Vessel equipped with Ballast Water Management Plan; and • Vessels maintain a Ballast Water Recording System.	**MC 9.1.2.2** Internal inspections / audits confirm implementation of ballast water recording system and approved methods of ballast water management	
		C 9.3 Apply risk-based IMS management for vessels	**EPS 9.3.1** Vessels will comply with IMO Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (2011) (as appropriate to class), including: • Vessels equipped with a Biofouling Management Plan; and • Vessels maintain a Biofouling Record Book.	**MC 9.3.1.1** Records demonstrate compliance with Convention for the Control and Management of Ships' Ballast Water and Sediments 2004 – MARPOL 73/78 (as appropriate to vessel class), Australian Ballast Water Management Requirements and Biosecurity Act 2015	Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
			EPS 9.3.2 Vessels mobilised to the Operational Area from international or domestic waters will comply with the Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Department of Agriculture, Fisheries and Forestry 2009): • Completion of IMS Risk Assessment • Implement mitigation measures commensurate with the level of risk Only vessels classified as a low-level risk shall be used on the project.	**MC 12.3.2.1** Records demonstrate compliance with the Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry Commonwealth of Australia, 2008), including: • IMS Risk Assessment • implementation of mitigation measures commensurate with level of risk	Contractor Project Manager
		C 9.5 Marine Growth Prevention System	**EPS 9.5.1** Vessels will have a marine growth prevention system	**MC 9.5.1.1** Records of quarantine management system process demonstrate vessels have a marine growth prevention system	Contractor Project Manager

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
Collision with marine fauna	**EPO 10** Zero incidents of injury/mortality of cetaceans/marine reptiles from collision with activity vessels operating within the Operational Area	**C 10.1** Avoid activities near cetaceans and turtles	**EPS 10.1.1** Vessels, excluding vessels which are unable to alter path while performing operations, will comply with EPBC Regulations – Part 8 Division 8.1 Interacting with cetaceans (and applied for marine turtles), specifically: • Apply the following Caution Zones, as per the meaning of Division 8.1 of the EPBC Regulations: – 300 m for whales; – 150 m for dolphins; – 150 for turtles • When operating a vessel or equipment within a Caution Zone: – Operate the vessel or equipment at a constant speed of < 6 knots and minimise noise; – Make sure the vessel or equipment does not drift or approach closer than: ▪ 100 m for whales; ▪ 50 m for dolphins, turtles or whale sharks; – If the cetacean, turtle or whale shark shows signs of being disturbed, immediately withdraw (where safe to do so) from the Caution Zone at a constant speed of < 6 knots; • Post a lookout for cetaceans, turtles and whale sharks while within a Caution Zone; – Not approach, pursue or restrict the movement of cetaceans, turtles or whale sharks.	**MC 10.1.1.1** Non-compliances with EPBC Regulations– Part 8 Division 8.1 during gas export pipeline installation activities and corrective action undertaken documented	Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 10.2 HSE inductions which will include environmental requirements	**EPS 10.2.1** All crew will attend HSE inductions which will include environmental requirements as required by this Plan	**MC 10.2.1.1** Personnel training records documented and saved on file	Contractor Project Manager
		C10.3 Vessel speed restrictions within the Operational Area	**EPS 10.3.1** Vessel speeds with the Operational Area will limited to 8 knots or less.	**MC10.3.1.1** Speed limit requirements contained within project documentation	ConocoPhillips Gas Export Pipeline Package Lead
		C 2.8 No pipeline installation activities will occur in the olive ridley turtles internesting BIA at any time	**Refer to EPS 2.8.1**		

Risk / Impact	**Environmental Performance Outcome**	**Control**	**Environmental Performance Standards**	**Measurement Criteria**	**Responsible Person**
Discharges					
Activity vessels	**EPO 6** Reduce impacts to water quality from activity vessel discharges by maintaining discharge streams in accordance with standard maritime practices.	**C 6.1** Routine discharges of treated sewage, grey-water, putrescible waste, deck drainage, and bilge water in accordance with standard maritime practice	**EPS 6.1.1** Vessels shall be equipped and crewed in accordance with the *Navigation Act 2012* (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 91 (Marine Pollution Prevention – Oil), including (as required by vessel class):	**MC 6.1.1.1** Records of ConocoPhillips Marine Vessel Vetting Process demonstrate compliance MARPOL73/78 Annex I, Annex IV and Annex V, and applicable Marine Orders	ConocoPhillips Marine Director

			- Machinery space bilge/oily water shall have IMO approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure Oil in Water (OIW) content to be less than 15 ppm prior to discharge. - A deck drainage system capable of controlling the content of discharges for areas of high risk of fuel/oil/grease or hazardous chemical contamination. - Waste oil storage available - Valid International Oil Pollution Prevention (IOPP) Certificate. - Vessel Specific SOPEP - Oil record book maintained.	**MC 6.1.1.2** Non-compliances with Marine Orders 91, 95 & 96 recorded during gas export pipeline activities and corrective action undertaken documented	Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
			EPS 6.1.2 Vessels shall be equipped and crewed in accordance with the *Navigation Act 2012* (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 96 (Marine Pollution Prevention – Sewage) including (as required by vessel class): - a valid International Sewage Pollution Prevention (ISPP) Certificate; - an ASMA approved sewage treatment plant; - a sewage communiting and disinfecting system; - a sewage holding tank sized appropriately to contain all generated waste (black and grey water); - discharge of sewage which is not comminuted or disinfected will only occur at a distance of more than 12 nm from the nearest land; - discharge of sewage which is comminuted or disinfected using a certified approved sewage treatment plant will only occur at a distance of more than 3 nm from the nearest land.		Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
			EPS 6.1.3 Vessels shall be equipped and crewed in accordance with the *Navigation Act 2012* (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 95 (Marine Pollution Prevention – Garbage) including: - Putrescible waste and food scraps are passed through a macerator prior to discharge so that it can pass through a screen with no opening wider than 25 mm. - Garbage management plan in place. - Garbage record book maintained onboard.		Vessel Master
Pipeline dewatering and pre-commissioning fluids	**EPO 7** No impacts to the marine environment from pipeline discharges resulting in a Consequence Severity greater than Minor (2)	**C 7.1** Chemical Selection Procedure for all chemicals planned to be released to the marine environment	**EPS 7.1.1** All chemicals planned to be released to the marine environment will be assessed through the chemical selection procedure.	**MC 7.1.1.1** Records demonstrate the chemical selection procedure has been implemented for all relevant chemicals.	ConocoPhillips Environmental Advisor
		C 7.2 Bulk dewatering will occur at the FPSO PLET location	**EPS 7.2.1** The bulk dewater will occur at the FPSO PLET location.	**MC 7.2.1.1** Records demonstrate bulk dewatering was at the FPSO PLET location	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 7.3 Contractor FCGT procedures	**EPS 7.3.1** All FCGT will be conducted in line with the Contractor FCGT procedures. These will include: • metering of chemical injection volumes during flooding and hydrotest operations • dosing rates / optimised treatment rates for chemicals	**MC 7.3.1.1** Records demonstrate a FCGT procedure implemented which included metering of volumes.	ConocoPhillips Senior Client Site Representative
		C7.4 Vertical diffuser for all subsea discharges of treated seawater	**EPS 7.4.1** All subsea discharges of treated seawater will be through a vertical diffuser	**MC 7.4.1.1** Records demonstrate a vertical diffuser used for discharge of treated seawater.	ConocoPhillips Gas Export Pipeline Package Lead
Subsea release from an unplanned pipeline wet buckle event / stuck pig	**EPO 11** Zero unplanned discharge of chemicals to the marine environment as a result of contingency dewatering.	**C 7.1** Chemical Selection Procedure for all chemicals planned to be release to the marine environment	**EPS 7.1.1** Refer to **EPO 7**		
		C 7.3 Contractor FCGT procedures	**EPS 7.3.1** Refer to **EPO 7**		
		C 11.1 Pipeline designed with buckle arrests in deep water	**EPS 11.1.1** Buckle arresters installed as per design specifications.	**MC 11.1.1.1** Alignment sheets show buckle arresters locations.	ConocoPhillips Gas Export Pipeline Package Lead
		C 11.2 No discharge of chemically treated seawater in the Habitat Protection Zone of the Oceanic Shoals Marine Park	**EPS 11.2.1** No discharge of chemically treated seawater in the Habitat Protection Zone of the Oceanic Shoals Marine Park	**MC 11.2.1.1** Procedures contain requirement for no discharge of treated seawater within the Habitat Protection Zone of the Oceanic Shoals Marine Park	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 2.4 DGPS for pipelay vessel to maintain accurate vessel position during installation	**EPS 2.4.1** Refer to **EPO 2**		
		C 11.3 Pipeline Installation Procedures	**EPS 11.3.1** The contractor will have an installation procedure which will include: • Alarm systems for dynamic positioning to indicate loss of vessel position • Minimum tensioner alarms to ensure pipeline catenary is maintained • Visual monitoring of pipeline relative to stinger • ROV Touchdown monitoring • Rollerbox load monitoring	**MC 11.3.1.1** Installation procedures shall detail requirements implemented	ConocoPhillips Gas Export Pipeline Package Lead
Deck and minor subsea spills	**EPO 12** Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of gas export pipeline installation activities.	**C 12.1** Chemical and hydrocarbon storage areas designed to contain leaks and spills	**EPS 12.1.1** Selection of vessel contractor is subject to ConocoPhillips local and global marine vessel vetting processes, specifically: • Appropriate procedures for storage (e.g. bunding), labelling (including Safety Data Sheet (SDS) available) and handling of chemicals and hydrocarbons; • Completion of vessel OVID inspection and report; • Implementation of a Permit to Work (PTW) or equivalent authorisation process (e.g. JSA) for transfers of hydrocarbon / chemicals (refer to bunkering for bunkering-specific controls).	**MC 12.1.1.1** Records of Contractor vessel audits demonstrate compliance with chemical and hydrocarbon storage and handling requirements and Marine Order 91 and 93	Contractor Project Manager

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 12.2 Chemicals and hydrocarbons will be managed in accordance with standard maritime practices	**EPS 6.1.1** Refer to **EPO 6**		
			EPS 12.2.1 • Marine Order 93 (Marine Pollution Prevention – Noxious Liquid Substances) including (as required by vessel class): - International Pollution Prevention (IPP) Certificate.		
		C 12.3 Spill clean-up kits available in high risk areas	**EPS 12.3.1** Selection of vessel contractor is subject to ConocoPhillips local and global marine vessel vetting processes, specifically: • Spill kits stocked and ready for use by trained personnel.	**MC 12.3.1.1** Contractor vessel audit process confirm spill kits stocked and ready for use	
		C 12.4 Inspection and maintenance for all equipment using hydrocarbons and/or chemicals	**EPS 12.4.1** Selection of vessel contractor is subject to ConocoPhillips local and global marine vessel vetting processes, specifically: • Planned maintenance system in place on vessels	**MC 12.4.1.1** Records from ConocoPhillips vessel vetting process confirm PMS schedule adhered to	
		C 12.5 ROV operations undertaken in accordance with good industry practice	**EPS 12.5.1** Procedures for ROV operations including: • ROV inspections and maintenance • pre-mobilisation audit for all ROV systems	**MC 12.5.1.1** Procedures and audit records available for ROV operations	

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 7.1 Chemical Selection procedure for chemicals planned to be released to the marine environment	**EPS 7.1.1** Refer to EPO7		
		C 12.6 No Perfluorinated Chemicals (PFAS)/ Perfluorooctane sulfonate (PFOS) will be used in firefighting foam	**EPS 12.6.1** Fire fighting foams shall be free of PFAS and PFOS	**MC 12.6.1.1** MSDS for firefighting foam will confirm no PFAS or PFOS	ConocoPhillips Environmental Specialist

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
Loss of hazardous and non-hazardous wastes	**EPO 13** Zero unplanned discharge of hazardous and non-hazardous solid wastes into the marine environment as a result of gas export pipeline installation activities.	**C 13.1** All wastes managed in accordance with vessel waste management plan	**EPS 13.1.1** Vessels will be suitably equipped and crewed in accordance with the Navigation Act 2012 (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 95 (Marine Pollution Prevention – Garbage) including: - Garbage management plan in place. - Types of wastes that will be generated onboard and will require containment, transport and disposal at a licensed facility onshore - Procedures for handling, storage segregation and disposal of wastes - Maintenance of Garbage Record Book, recording the types and volumes of waste incinerated or disposed onshore - Garbage record book maintained onboard.	**See MC 1.1.1.1**	Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
			EPS 13.1.2 Vessels will be suitably equipped and crewed in accordance with the *Navigation Act 2012* (Cth) and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 94 (Marine Pollution Prevention – Packaged Harmful Substances) including (as required by vessel class): - no disposal of harmful substances (identified as marine pollutants in the IMDG Code) overboard - packaged harmful substances to be properly packed, marked, labelled, stowed and secured - any loss or discharge to sea of harmful materials will be reported to the AMSA RCC via a marine pollution report (POLREP).		Vessel Master
		C 13.2 HSE inductions – cover requirements e.g. label and cover waste skips and bins	**EPS 13.2.1** All crew will attend HSE inductions which will include requirements of the vessel waste management plan	**MC 10.2.1.1** Personnel training records documented and saved on file	Contractor Project Manager
		C 13.3 No end caps on pipes	**EPS 13.3.1** No end caps on pipe lengths that arrive in the Operational Area	**MC 13.3.1.1** Specifications require no end caps	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
Marine diesel release from vessel collision	**EPO 14** No marine diesel releases to the marine environment as a result of a vessel collision	**C1.1** Activity vessels equipped and crewed in accordance with Australian maritime requirements	**EPS 1.1.1** Refer to **EPO 1**		
		C 1.2 Undertake consultation with relevant persons (including applicable notifications) to support gas export pipeline installation campaign	**EPS 1.2.1, 1.2.2 and 1.2.3** **Refer to EPO 1**		
		C 1.4 One vessel will act as a surveillance vessel within the Operational Area during gas export pipeline installation.	**EPS 1.4.1** **Refer to EPO 1**		
		C 14.1 Implement the vessel SOPEP	**EPS 14.1.1** Implement the vessel SOPEP in the event of an MDO spill	**MC 14.1.1** Records demonstrate that the SOPEP was implemented	Vessel Master
		C 14.2 Implement tiered spill response in the event of an MDO spill	**EPS 14.2.1** Implement tiered spill response in the event of an MDO spill	**MC 14.2.1** Records demonstrate that spill response options are delivered in accordance with OPEP (BAA-100 0330)	ConocoPhillips Emergency Response Coordinator
		C 14.3 No IFO or HFO will be used in activity vessels	**EPS 14.3.1** No IFO or HFO in any activity vessel tanks.	**MC14.3.1.1** Contract specifies no IFO on board any activity vessels in the operational area	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
Hydrocarbon release from refuelling incident	**EPO 15** No hydrocarbon releases to the marine environment as a result of refuelling	**C 15.1** Vessel equipped and crewed in accordance with Australian maritime requirements	**EPS 6.1.1** Refer to **EPO 6**		
		C 12.3 Spill clean-up kits available in high risk areas	**EPS 12.3.1** Refer to **EPO 12**		
		C 15.2 Vessel-specific bunkering procedures and equipment consistent with ConocoPhillips marine vessel vetting requirements	**EPS 15.2.1** ConocoPhillips will confirm vessel bunkering procedures include: • defined roles and responsibilities – bunkering to be undertaken by trained staff • use of bunkering hoses that have quick connection couplings • Visual inspection of hose prior to bunkering to confirm they are in good condition and correct valve line up • Assessment of weather and sea state • Testing emergency shutdown mechanism on the transfer pumps • Established communication protocols between vessel master and personnel responsible for monitoring tank levels, leaks and overflows during bunkering operations. • Continual visual monitoring during diesel transfers of hoses, connections and tank levels to detect leaks and prevent overflows during bunkering operations.	**MC15.2.1.1** Vessel bunkering procedures in place.	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C14.2 Implement tiered spill response in the event of an MDO spill	**EPS14.2.1** Refer to **EPO 14**		
		C 15.3 No bunkering within 20 km of the Tiwi Islands whilst in the Operational Area	**EPS 15.3.1** All bunkering undertaken more than 20 km form the Tiwi Islands when vessel in the Operational Area	**MC 15.3.1** Bunkering procedures contain no bunkering within 20 km from Tiwi Islands when in the operational area	ConocoPhillips Gas Export Pipeline Package Lead
		C 15.4 Helicopter refuelling	Helicopter refuelling procedures to include: • a completed PTW and/or JSA for the activity. • continual visual monitoring of gauges, hoses, fittings and the sea surface during the activity. • hose and fittings checks prior to commencement of the activity. • weather conditions to be assessed prior to the activity.	**MC15.2.1.1** Helicopter refuelling procedures in place.	ConocoPhillips Gas Export Pipeline Package Lead
Atmospheric, Sound and Light Emissions					
Atmospheric emissions from vessels combustion engines and incinerators	**EPO 5** Reduce impacts to air quality from combustion engines and incinerators by maintaining	**C 5.1** Atmospheric emissions from combustion, incinerators and ODS managed in accordance with	**EPS 5.1.1** Vessels will be suitably equipped and crewed in accordance with the *Navigation Act 2012* (Cth), including implementing:	**MC 5.1.1.1** Records of ConocoPhillips Marine Vessel Vetting Process demonstrate compliance with MARPOL73/78 Annex VI and applicable Marine Orders	ConocoPhillips Marine Director

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
impacting on air quality.	atmospheric emissions in accordance with standard maritime practices	standard maritime practice	• Marine Order 97 (Marine Pollution Prevention – Air Pollution) including (as required by vessel class): – a valid International Air Pollution Prevention (IAPP) Certificate and / or Engine International Air Pollution Prevention (EIAPP) Certificate and / or International Energy Efficiency (IEE) Certificate – A Ship Energy Efficiency Management Plan (SEEMP); – Use of incinerators in accordance with Annex VI of the MARPOL Convention; – ODS record book; and – Use of low sulphur fuel	**MC 5.1.1.2** Non-compliances with Marine Order 97 during gas export pipeline installation activities and corrective action undertaken documented	Vessel Master
				MC 5.1.1.3 Record of the activity vessel OVID's obtained prior to mobilisation.	ConocoPhillips Marine Director
Atmospheric emissions from the release of dry gas impacting on air quality	**EPO 16** No releases of gas from the Bayu-Undan Pipeline to the environment	**C 8.1** Implement standards and procedures for lifting equipment	**EPS 8.1.1** Refer to ***EPO 8***		
		C16.1 Implement procedures for lifting over live infrastructure	**EPS 16.1.1** ConocoPhillips will confirm the vessel procedures for lifting over live infrastructure include • The vessel is offset from the Bayu-Undan pipeline • Then objects are slowly 'walked' to the target location at a reduced height above the seabed	**MC 16.1.1.1** Procedures in place for lifting over live infrastructure	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 16.2 Emergency response implemented to minimise potential for impacts in the event of a loss of containment from the Bayu-Undan Pipeline	**EPS 16.2.1** The Bayu-Undan Emergency Response Plan (ALL/HSE/ER/003) and the Pipeline Emergency Repair Management Plan (H8-10000005136) to be followed in the event of an impact to the Bayu-Undan Pipeline.		ConocoPhillips Senior Client Site Representative
Light emissions from vessels and ROV altering marine fauna behaviour	**EPO 4** No significant impacts to turtle populations from installation of the gas export pipeline	**C 2.8** No pipeline installation activities within olive ridley turtles internesting BIA	**EPS 2.8.1** Refer to **EPO 2**		
		C 5.9 The pipelay vessel will have an enclosed pipe welding deck.	**EPS 5.9.1** The pipelay vessel shall have an enclosed pipe welding deck to shield light emissions	**MC 5.9.1.1** Pipelay vessel specification demonstrate that the pipelay vessel has an enclosed pipe welding deck	ConocoPhillips Gas Export Pipeline Package Lead

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 5.10 Crew transfers or loading of supplies (not including linepipe deliveries) which require direction of floodlights outside vessel will not occur during hours of darkness within 10 km of turtle nesting beaches during peak hatchling season.	**EPS 5.10.1** During peak turtle nesting/hatching season, within 10 km from turtle nesting beaches, activities that require direction of floodlights outside the vessels (i.e. crew transfers or loading of supplies but excluding linepipe deliveries) shall not be undertaken during hours of darkness.	**MC 5.10.1.1** Daily operational reports confirm no crew transfers or supply loading undertaken during the hours of darkness during peak turtle nesting/hatching season, within 10km from turtle nesting beaches	ConocoPhillips Gas Export Pipeline Package Lead
		C2.10 Sequence activities to minimise the time pipelay, and associated activities, are performed within peak internesting periods in important habitat for listed marine turtles.	**Refer to EPS 2.10.1**		
		C 5.11 Vessel searchlights will only be operated in an emergency situation	**EPS 5.11.1** Vessel searchlights shall only be operated in an emergency situation	**MC 5.11.1.1** Audit confirms that the vessel master is aware that search lights are to be operated only in an emergency situation. Visual observations confirm that search light not illuminated during routine pipelay activities.	Vessel Master

Risk / Impact	Environmental Performance Outcome	Control	Environmental Performance Standards	Measurement Criteria	Responsible Person
		C 5.12 Minimise direct light spill on the ocean surface by adjusting orientation of lights and installing shielding when operating vessels within 10 km of marine turtle nesting habitat during peak hatchling emergence season.	**EPS 5.12.1** A qualitative assessment of vessel lighting shall be undertaken to identify any lights causing light spill overboard from the vessel. **EPS 5.12.2** Prior to entering within 10 km of marine turtle nesting beaches during peak hatchling emergence season, direct light spill on the ocean surface shall be minimised by adjusting orientation of lights and installing shielding where it does not impact safety.	**MC 5.12.1.1** Qualitative light assessment report identifies lights requiring reorientation or shielding. **MC 5.12.1.2** Prior to entering within 10 km of marine turtle nesting beaches, pipelay contractor confirms that light spill on the ocean surface minimised through adjusting orientation of lights and installing shielding	ConocoPhillips Gas Export Pipeline Package Lead
		C 5.13 Communicate the requirement and implement light management measures when operating vessels within 10 km of marine turtle nesting habitat during peak nesting and hatchling emergence season.	**EPS 5.13.1** Light management measures shall be implemented when operating vessels within 10 km of marine turtle nesting habitat during peak nesting and hatchling emergence season. Lighting management measures includes crew awareness through inductions and daily HSE meetings, the switching off of lights not operationally critical and the closing of curtains in sleeping accommodation.	**MC 5.13.1.1** Induction records and records of daily HSE meetings confirm that crew are aware of light management requirements when operating within 10 km of marine turtle nesting habitat during peak nesting and hatchling emergence season.	Contractor Project Manager
Underwater noise emissions	**EPO 3** No significant impacts to marine fauna from noise generated during the gas export pipeline installation campaign	**C 3.1** Maintaining helicopter separation from cetaceans as per EPBC Regulations	**EP 3 1.1** Helicopters will comply with EPBC Regulations– Part 8 Division 8.3 Interacting with cetaceans, specifically: • Helicopters shall not operate lower than 1650 feet or within a horizontal radius of 500 m of a cetacean known to be present in the area, except for take-off and landing.	**MC 3.1.1.1** Records demonstrate no breaches of EPBC Regulations– Part 8 Division 8.1 Interacting with cetaceans	Helicopter Pilot

7 IMPLEMENTATION STRATEGY

This section details the implementation strategy for the activity, as required under Regulation 14 of the OPGGS(E) Regulations. The implementation strategy describes the arrangements for monitoring, review and reporting of environmental performance and the strategy to confirm that the controls are implemented, maintained and effective for the in-force period of the EP. This will allow environmental impacts and risks to be continually managed to a level that is ALARP and acceptable, and EPOs and environmental performance standards to be met.

The implementation strategy includes roles/responsibilities and training/competency requirements for all personnel (ConocoPhillips and contractors) in relation to:

- implementing controls;
- managing non-conformance;
- emergency response; and
- meeting monitoring, auditing, and reporting requirements.

ConocoPhillips, as one of the future titleholders, is responsible for ensuring that the activity is carried out in accordance with the implementation strategy and ConocoPhillips' ABU-W HSEMS.

7.1 ConocoPhillips Health, Safety and Environmental Management System

At ConocoPhillips, a HSEMS provides a systematic process to identify, assess, and manage the operational risks to the business, employees, contractors, stakeholders and the environment. The routine application of a HSEMS provides ongoing identification, prioritisation and control of these risks.

The Corporate HSEMS Standard (Issue No. 3.1, October 2014) establishes a continuous improvement process for the implementation of the HSE Policy, leadership expectations, and SPIRIT values (i.e. Safety, People, Integrity, Responsibility, Innovation and Teamwork, **Figure 7-1**). It also defines the framework and requirements for each element within each Business Unit's (BU's) HSEMS to ensure that HSE issues are managed in a consistent manner across the ConocoPhillips companies.

Figure 7-1: ConocoPhillips SPIRIT values

The HSEMS is implemented through a hierarchy of policies and procedures that cascade from the corporate level through to the BU's and their individual operating assets. The system has four distinct phases and 15 interrelated elements, as shown in **Figure 7-2**, with each phase of the process building on the previous phases:

- PLAN: hazards, risks, and regulatory requirements are identified in these elements. These elements also identify the risk mitigation requirements that will be built-out in the DO phase and provide for the establishment of strategic plans, goals and objectives.
- DO: describes the specific implementation tools needed to manage the risks and requirements identified in the PLAN phase.
- ASSESS: describes detailed monitoring and auditing to ensure that risks and requirements are being identified, assessed, and managed.
- ADJUST: provides for modification of the HSEMS and its implementation to adjust for strengths, gaps and opportunities for improvement identified in the ASSESS phase.

Figure 7-2: Overview of ConocoPhillips HSEMS

The ABU-W HSEMS has a consistent content to the Corporate HSEMS 15 element model, with further detail on the individual elements provided below in **Section 7.1.1**.

In an ABU-W context, the policies and procedures are framed and implemented within the ABU-W HSEMS, which is aligned to the Australian Standards/New Zealand Standards (AS/NZS) ISO 14001:2004 Environmental Management Systems Standard. The ABU-W HSEMS outlines the key HSE processes and requirements for all HSE related activities for the ABU-W, including the broader aspects of plant equipment/infrastructure, programs and procedures, people, management of change and their interactions. This HSEMS also maps out how ABU-W meets the corporate HSEMS standard.

The core objectives of the ABU-W HSEMS are to support implementation of the ABU-W HSE and Sustainable Development (HSE&SD) Policy and the ConocoPhillips SPIRIT values and to provide a consistent framework and approach for effective management of HSE. The ABU-W HSEMS applies to all ConocoPhillips ABU-W owned and/or operated facilities/locations and allows activities to be conducted in a safe, healthy, and environmentally conscious manner. The overarching intent of the HSEMS is to protect people, assets and the environment.

7.1.1 ConocoPhillips ABU-W HSEMS Elements

7.1.1.1 Element 1: Policy and Leadership

This element defines expectations for the ABU-W HSE policy and leadership requirements for supporting a strong HSE culture, ensuring compliance with HSE requirements and driving HSE excellence.

The HSE&SD Policy (**Figure 7-3**) establishes the expectations, principles of operation and desired outcomes for the ABU-W.

7.1.1.2 Element 2: Risk Assessment (and Management)

This element defines the HSE&SD risk management requirements outlined in the ABU-W HSEMS.

The ABU-W seeks to maintain the health and safety of its employees and minimise environmental impact through the active and progressive elimination of hazards and the reduction of risk in the work place. This objective is achieved at all ABU-W facilities and sites through a systematic and integrated approach to risk management to reduce risks to a level that is ALARP.

The Barossa Hazard and Impact Analysis Procedure (BAA-100 0081) outlines the risk assessment process, including for environment and sustainable development assessments for Barossa activities and is consistent with ABU-W Risk Management Procedure (ALL/HSE/PRO/040).

Section 5 provides a full summary of the risk approach undertaken for this EP.

7.1.1.3 Element 3: Legal Requirements and Standards of Operation

This element establishes requirements for maintaining a process to monitor changing laws/regulations and site activities, and assigning responsibilities to help assure compliance with legal requirements (e.g. laws, regulations, permits or project approvals and commitments made in permit applications) and standards of operation (e.g. relevant ConocoPhillips and industry standards and/or design codes) applicable to the ABU-W.

All aspects of ABU-W operations (including project design, construction, commissioning, and operation and decommissioning) are compliant with relevant International, Commonwealth, State and Territory requirements, codes and standards of operation.

The ABU-W HSE Legal Requirements Identification and Monitoring Procedure (ALL/HSE/PRO/087) outlines the process for monitoring changing legal requirements and achieving legal compliance. Additionally, for all Barossa activities, the Barossa Regulatory Requirements Database, Barossa Regulatory Approvals Plan (BAA-100 0217) and the Barossa Regulatory Approvals Register and Schedule (BAA-100 0218) will track changing legal requirements and achieve regulatory compliance,

7.1.1.4 Element 4: Strategic Planning, Goals and Objectives

This element establishes the requirements associated with HSE planning and goal setting. Planning at ConocoPhillips cascades from the Corporate level to the BU level (including the ABU-W) and then to individual functions, including HSE, Governance and Capital Projects.

The ABU-W HSEMS defines and implements a strategic HSE&SD planning, goals and objectives process. The ABU-W HSE planning process includes a strategic HSE Plan that is developed, resourced, communicated and measured to contribute to continuous HSE improvement and the reduction of HSE risk.

7.1.1.5 Element 5: Structure and Responsibility

This element establishes requirements to define and manage roles, responsibilities, accountabilities, employee engagement, and interrelationships.

The ABU-W maintains a structured organisation to manage all HSE issues that impact on, or have the potential to impact, ConocoPhillips including:

- maintaining a specialist HSE team with specialists deployed to project and operations groups as required;
- communicating organisation charts outlining the resourcing and management structure for ABU-W;
- HSE Committees that function at multiple levels to review and manage HSE related issues;
- conducting management reviews of the ABU-W HSEMS to assess resource needs;
- implementing specific processes which identify and effectively communicate roles, responsibilities and accountabilities associated with critical equipment and systems including via inductions, on-boarding processes and competency training programs; and
- documenting roles, responsibilities and accountabilities, as they relate to the HSEMS and the HSE&SD Policy, in various HSEMS documents.

7.1.1.6 Element 6: Programs and Procedures

This element establishes requirements to develop and implement, within the ABU-W HSEMS, programs and documented procedures to ensure compliance with legal requirements and standards of operation and to manage HSE risk. All ABU-W HSE procedures are maintained on the ABU-W (HSE) intranet site and accessible to the business.

Documented ABU-W HSE programs and procedures, relevant to operational activities, are established and maintained to manage significant risks and comply with legal requirements and standards of operation. These programs, processes and procedures are made easily accessible to relevant employees and contractors and are reviewed at an appropriate BU level in accordance with a defined review schedule. The ABU-W employs competent people capable of identifying and implementing programs and procedures to facilitate HSE compliance and continuous improvement.

7.1.1.7 Element 7: Asset and Operating Integrity

This element establishes standards for BU development, implementation and maintenance of its Asset and Operating Integrity (A&OI) programs to:

- properly managed risks associated with operations, equipment failure or uncontrolled loss of primary containment; and
- establish within the ABU-W a clear understanding of its assets, failure mechanisms and their consequences/associated risks.

The ABU-W A&OI philosophy is communicated and fully integrated through the implementation of various A&OI programs, processes and procedures that define and manage the integrity of ABU-W assets and operations across the life cycle and comply with legal requirements (including statutory inspections, e.g. vessels) and standards of operation. These programs and procedures include:

- procurement and pre-construction HSE assessment (e.g. design considerations);
- identifying and documenting major accident hazards, safety critical elements and technical performance requirements;

- process, mechanical instrumentation and electrical system documentation;
- commissioning and pre-start up review;
- structural integrity systems;
- safe work practices;
- hazard registers;
- SAP maintenance system;
- operating and maintenance procedures and programs; and
- management of change procedures.

The A&OI programs are reviewed and updated by technically competent personnel to manage the risks associated with the asset life cycle. This process involves application of appropriate controls and A&OI integrity management performance measures, and engagement of ConocoPhillips personnel/contractors through communication of the aims and goals established for the management of technical integrity.

7.1.1.8 Element 8: Emergency Preparedness

This element defines the Crisis Management and Emergency Response (CM&ER) planning and preparedness requirements for ConocoPhillips operated assets and the Crisis Management support functions provided and coordinated from ConocoPhillips Corporate Headquarters.

All reasonably foreseeable crisis and emergency situations are identified via appropriate systematic review and analysis processes, with results documented in facility/project specific CM&ER processes and systems.

The ABU-W Crisis and Incident Management Plan (ALL/HSE/ER/001) defines the organisational responsibilities, actions, reporting requirements and management processes to be applied in the event of an emergency or crisis occurring. Crisis and emergency response is managed by a hierarchy of teams within the ABU-W, e.g. a facilities-based Emergency Response Team (ERT), an Incident Management Team (IMT) and Crisis Management Team (CMT).

The corresponding Oil Pollution and Emergency Plan (**Appendix H**) has been developed in accordance and to align with the ABU-W Incident Management Plan.

7.1.1.9 Element 9: Awareness, Training and Competency

This element establishes the requirement that all employees, contractors, and visitors have the necessary awareness, training, and competency to perform their activities consistent with the Company HSE Policy, standards, and procedures.

The ABU-W implements a documented training and competency system to confirm that employees/contractors have the required training and competency to fulfil their duties in a safe, environmentally and socially responsible manner. The system addresses:

- employee selection and identification of training, competence and development needs;
- contractor evaluation and management;
- employee orientation;
- operator or mechanical skills training and qualification;
- development and maintenance of training resources and records; and
- demonstration of competency.

The level of training and competency required at ABU-W facilities is based on the degree of risk and the complexities of the actions required to control or mitigate the risk. Measures are put in place to assess the competency of those trained and to determine the effectiveness of implemented training programs. Managers are personally responsible for ensuring that the ABU-W complies with ConocoPhillips Corporate and Regulatory training and competency requirements. Further information of training and competency requirements is provided in HSE Training and Competency procedure ALL/HSE/PRO/089.

7.1.1.10 Element 10: Non-Conformance, Incident, and Near Miss Investigation and Corrective Action

Through this element, the ABU-W implements a systematic approach so that all incidents and near misses are consistently, methodically and effectively investigated, as appropriate to their risk or potential severity. All incidents including near misses are reported, investigated in a timely manner and analysed to identify corrective actions/preventive measures to prevent recurrence and continuously improve HSE performance. Incident investigations are documented using a database to track actions and enable sharing of learnings. The ABU-W Incident Reporting and Investigation Procedure (ALL/HSE/PRO/003) is the key document which outlines these requirements. For Barossa activities, the Barossa Incident Reporting Procedure (BAA-100 0297) will be implemented and is consistent with the ABU-W Incident Reporting and Investigation Procedure.

Non-conformances may be identified through audits, observations or incident reports. Actions to address non-conformances are developed following the same process applied to address root causes of incidents.

Key performance indicators are in place to track and report the status of actions arising from incidents and audits.

7.1.1.11 Element 11: Communication

This element sets the requirements for the communication of information within the Company and engagement with external stakeholders.

The ABU-W actively seeks and obtains the co-operation and involvement of ABU-W personnel in promoting and improving HSE management and communication. Workers and technical experts are consulted when new HSE procedures or processes are developed or changes to the HSEMS occur (including risk management processes).

Internal Communication

The ABU-W has processes and procedures to facilitate effective internal communication of HSE&SD-related issues at ConocoPhillips Corporate, BU, project and operations levels. Examples include, but are not limited to, office and facility inductions, HSE Intranet websites with performance metrics, programs and procedures, ABU-W HSEMS Manual and HSE Procedures, HSE bulletins and safety moments, hazard reporting and issue resolution procedures and training programs and processes.

External Communication

The ABU-W is committed to ongoing, active, transparent and collaborative consultation with stakeholders throughout the lifecycle of its projects and operations. Accordingly, the ABU-W has developed processes and procedures to manage stakeholder relations, to understand and respond appropriately to their diverse and evolving expectations via free and open communication.

External communication processes define responsibility and chain of control for receiving and handling inquiries is defined in external communication processes and the ABU-W documents and tracks the receipt, response, and status of inquiries from external parties.

Refer to **Section 8** for an overview of the consultation program of relevance to this EP.

7.1.1.12 Element 12: Document Control and Records Management

This element establishes the requirements for management and control of HSEMS documents and records.

The ConocoPhillips HSE Documents and Records Management (BAA-100 0002) is implemented to efficiently manage key documentation, including confirming that it remains accurate, current and available to required personnel. Documents and records, including procedures, work instructions and other information necessary to carry out work activities, are retained to corporate and legislative requirements. Documents are also periodically reviewed and revised as necessary, with current versions made available and obsolete documents removed or identified and retained (where necessary) for legal use.

Key ABU-W document control and records management processes include HSE procedure review and update schedules, document retention codes, management of change procedures, HSE Controlled Documents Registers and Document Management System. Further detail is provided in HSE Documents and Records Management Procedure (BAA-100 0002).

7.1.1.13 Element 13: Measuring and Monitoring

This element defines the requirements for measuring and monitoring ABU-W HSE performance, providing assurance of compliance, assessing the effectiveness in meeting the ConocoPhillips' goals and legal obligations, and identifying opportunities for improvement.

The ABU-W has developed processes for measuring and monitoring HSE performance, evaluating the achievement of HSE goals and objectives, identifying opportunities for improvement and providing assurance of compliance. Leading and lagging performance measures are developed, identified and tracked to provide timely information to manage trends and impacts and to establish future goals and direction. Processes are also in place to measure and monitor project operations and activities, as per the ConocoPhillips Projects HSE Management System Manual (ALL/HSE/MAN001).

Key ABU-W processes for the measuring and monitoring HSE performance include development and implementation of HSE Strategic Plans, ABU-W competency assurance management, HSE committees and meetings, key performance indicators, environmental monitoring and reporting procedures, Asset Integrity and Process Safety Management System and contractor performance monitoring.

7.1.1.14 Element 14: Audits

This element establishes requirements for audit programs that assess the adequacy and effectiveness of HSE controls. The audit program also identifies any non-conformances within the HSEMS. The ABU-W implements and maintains a program for the planning, preparation, execution, reporting and close-out of HSE audits carried out across all areas of the ABU-W including Capital Projects.

The ABU-W HSE auditing process consists of a three-tier auditing hierarchy:

- Tier 3 – External to the BU (corporate, regulatory bodies and other external bodies);
- Tier 2 – Internal to the BU, independent to facility/project (HSEMS and A&OI MS policies and procedures); and
- Tier 1 – Workplace inspections (workplace hazard identification and control).

The ABU-W HSE Auditing and Inspection Procedure (ALL/HSE/PRO/031) provides methods and guidance for the implementation and execution of Tier 1, 2 and 3 auditing and inspection processes. An ABU-W Tier 1, 2 and 3 audit schedule is prepared on a three-year rolling plan basis and allows for an audit of all elements of the ABU-W HSE Management System over a three-year period. The schedule outlines which management system elements are to be audited in each year and refers to the applicable HSE Management System procedures. Once approved, the audit schedule is included in planning processes for the respective facilities and areas of operation for the coming year.

7.1.1.15 Element 15: Review

This element establishes requirements to review the content and functionality of the HSEMS to ensure there is a functioning and systematic process in place so that HSE&SD risks are identified and managed to achieve the Company and BU HSE&SD goals and objectives.

With participation from the most senior leadership positions, the ABU-W implements a documented annual HSE and A&OI Review Process for the review of the ABU-W HSEMS. The reviews are conducted by defined groups, teams, or committees (including HSE Steering Committees), with results reported to, and reviewed by, ABU-W management.

The review process considers applicable HSEMS data and outputs and includes a consideration of:

- results of internal audits and evaluations of compliance with legal and other requirements;
- communications from external interested parties, including complaints;
- the environmental performance of the organisation;
- the extent to which objectives and targets have been met considering changing circumstances and commitment to continuous improvement;
- status of corrective and preventive actions from investigations and audits;
- follow-up actions from previous management reviews;
- significant issues from risk assessments;
- resource allocation for system implementation and maintenance;
- incidents; and
- recommendations for improvement.

The outcomes and decisions made in these reviews are distributed to appropriate management and planning teams. This ensures that the 'adjust' phase of the HSEMS process may feed into the 'plan' phase, closing the loop on the plan, do, assess, and adjust cycle of continuous improvement (**Figure 7-2**).

7.1.2 ConocoPhillips ABU-W Health, Safety, Environment and Sustainable Development Policy

The ConocoPhillips' ABU-W HSE&SD Policy (HSEMS Element 1), as presented in **Figure 7-3**, establishes the expectations, principles of operation and desired outcomes for the ABU-W. The policy is distributed to all ABU-W facilities and contracted parties and is displayed prominently at work sites. Inductions to the ABU-W facilities/projects include presentation and discussion of the HSE&SD Policy.

ConocoPhillips
Australia

AUSTRALIA BUSINESS UNIT - WEST
HEALTH, SAFETY, ENVIRONMENT POLICY

Our Commitment

ConocoPhillips is committed to protecting the health and safety of everybody who plays a part in our operations, lives in the communities in which we operate or uses our products. Wherever we operate, we will conduct our business with respect and care for both the local and global environment and systematically manage risks to drive sustainable business growth. We will not be satisfied until we succeed in eliminating all injuries, occupational illnesses, unsafe practices and incidents of environmental harm from our activities. No work is so urgent or important that we cannot take the time to do it safely or in an environmentally prudent manner.

Our Plan

- Demonstrate visible and active leadership that engages employees and service providers, and manages health, safety and environmental (HSE) performance as a line responsibility with clear authorities and accountabilities.
- Ensure that all employees and contractors understand that working safely is a condition of employment, and that they are each responsible for their own safety and the safety of those around them.
- Maintain "stop work" policies that establish the expectation and authority for all employees and contractors to stop work they believe to be unsafe.
- Report all incidents in a timely manner and treat all incidents as opportunities to learn and prevent recurrence.
- Promote a learning culture by proactively encouraging near miss reporting with specific focus on Process Safety.
- Safeguard our operations from Process Safety incidents by ensuring the integrity and reliability of our equipment and operational capability.
- Manage all projects, products and processes through their life cycles in a way that protects safety and health and minimises impacts on the environment.
- Provide employees with the capabilities, knowledge and resources necessary to instill personal ownership and motivation to achieve HSE excellence.
- Provide relevant HSE information to contractors and require them to provide training for the safe, environmentally sound performance of their work.
- Measure, audit and publicly report HSE performance and maintain open dialogue with stakeholder groups and with communities where we operate.
- Comply with applicable regulations and laws.
- Work with governments, stakeholders and industry to develop regulations and standards that improve the safety and health of people and the environment.
- Maintain a secure work environment to protect ourselves, contractors and the Company's assets from risks of injury, property loss or damage resulting from hostile acts.
- Communicate our commitment to this policy to subsidiaries, affiliates, contractors and governments worldwide seeking their support.

Our Expectations

Through implementation of this policy, ConocoPhillips seeks to earn the public's trust and to be recognized as the leader in HSE performance.

Chris Wilson President	David Boyle VP Operations, Drilling & Supply Chain	Michael Mindrup VP Finance	Richard Brazier VP HSE	Frank Krieger VP Exploration & Development	Steve Ovenden VP Barossa
David Bridges VP Legal	Kayleen Ewin VP Sustainable Development, Communications & External Affairs	Jose Lobato Goncalves Timor-Leste Country Manager	Mike Nazroo VP Commercial	Alison Smith VP Human Resources	Sanjay Mehta AP & ME Regional IT Manager

January 2019

Figure 7-3: ConocoPhillips ABU-W HSE Policy

7.2 Other Supporting Management Processes and Procedures

In addition to the HSEMS, ConocoPhillips has several supporting management processes and procedures that outline how it undertakes its business.

7.2.1 ConocoPhillips Life Saving Rules

ConocoPhillips has established a set of life saving rules (**Figure 7-4**) to help strengthen existing HSEMS barriers globally and drive appropriate HSE critical behaviours and practices at the ABU-W level. The lifesaving rules provide a specific rule-set for high-risk work activities and serve to ensure people, the environment and assets are protected during higher risk activities. They align with the ConocoPhillips' Safety Motto and Target Zero campaign, strengthen the corporate HSE culture, and communicate expectations to employees, contractors and partners.

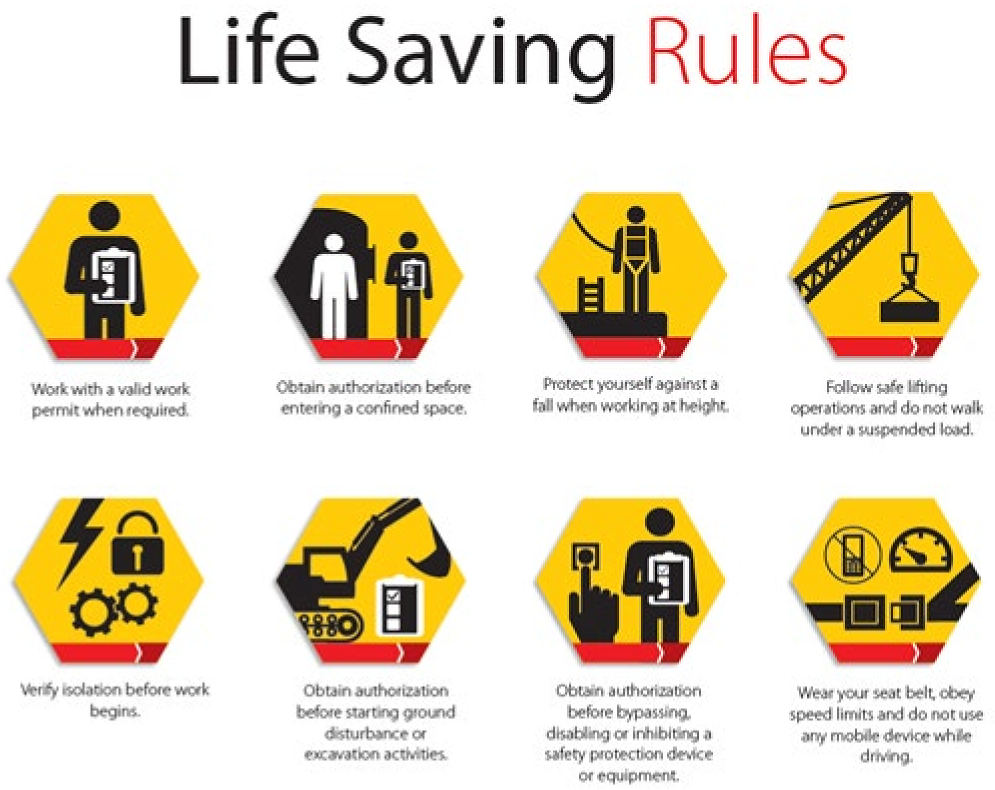


Figure 7-4: ConocoPhillips Life Saving Rules

7.2.2 Contractor HSE Requirements

In support of the Corporate HSEMS Standard, the Corporate Contractor HSE Standard (Issue No. 3, May 2008) establishes the minimum requirements and expectations for HSE management of Contractors and subcontractors. In addition, Barossa has dedicated HSE Exhibit for the subsea and pipeline scopes of work. The HSE Exhibit has a detailed environmental requirements section (HSE Exhibit D-3). This Exhibit contains the following:

- Contractor to determine environmental risks and proposed controls;
- Understand and comply with applicable environmental legislation;
- Contractor Group to have involvement in meeting environmental requirements;
- EMS used to manage environmental risks;
- Key activities to support continuous environmental improvement;
- Definition of the operational area of the work;
- Chemical selection and approvals;

- Prohibits materials and chemicals;
- Vessel requirements; and
- Additional environmental requirements for transferring line pipe in sheltered waters.

For ABU-W, the HSE requirements for contracts/contractor management during pre-contract planning, contracting, contract execution and contract completion and evaluation are outlined in the HSE Contractor HSE Management Process document. It includes the following minimum requirements:

- Contractors to comply with all applicable HSE laws and regulations and any additional guidelines, operating standards and policies provided to the Contractor;
- A review of the Contractor HSE Management System is completed before being contracted; and
- Provisions for ConocoPhillips to conduct audits/inspections of the Contractor's operations, equipment and emergency procedures at any time.

7.2.3 ConocoPhillips Marine Vessel Vetting Process

ConocoPhillips manages marine vessel vetting and assurance using a hierarchy of procedures, outlined below. These requirements for vessel acceptance criteria include technical, personnel (e.g. crew competencies) and operational requirements for marine vessels engaged by ConocoPhillips.

7.2.3.1 Marine vetting and audit process manual for offshore vessels

ConocoPhillips Marine Vetting and Audit Process Manual for Offshore Vessels (GM-PRO-MA-001) is a ConocoPhillips global standard that requires all vessels (including MODUs) used by ConocoPhillips to be vetted. The vetting process is based on industry standards and best practices along with considerations of guidelines and recommendations form recognised industry organisations such as Oil Companies International Marine Forum (OCIMF) and International Maritime Contractors Association (IMCA), and international regulatory agencies like the International Maritime Organization (IMO) and vessel Classification Societies.

The Marine Vetting and Audit Process Manual for Offshore Vessels (GM-PRO-MA-001) requires a valid Offshore Vessel Inspection Database (OVID) report or Common Marine Inspection Document (CMID) report as required for vessel operation types.

For vessels where the OVID and/or CMID are not valid or available, a ConocoPhillips Approved Inspection Report is required.

7.2.3.2 Vetting Exception Request Process

The Vetting Exception Request Process (GM-PRO-MA-006) is a global process to be used only in exceptional circumstances when a justifiable case exists for contracting a vessel rejected through the ConocoPhillips vetting process and is only to be used when no other approved document or equipment is available in the time required and rejecting the vessel would have significantly impeded operations.

An exception request will at no time conflict with the ConocoPhillips HSEMS. An exception requires the development of a risk assessment and risk mitigation plan.

7.2.3.3 Barossa Field Marine Operations Manual

The Barossa Field Marine Operations Manual (BAA-100 0273) details:

- Standard operating procedures for all vessels under contract with ConocoPhillips ABU-W.
- Compliance requirements for relevant maritime legislation and relevant guidelines, standards and codes.
- Compliance requirements for international conventions and agreements, including, but not limited to:

  - International Convention for the Safety of Life at Sea (SOLAS), 1974 and its Protocol of 1988;
  - International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78);
  - the Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGS); and
  - International Convention on Standards of Training, Certification and Watchkeeping (STCW) for Seafarers, 1978.
- Compliance requirements for industry standards as set up by:
  - Oil Companies International Marine Forum (OCIMF);
  - International Marine Contractors Association (IMCA);
  - Guidelines for Offshore Marine Operations (GOMO); and
  - Nautical Institute;
- ConocoPhillips and contractor standards, procedures and best practice management, including, but not limited to:
  - vessels' safety of navigation; vessels' using DP systems;
  - vessels' bunkering procedures;
  - crew competency and training records;
  - biosecurity management;
  - chemical storage and handling procedures;
  - discharge management procedures;
  - waste management procedures;
  - anchoring procedures; and
  - vessel and equipment maintenance procedures as per the vessel specific safety management system.

ConocoPhillips carries out a risk assessment or HSE Qualification Evaluation process for each vessel to identify any HSE issues or specific management requirements prior to commencing activities.

7.2.4 ConocoPhillips Waste Management Process

The Corporate HSE Waste Management Standard (Issue No. 1.2, December 2010) establishes a requirement to evaluate the suitability of industrial waste facilities used by ConocoPhillips and to only use those that are company approved. It applies to captive waste management units (owned or operated by ConocoPhillips or one of its subsidiaries) or commercial waste management facilities (not owned or operated by ConocoPhillips) where industrial wastes and residuals, generated by ConocoPhillips or its contractors, are subsequently managed.

ABU-W is responsible for evaluating the suitability of the waste facilities and the ABU-W Waste Management Plan outlines the requirements for the management of wastes produced by ConocoPhillips operated facilities, including compliance assurance processes (monitoring, auditing and reporting).

7.2.5 Ballast Water Management

7.2.5.1 Summary of Requirements

The Australian ballast water requirements set out the obligation on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas. All internationally operating vessels entering Australia will require:

- an approved Ballast Water Management Plan;

- maintenance of a complete and accurate record of all ballast water movements including those conducted in Australian waters; and
- an international Ballast Water Management Certificate.

Ballast water exchange should be conducted in areas at least 12 nautical miles from the nearest land and in water at least 50 metres deep. Volumetric exchange must be at least 95% of the relevant tank.

Records on ballast water exchange shall include the start and finish times and geographic co-ordinates of the operation.

All ballast water management equipment such as pumps will be maintained as per the vessel preventive maintenance system and regularly tested to ascertain accurate calculations for ballast water exchange operations.

7.2.5.2 Australian Pre-Arrival Report

All international vessels must submit a Ballast Water Report and a Pre-Arrival Report (PAR), 96 to 12 hours prior to arriving in an Australian port through the Maritime Arrival Reporting System (MARS), for the Australian Department of Agriculture to review and process.

MARS is the online portal for commercial Vessel Masters and Shipping Agents to submit reports required of all international vessels seeking Australian biosecurity clearance; and request services such as coastal strip, waste removal, ship sanitation certification and crew change.

Department of Agriculture will request the following evidence from vessels with a ballast water management system:

- valid ballast water management plan specific to the vessel (consistent with the Convention);
- valid ballast water management certificate, or certificate of compliance, that is approved by a port state administration, or a recognised survey authority (consistent with the Convention); and
- ballast water management records that clearly demonstrate the BWMS has been operated consistent with the ballast water management plan.

A Department of Agriculture biosecurity officer will board the vessel to verify the Pre-Arrival Report and Vessel Master must ensure the vessel and personnel are available and able to demonstrate proficiency in the operation and maintenance of the ballast water management system.

7.2.6 Biofouling Management

IMS may be present as biofouling on the vessel hull, or within piping, sea chests etc. The biofouling which may be found on and in a vessel reflects the vessel's design, construction, maintenance and operations. Each of these aspects introduces particular biofouling vulnerabilities but also offers opportunities to limit the extent and development of biofouling, with commensurate reduction in biosecurity risks.

7.2.6.1 Vessel Risk Assessment

Vessels mobilised to the Operational Area from international or domestic waters will comply with the Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Department of Agriculture, Fisheries and Forestry 2009). This includes:

- completion of a biofouling risk assessment; and
- implementation of mitigation measures commensurate with the level of risk.

Figure 7-5 presents the risk assessment process. Factors that will inform risk are:

- timing of marine pest risk assessment relative to vessels selection and movement to the title area to ensure there is sufficient time to implement control measures in cases where management is warranted;
- history of the vessels including time spent in ports of call since last dry dock and clean to inform whether the facility or vessel may have been exposed to high risk ports/locations;
- level of biofouling and the presence of species of concern (in particular the presence of marine pests) within biofouling communities on the vessels associated with the activity (often informed by biofouling record books and / or maintenance / cleaning or inspection programs);
- operational profile relevant to biosecurity risk such as operating speed, time alongside a facility and the need for ballast exchanges within the title area;
- receiving environment including the presence of shallow water sensitivities within proximity to the activity and the presence and area of non-biocidal surfaces on facilities that could harbour marine pests;
- presence and effectiveness of external and internal marine growth prevention systems including effectiveness and integrity of antifouling coatings and functionality of internal treatment systems; and
- qualifications and competency of personnel conducting and reviewing the risk assessment and making management decisions.

7.2.6.2 Vessel Risk Status

There are three outcomes from the risk assessment which categorise the vessels risk status as outlined below. Vessels are required to have a ‘low’ risk status to demonstrate to the government that ConocoPhillips have taken all reasonable measures to minimise the risk of IMS.

Low	Low risk of introducing IMS - no additional management measures required.
Uncertain	Risk of introducing IMS is not apparent - precautionary approach adopted, additional management measures required to achieve low status.
High	High risk of introducing IMS - additional management measures will be required.

7.2.6.3 Potential Management Measures (to achieve low risk status)

The outcome of the risk assessment will determine management measures required. If the vessel is deemed as ‘low’ risk status, no other measures are required (providing the vessel does not exceed the seven-day threshold at stationary or slow speed, in waters outside Australia (similar region)).

For vessels that present an ‘uncertain’ or ‘high’ risk, Contractors will engage a qualified IMS inspector to conduct inspections and / or provide advice on obtaining low status. **Table 7-1** lists mitigation measures that can be applied to achieve ‘low’ risk status.

Table 7-1: Biofouling mitigation measures

No.	Mitigation Measure	Overview
1	IMS Inspection	Visual inspection of submerged surfaces and niche areas by a qualified biosecurity inspector to better understand the actual biosecurity risk. IMS Inspectors will have the qualifications and align inspections and reports with DPIRD guidance: • Criteria for Suitably Qualified Invasive Marine Pest Experts (DPIRD, 2017a);

		• Best Practice Guidelines for Invasive Marine Species Inspections (DPIRD, 2017b); and • Invasive Marine Species Inspection Report Requirements (DPIRD, 2017b).
2	In Water Cleaning	The appropriateness of in-water cleaning operations must be a decision made closely with IMS inspector on a case-by-case basis. Many factors will be considered: • Degree and type of biofouling; • Location of biofouling on the vessel. Prior to undertaking in-water cleaning within Australia, approval from the relevant state/territory authority must be granted and conditions may be imposed. Application for administering authority (Harbour Master, local government or state environmental protection agency) at least five working days prior to the proposed commencement of the work.
3	Dry Docking Cleaning	Dry docking and the removal/cleaning of biofouling will include hull surfaces, niche areas such as sea chests, all retractable equipment such as thrusters, intakes and outlets, anodes and voids.
4	Temporal or spatial controls	Temporal or spatial controls to limit vessel exposure to sources of risk.
5	Application of anti-fouling coating	Depending on the age the vessel may require application of new anti-fouling coating. The anti-fouling coating type will be based on technical advice and carried out by professional operators. All vessels greater than 400gt will retain Antifouling System Certificate
6	Treatment of Internal Seawater Systems	In the absence of a marine growth prevention system, cleaning of internal seawater systems may be required, which may include: • Dehydration; • Heat; • Physical Removal; and • Chemical Treatment. Treatment of Internal Seawater systems will ideally be undertaken prior to mobilisation to Australia. Where chemical treatments are to be undertaken within Australian waters, advice will be sought from the Australian Pesticides and Veterinary Medical Authority (www.apvma.gov.au) in relation to permit and reporting requirements as it is prohibited to clean internal systems without a permit.

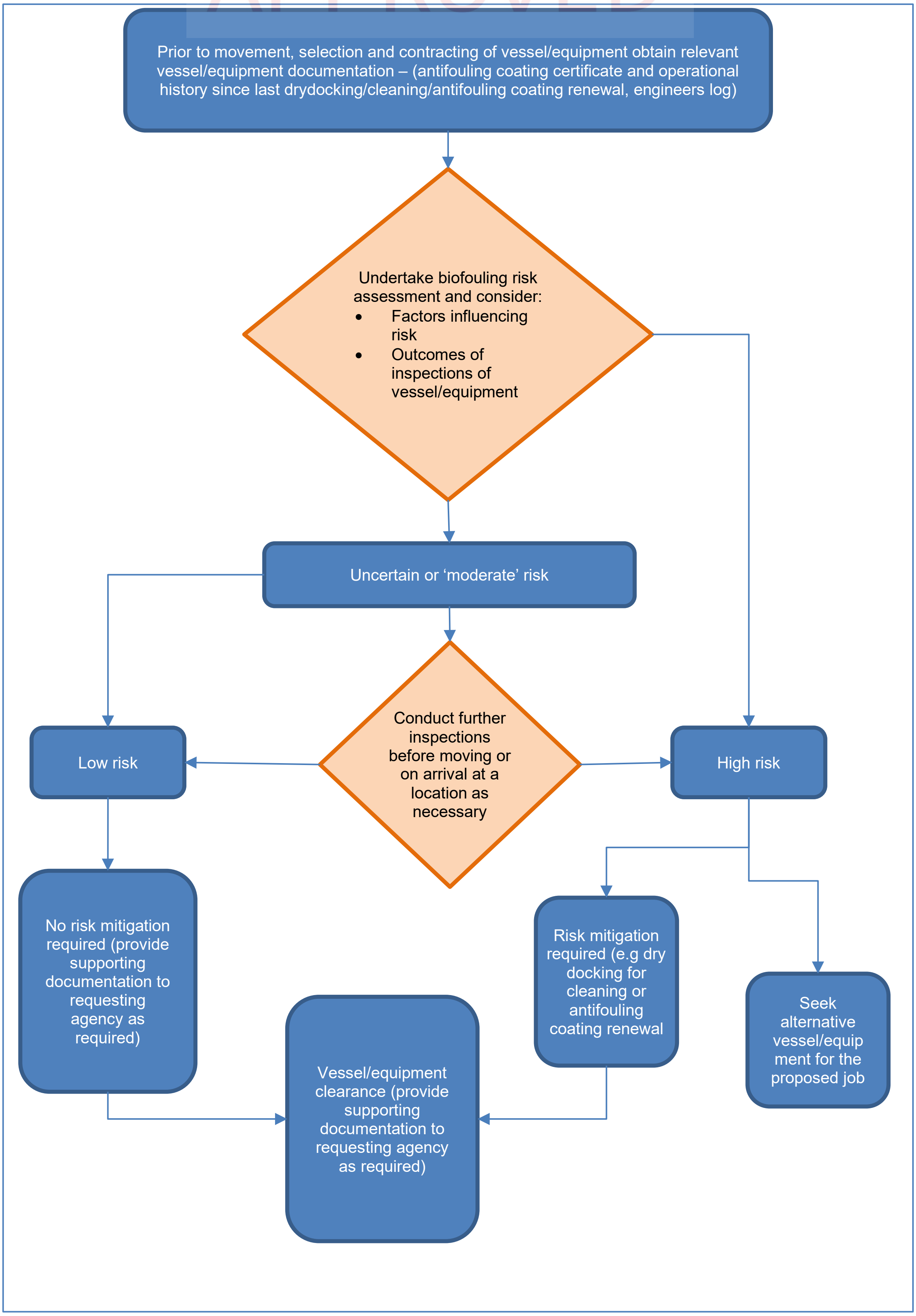


Figure 7-5: Generic biofouling risk assessment process (from Department of Agriculture, Fisheries and Forestry 2009)

7.3 Systems, Practices and Procedures

All activities associated with the pipeline installation campaign are identified, planned and implemented in accordance with relevant legislation, EP commitments and ConocoPhillips environment standards and procedures. Processes are in place to verify that the controls and performance standards contained in this EP are being implemented to manage environmental impacts and risks associated with the maintenance activities to ALARP.

7.3.1 HSEMS Interfaces

The Contractor pipelay and construction vessels will operate under their own Safety Case. The Contractor's 'vessel' Safety Case will cover pipeline installation and associated construction operations. The Safety Case addresses generic aspects and the Safety Case Revision documentation addresses project and location specific aspects. This includes the HSEMS interfaces between Contractor and ConocoPhillips and any additional hazards/risks associated with specific operations of the installation campaign.

It is the intention of ConocoPhillips and the Contractor to have a clear demarcation of HSE management system interfaces to ensure there will be no confusion between the roles and responsibilities of personnel, organisations, management of environment, operating procedures and/or reporting structure.

7.4 Roles and Responsibilities of Personnel

7.4.1 Pipeline Installation Campaign

In general, it is the responsibility of all personnel to act in an environmentally responsible manner and to follow the environmental procedures detailed within this EP. The Contractor's HSEMS will ensure that responsibilities for environmental performance are clearly delegated, all personnel are aware of their roles/responsibilities and personnel achieve adequate training on environmental issues. The suitability of the Contractor to undertake the proposed work, including their HSEMS and past HSE performance, has been evaluated during the contractor evaluation phase of the project planning. Roles and responsibilities for the pipeline installation campaign are outlined in **Table 7-2.**

Table 7-2 Roles and Responsibilities relevant to this EP

Title (role)	Environmental responsibilities
Office based personnel	
ConocoPhillips Subsea and Pipelines Manager	• Confirm that the campaign is undertaken in accordance with this EP • Provide sufficient resources to implement the management controls in this EP • Confirm Contractor personnel attend an environmental induction (**Section 7.5**) upon commencing work on the campaign • Action the management controls, as detailed in the EPSs in this EP (**Section 5.3.10**), as required, prior to the commencement of the activity • Confirm the Contractor meets the requirements of the ConocoPhillips HSEMS and relevant standards/procedures
ConocoPhillips HSE Manager	• Provide assurance that adequate resources are provided to support all environmental activities associated with this EP • Develop and Implement a program to implement and monitor EP commitments • Liaise with NOPSEMA and Parks Australia • Ensure incident notification process is in place and investigations completed to identify root causes • Review and submit monthly and end of activity reports
ConocoPhillips Gas Export Pipeline Package Lead	• Confirm that the campaign is undertaken in accordance with this EP • Communicate any changes to the activity that may affect the risk and impacts assessment, EPOs, EPSs and MC detailed in this EP to the ConocoPhillips HSE team

Title (role)	Environmental responsibilities
	• Provide the resources required to enable the commitments in this EP to be maintained • Ensure that lighting inspection is carried out on vessels prior to operating within 10 km of marine turtle nesting habitat during peak hatchling emergence season • Confirm the reporting of environmental incidents meets both external and ConocoPhillips incident reporting requirements • Liaise with ConocoPhillips Environmental Advisor on environmental incidents and what constitutes a reportable incident • Track and close out of any corrective actions raised from environmental audits as required by this EP
ConocoPhillips Gas Export Pipeline Engineer	• Communicate any changes to the activity to the ConocoPhillips Environmental Advisor • Confirm all subsea chemical components and other fluids that may be discharged to the marine environment are approved for use
ConocoPhillips Marine Director	• Confirm vessel vetting as per ABU-W Support Vessel Requirements Document No: IOSC/OPS/GLN/001 and obtain approvals from COP Corporate Marine Assurance for all vessel operations • Conduct relevant inspections to confirm vessels comply with relevant Marine Orders and ConocoPhillips marine standards/procedures and on boarding requirements to meet safety, navigation and emergency response requirements • Communicate activity-specific EP requirements to the support vessel crew
ConocoPhillips Crisis and Emergency Management Specialist	• Ensure emergency response drills are undertaken as per the schedule outlined in this EP • Develop ConocoPhillips Crisis Management and Emergency Response Plans and procedures • Provide input into NEBA for response strategies
ConocoPhillips Emergency Response Coordinator	• Undertake IMT drills in accordance with this EP and OPEP (Appendix H) • Assure that stocks of spill response equipment are maintained and adequately stocked • Review ConocoPhillips Emergency Response Plans and procedures • Provide input into NEBA for response strategies
ConocoPhillips Environmental Advisor	• Confirm environmental audits are undertaken as outlined in this EP • Develop offshore environmental approval documents, including EPs and OPEPs, for submission and acceptance by NOPSEMA • Provide environmental induction to contractor personnel • Review and approve chemical products that will be discharged to the marine environment and require assessment • Review biofouling risk assessments undertaken by Contractors • Prepare monthly and end of activity environmental reports • Advise on incident reporting requirements, particularly what constitutes a reportable incident
ConocoPhillips External Relations Advisor	• Prepare and implement the stakeholder consultation program for the activity • Manage and report on any stakeholder consultation received in relation to the activity • Undertake ongoing engagement with relevant stakeholders for the duration of the activity, as required
Contractor Project Manager	• Undertake the pipelay installation in accordance with this EP • Provide the resources required to enable the commitments in this EP to be maintained • Undertake biofouling risk assessment on all vessels mobilised to the Operational Area (**Section 7.2.6**).

Title (role)	Environmental responsibilities
	• Ensure that all crew attend HSE inductions and that attendance records saved. • Ensure incidents are reported and investigated, as required.
Offshore based personnel	
ConocoPhillips Senior Client Site Representative	• Confirm contractors undertake the activity in a manner consistent with the EPOs and environmental management procedures detailed in this EP • Confirm the management measures detailed in this EP are implemented • Confirm that the Vessel Master and all crew adhere to the requirements of this EP • Advise the ConocoPhillips Gas Export Pipeline Package Lead of any changes in activities that may lead to non-conformance with the EPOs in this EP • Report environmental incidents to the ConocoPhillips Gas Export Pipeline Package Lead
Vessel Master (contractor personnel)	• Confirm vessel management system and procedures are implemented and comply with the requirements detailed in this EP • Confirm personnel receive an environmental induction that meets the requirements outlined in this EP on commencing work on the vessel • Confirm crew personnel are competent to undertake the assigned work tasks • Confirm SOPEP drills are undertaken in accordance with the vessel's schedule • Comply with vessel entry and movement requirements within the 500 m exclusion zone • Maintain ballast water management plan, valid ballast water management certificate, ballast water management records, and Antifouling System Certificate specific to the vessel. • Confirm vessel crew are provided with sufficient training to implement the SOPEP/SMPEP (as appropriate to vessel class) • Supervise all bunkering/transfer operations to the vessel • Report any environmental incidents or non-conformance with the EPOs, EPSs or MC in this EP, immediately to the ConocoPhillips Senior Client Site Representative
Offshore Construction Superintendent (Contractor Personnel)	• Responsible for ensuring that pipeline installation activities are carried out in accordance with this EP
Offshore HSE Advisors (ConocoPhillips and/or Contractor)	• Support the ConocoPhillips Senior Client Site Representative to ensure that the controls detailed in this EP relevant to offshore activities are implemented, and assist in collection and recording of evidence of implementation (other controls are implemented and evidence collected onshore) • Support the ConocoPhillips Senior Client Site Representative to ensure environmental incidents or breaches of outcomes or standards outlined in this EP, are reported, and corrective actions for incidents and breaches are developed, tracked and closed out in a timely manner • Ensure periodic environmental inspections/reviews are completed and corrective actions from inspections are developed, tracked and closed out in a timely manner • Review Contractors procedures, input into Toolbox talks and JSAs. • Provide day to day environmental support for activities in consultation with the ConocoPhillips Environmental Advisor
All offshore staff	• Act in an environmentally responsible manner • Undertake work in accordance with accepted vessel HSE systems and procedures • Comply with this EP and all regulatory requirements as applicable to assigned role • Report any unsafe conditions, near misses or environmental incidents immediately to supervisors

Title (role)	Environmental responsibilities
	• Attend environmental inductions and HSE meetings, and complete training as required

7.5 Training and Competencies

7.5.1 Pre-mobilisation Campaign Vessel Engagement

All contractors are managed through ConocoPhillips Contractor HSE Management Process (ALL/HSE/PRO/016). As part of this process all contractors undergo a prequalification screening of HSE Management systems. This includes a review of training and competency processes.

7.5.2 Pre-installation Campaign

All personnel, including third party contractors, involved with the activity will undergo environmental awareness training prior to commencing work on the project as part of their induction. This will include being made aware of their responsibility to implement the commitments in this EP. The environmental training will inform the work crews of their obligations and specific environmental management procedures, including responsibilities and lines of communication.

Inductions will also cover the relevant components of this EP, ConocoPhillips HSEMS, Contractor HSEMS, and Gas Export Pipeline Installation Safety Case revision documents developed to link procedures, roles and responsibilities.

The induction will cover aspects such as:

- Environmental regulatory requirements described in this EP;
- Marine user interaction:
  - requirement to record and report sightings of whales;
  - complaint/issue handling from other users.
- Waste segregation, containment and disposal:
  - no waste disposal overboard;
  - requirements for waste, segregation, labelling, handling and storage;
  - requirements for recording waste movements and transfers in Garbage Record Book.
- Housekeeping and spill prevention:
  - requirements to store chemicals, oils and wastes in designated area;
  - requirements to adhere to bunkering procedure for fuel transfers;
  - availability of spill transfer equipment.
- Spill preparedness and response:
  - alerting procedure and immediate spill response actions.
- Environmental incident reporting:
  - requirements for reporting reportable and recordable incidents.

7.5.3 During Installation Campaign

HSE management system audits of third party contractors are completed according to the ABU-W audit procedure, which includes an evaluation of training matrix, checks of training and competency and site specific environmental training requirements. The frequency of contractor audits is reviewed and updated annually in the ABU HSE Audit schedule. Environmental risks will be discussed through job safety analyses, pre-tour and safety meetings conducted on board the vessels.

Additional communications, including the findings of any incident investigations, will continue through daily meetings on board the maintenance vessels and via daily progress reporting.

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

7.6.1 Environmental Monitoring

In accordance with ConocoPhillips' HSEMS (Element 13), ConocoPhillips has developed processes for measuring and monitoring HSE performance, evaluating the achievement of HSE goals and objectives, identifying opportunities for improvement and providing assurance of compliance. Leading and lagging performance measures are developed, identified and tracked to provide timely information to manage trends and impacts and to establish future goals and direction. Processes are also in place to measure and monitor project operations and activities, as per the ConocoPhillips Projects HSE Management System Standard.

ConocoPhillips and its contractors will monitor and review HSE performance for the duration of the installation campaign. Specific monitoring activities related to the management of environmental risks identified within **Section 5.2** and **Section 5.3** will collect, as a minimum, the information referred to in the MC listed in **Section 6.** This information will be collected through set internal reporting processes, as detailed in this section.

7.6.2 Environmental Audits and Review

Environmental performance auditing and review programs will be completed to:

- confirm impacts and risks are being effectively managed;
- confirm relevant standards and procedures are being followed;
- demonstrate compliance with regulatory requirements, approval commitments and conditions within this EP;
- monitor, review and evaluate the effectiveness of ConocoPhillips' HSEMS;
- confirm a senior management review of performance via consideration of the audit reports.

An environmental auditing program will be implemented for the pipeline installation campaign and will include the key elements and frequencies outlined in **Table 7-3**.

Table 7-3: Barossa Gas Export Pipeline Installation EP auditing and review program summary

Audit type	Description	Scope	Frequency
Tier 1	*Weekly performance checklist for the vessel*	*Site inspection of chemical and hydrocarbon storage areas, deck and bilge drainage and waste segregation*	*Weekly*
Tier 2	*Internal environmental compliance audit*	*Audit of Contractor HSEMS, which will include an audit of implementation of the requirements of the EP, specifically performance against the EPOs, EPSs and MC (**Section 5.3.10**)*	*As per ABU-W HSE Audit Schedule (i.e. minimum of monthly)*
Tier 3	*NOPSEMA audits*	*Regulatory compliance*	*Unscheduled (i.e. on notification by NOPSEMA)*

Audit type	Description	Scope	Frequency
Management review	*Barossa Leadership Team*	*Management team mid-year and annual review of HSE performance*	*Mid-year/annually*
Incident investigation review	*Review in line with the Barossa Incident Reporting Procedure (BAA-100 0297)*	*The objective of the incident investigation is to establish the root cause(s) of an incident and to raise and close-out corrective actions to prevent recurrence.*	*Following an incident or training exercise*

Tier 1 and Tier 2 HSE audits and follow-up actions are conducted in accordance with ConocoPhillips ABU-W HSE Auditing and Inspection Procedure (ALL/HSE/PRO/031). The audits will be documented and corrective actions tracked to completion in accordance with this procedure.

7.6.3 Vessel Contractor Management

HSE assurance of all contracted vessels will be performed in accordance with ConocoPhillips' Contractor HSE Management Process (ALL/HSE/PRO/016). The ConocoPhillips Marine Vessel Vetting Process (**Section 7.2.3**) outlines the minimum requirements that must be met and confirms that the vessels meet or exceed the standards and criteria set by industry practice, international regulations, and relevant authorities such as AMSA. The marine assurance process includes assessment of vessel suitability, equipment and design, and personnel training, including officer experience, followed by on vessel inspection and verification.

7.6.4 Management of Non-conformance Investigation and Corrective Action

HSE hazards and incidents will be reported in accordance with the ConocoPhillips ABU Incident Reporting and Investigation Procedure (ALL/HSE/PRO/003). A corrective action plan will be developed in consultation with senior management and other relevant action owners to address non-conformances. Audit findings and agreed audit follow-up actions will be entered into a dedicated incident and assessment action tracking system and tracked through to closure.

7.6.5 Management of Change

7.6.5.1 Pipeline installation campaign management of change

Any modification to the pipeline installation campaign must comply with the Barossa Management of Change (MOC) Procedure to ensure that:

- changes conform to appropriate standards, utilise safe and approved methods, and ensure risk remains within an acceptable level from their concept to implementation;
- all relevant documentation e.g. procedures, instructions, guidelines, drawings, databases, etc., affected by the change process are updated accordingly and provided for reference; and
- changes are promptly communicated to all sections of the workforce who are affected by the change.

The MOC process includes the following stages:

- preliminary risk rating (included on Change Request Form);
- screening review covering Process Safety Management, Safety and OHS issues;
- HSE Checklist covering Major Hazards, Occupational Health and Safety (OHS) and Loss Prevention (aimed at determining whether the proposed changed would have an impact on the Gas Export Pipeline Installation Safety Case);
- Hazard Identification (HAZID) and Hazard and Operability (HAZOP) Studies, where required;
- Risk Assessment; and
- Construction HAZID (if required).

7.6.5.2 Environment Plan Maintenance and Revision

ConocoPhillips has a Management of Change (MOC) procedure (ALL/HSE/PRO/090) which is specific to managing (potential) changes associated with operations / activities within an accepted EP. It covers all content of the EP, including any legislative, procedural, engineering or physical change that is permanent, temporary, prospective or retrospective that may affect the potential impacts and risks from an activity and / or the environmental performance of an activity. The procedure defines a framework that enables changes to be considered in the merit of a number of aspects including regulatory requirements and a ‘materiality test’, i.e. screening for significance. The procedure allows for (potential) changes to be appropriately assessed and managed under internal decision points or to identify when resubmission to the regulator is required.

A risk assessment may also be completed to determine if there is an increased risk to the marine environment. In all cases, where a potential release to the marine environment has been identified, assessment of implementing additional risk control measures to lower the potential risk to ALARP will be undertaken. Any significant changes to the operations may necessitate amendment to the EP and OPEP, as appropriate to the level of change.

A revised EP will be submitted to NOPSEMA under Regulation 17 of the OPGGS(E) Regulations if any changes occur to this EP due to:

- a new activity;
- a significant modification or new stage of activity that is not provided for in the approved EP;
- significant new or increased environmental impact or risk; or
- changes in titleholder that results in a change in the way the environmental impacts and risks of the activity are managed.

NOPSEMA will assess the revised EP and all relevant documents under Regulation 21 of the OPGGS(E) Regulations. While the revision is being assessed any activities adequately addressed under the existing accepted EP can still occur.

The EP may be revised in line with ConocoPhillips management of change process but may not be resubmitted to NOPSEMA if it does not trigger Regulation 17 of the OPGGS (E) Regulations.

ConocoPhillips will undertake an annual review of this EP to identify any changes that may have arisen since acceptance, such as:

- any additions to the threatened species list within the EMBA (e.g. PMST report);
- publication of new conservation advice, recovery plans and/or scientific literature; and
- changes to the risk profile of the activities.

7.7 Routine Reporting

7.7.1 Internal Routine Reporting

Table 7-4 contains a summary of internal reporting that will be completed for the duration of installation activities.

Table 7-4: Summary of internal reporting

Report	Frequency	Contents
OVID inspection reports	*Prior to commencement of the activity*	*Provides a summary of the findings of the support vessel inspection which assesses compliance with relevant international (e.g. MARPOL 73/78), Australian and ConocoPhillips requirements.*

Report	Frequency	Contents
Pre-start contractor audit	*Prior to commencement of the activity*	*Confirmation of compliance for various matters outlined in* ***Section 7*** *of this EP relating to operational procedures and processes that ConocoPhillips require to be in place prior to the commencement of the activity.*
Vessel Reports	*Daily*	*Update on day's activities, including any identified non-conformance against this EP, and any issues that may need addressing.*
HSE Meetings	*Weekly*	*Weekly, dedicated HSE meetings are held with the offshore and Perth-based management (including contractor management) and advisors to address targeted health, safety and environment incidents and initiatives. Minutes of these meetings are produced and distributed as appropriate.*
First Incident Report *(see Attachment I)*	*Incident specific*	*Provides framework for Internal notification of incidents including spills. The first report contains tools for assessing the severity of the incident and escalating as per the ABU incident notification procedure.*
Gas Export Pipeline Installation Environmental Report	*At completion of the activity.*	*Provides a summary of compliance performance, specifically in relation to the environmental performance objectives, standards and measurement criteria within this EP.*
Incident Action Plan *(see Attachment I)*	*Incident specific*	*Provides an action plan in the event of an incident which summarises the appropriate policy, aims, objectives, response strategies and methods that will be employed as appropriate to the incident.*
Incident Investigation Report	*Incident specific*	*Contains a summary of the audit and review process undertaken to investigate an incident. The report also details close-out corrective actions to prevent recurrence.*
Post Exercise Report	*Incident/drill specific*	*These reports are completed following an exercise or drill. They generally report on what worked well, opportunities for improvement and corrective actions to address opportunities for improvement.*
Spill Debrief Report	*Incident specific*	*Spill debrief reports provide key information pertaining to the spill that has occurred. This includes details of the drill (date, time), list of attendees, key response actions, lessons learnt, outcomes/actions from the spill debrief meeting.*

7.7.2 External Routine Reporting

7.7.2.1 Director of National Parks Notifications

As per Condition 4 of the Commercial Activity Licence (**Table 2-2**), ConocoPhillips shall:

(a) notify the director of the grant of the GEP Licence (if granted) within 24 hours of its grant;

(b) notify the Director of the acceptance or refusal of an environment plan by NOPSEMA within 24 hours of its acceptance or refusal.

(c) following acceptance of an environment plan by NOPSEMA, provide the Director with a copy of that environment plan within 10 business days of acceptance.

(d) following the completion of construction of the GEP, promptly provide the Director with as built coordinates for the location of the GEP in degrees, minutes and seconds using geographic coordinate system GDA94.

ConocoPhillips will also notify the Director, at least 10 days prior to the start date, of the commencement of pipeline installation activities, including details of the vessels to be used for pipeline installation activities in the Oceanic Shoals Marine Park. ConocoPhillips will then notify the Director upon completion of the pipeline installation activities, within 10 days of completion.

7.7.2.2 Annual Environmental Report

ConocoPhillips will submit an environmental report to NOPSEMA in accordance with Regulations 14(2) and 26C of the OPGGS(E) Regulations. The report shall be submitted:

- As soon as practicable after the end of the activity, and in any case not later than three months after the end of the activity; or
- On an annual basis, if activities extend for more than one year.

It will include all information necessary to enable NOPSEMA to determine whether the environmental performance objectives and standards for the petroleum activities, as detailed within this EP, have been met.

7.7.2.3 End of the EP

As per Regulation 25A of the OPGGS(E) Regulations, this EP will end when:

- ConocoPhillips notifies NOPSEMA that:
  - the activity has ended
  - all obligations under the EP have been completed, and
- NOPSEMA accepts the notification.

7.8 Incident Reporting

Table 7-4 provides a summary of incident reporting requirements.

7.8.1 Reportable Incidents

A reportable incident is defined as 'an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage, including moderate to significant environmental damage to an Australian Marine Park or its values, as categorised by the risk assessment process undertaken as part of the preparation of this EP.

The environmental risk assessment (**Section 5**) conducted for the activity identified the following risks that have the potential to cause moderate or significant environmental/social damage:

- adverse interaction with other marine users (as defined in **Section 5.2.1**);
- introduction of IMS (**Section 5.3.2**); and
- marine diesel spill from a vessel collision (**Section 5.3.7**).

The notification and reporting requirements for incidents in Commonwealth Waters are outlined in **Table 7-5**. NOPSEMA reporting forms are provided in **Appendix D**. The ConocoPhillips Environmental Advisor shall decide on what volume constitutes a reportable incident. For an oil spill and as a guide, a volume of 80 Litres or greater is considered reportable.

Reporting of any injury or death of any marine fauna species listed as threatened or migratory under the EPBC Act will be also undertaken and reported to DoEE within seven days.

7.8.2 Recordable Incidents

A recordable incident as defined as an incident arising from the activity that breaches an EPO or EPS in the EP that applies to the activity and is not a reportable incident.

With respect to recordable incidents, the environmental management strategies described in Section 6 contain EPOs and EPSs. MC are also described to outline how the desired EPSs are maintained for the duration of the activity. Any incident that breaches these EPSs will be considered as a recordable incident and reported to NOPSEMA.

NOPSEMA will be notified of all recordable incidents as soon as practicable after the end of the calendar month but not later than 15 days after the end of the calendar month. The written report must contain:

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

If no recordable incidents have occurred a 'nil incident' report will be submitted to NOSPEMA.

7.8.3 Other Incident Reporting Requirements

7.8.3.1 Reporting under MARPOL

In addition to the notification and reporting of environmental incidents defined in this EP and ConocoPhillips requirements, the following incident reporting requirements also apply:

- damage, failure or breakdown of a ship of 15 metres in length or more which affects the safety of the ship or results in impairment of the safety of navigation (including collision, grounding, fire, structural or engine failure);
- any discharge or probable discharge of oil or noxious liquids substances carried in bulk, resulting from damage to the ship or its equipment, or for the purpose of securing the safety of a ship or saving life at sea;
- any discharge during the operation of the ship of oil or noxious liquid substances in excess of MARPOL discharge limits or rates; and
- any discharge or probable discharge of harmful substances in packaged form (including freight containers, shipborne barges, road and rail vehicles, and portable tanks).

Reports are to be made without delay to AMSA via the national 24-hour emergency notification contacts:

- Phone: 02 6230 6811 or 1800 641 792
- Facsimile: 02 6230 6868
- Email: rccaus@amsa.gov.au

Additionally, the following pollution activity should also be reported to AMSA via RCC Australia by the Vessel Master:

- any loss of plastic material;
- garbage disposed of in the sea within 12 nm of land; and
- any loss of hazardous materials.

For oil spill incidents other agencies and organisations will be notified as appropriate to the nature and scale of the incident as per procedures and contact lists in ConocoPhillips' OPEP for the activity.

Table 7-5: Summary of external incident reporting

Report	Designated Authority	Timing	Contents
Reportable Incident Notification			
Commonwealth Waters			
Reportable Incident Notification	*NOPSEMA*	*Verbally, as soon as practicable, but within two (2) hours*	*ConocoPhillips must notify the Regulator of any unplanned event identified as having the potential to cause moderate to significant environmental damage.* *In most circumstances reportable incident parameters will be detailed specifically within an EP for an activity; however, should an unforeseen event occur that has caused or has the potential to cause moderate to significant environmental damage this must also be reported to NOPSEMA.* *Section 7.8.1 details what constitutes a reportable incident.*
Written report of reportable incident	*NOPSEMA* *NOPTA*	*As soon as practicable but no later than three (3) days after the incident*	*A written report of a reportable environmental incident must be provided unless otherwise agreed with NOPSEMA. The report will contain all material facts and circumstances concerning the reportable incident, actions taken to avoid or mitigate any adverse impacts, and corrective action taken.* *If NOPSEMA is not satisfied that the initial written report satisfies the requirements of the Regulations further information may be requested from the operator, which may include but is not limited to:* • immediate cause analysis • root cause analysis and a full report • actions taken to prevent recurrence of the incident with the responsible party, and • completion date. • ConocoPhillips will provide NOPTA with a copy of the written report within 7 days after giving NOPSEMA the written report.
Monthly Recordable Incident Reports (refer Section 7.8.2)	*NOPSEMA*	*Monthly, on or prior to the 15th day of each month*	*Either a 'nil incident' report or details of recordable incidents that have occurred for previous month.*
Other Reporting Requirements			
Any discharge or probable discharge in excess of MARPOL 73/78 discharge rates – Marine Pollution Report (POLREP)	*AMSA Response Centre (ARC)*	*Within 24hrs of the incident occurring (by vessel master)*	*Contents of the reports will slightly differ depending on the type of discharge but generally will contain: technical name, MSDS information, manufacturer, quantity spilled etc.*

Report	Designated Authority	Timing	Contents
Any injury or death of any marine fauna species listed as threatened or migratory under the EPBC Ac	*DoEE*	*Within seven days*	*The report will contain:* • titleholder details • time, location and description of the incident • a summary of the response being undertaken by ConocoPhillips, and • details of the relevant contact person.
Any incidents that have caused or have potential to cause moderate to significant environmental damage to an Australian Marine Park or its values	*Director of National Parks*	*Within 24hrs of the incident occurring*	*The report will contain:* • titleholder details • time, location and description of the incident • the Australian Marine Park at risk • a summary of the response being undertaken by ConocoPhillips, and • details of the relevant contact person in the IMT.
Suspected contravention of the OPGGS Act within the Habitat Protection Zone	*Director of National Parks*	*Within 24hrs of incident being identified*	*ConocoPhillips must notify the Director of any activities in contravention of the OPGGS Act.*
Any discharge during the operation of the ship of oil or noxious liquid substances in excess of MARPOL discharge limits or rates; or any discharge or probable discharge of harmful substances in packaged form	*AMSA Response Centre (ARC)*	*Within 1 hour of the incident occurring*	*Verbal reporting will consist of transfer of information to conduct a coordinated emergency response. All reporting will be carried out by the vessel master as per the vessel specific SOPEP.*
Any spills likely to enter NT Waters	*NT DPIR*	*As soon as practicable.* *Written report as soon as practicable after request by DPIR*	*Verbal reporting will consist of transfer of information to conduct a coordinated emergency response. All reporting will be carried out by the vessel master as per the vessel specific SOPEP.* *Written reports will contain all material facts and circumstances concerning the reportable incident, actions taken to avoid or mitigate any adverse impacts, and corrective action taken.*

7.9 Record Keeping

Records management is the systematic control of information from creation to disposal. ConocoPhillips has procedures in place detailing the types of records and duration records need to be retained.

The following records will be maintained for the activity:

- environmental training and induction records;
- details of non-conformance inducing environmental incidents, complaints and follow up actions;
- internal and external environmental audit reports;
- reports of any regulatory authority inspection and actions undertaken and actions taken to rectify any issues raised through the audit or inspection;
- contractor daily reports; and
- equipment and activity inspection records.

Documents and records related to the integrity of the pipeline will be stored in the ConocoPhillips document management system. The documentation will be stored for at least the lifetime of the Pipeline or five years from the issuing of the document or record, whichever is the greater.

7.10 Emergency Preparedness and Response

7.10.1 Overview

The ConocoPhillips HSEMS (Element 8) defines the Crisis Management and Emergency Response planning and preparedness requirements for ConocoPhillips operated assets and the Crisis Management support functions provided and coordinated from ConocoPhillips Headquarters Houston.

Under Regulations 14(8) the Implementation Strategy must contain an 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.

A summary of the key documents that may be used to guide an emergency response are described in the following sections. It should be noted that in the event of an incident occurring, the Emergency Response Plan and OPEP will be used to guide personnel in the initial stages of an incident. Following this, if an IMT is established then IMT personnel will continue to use the OPEP and the detailed guidance and checklists in the ABU-W Crisis and Incident Management Plan to direct the response.

7.10.2 Contractor Emergency Response Plan

The installation contractor will develop a comprehensive Emergency Response Plan (ERP) that addresses emergency response actions associated with all credible incidents for the activity, including. It will describe the interface arrangements between the ABU-W IMT and covers all aspects of emergency response including technical, logistical and medical support.

The ERP also outlines roles and responsibilities of contractor personnel for emergency events. The ERP is accepted by ConocoPhillips and reviewed on an annual basis by the contractor or if a significant change has occurred to the incident management or emergency response arrangements.

Scenario-based drills are performed to test the emergency response arrangements and updates are made to improve the ERP, if required.

7.10.3 Oil Pollution Emergency Plan

The OPEP (BAA-100 0330) outlines the emergency management arrangements and oil spill response for the activity. The OPEP provides activity-specific information required for an effective response in the unlikely event of an unplanned release of petroleum products. The OPEP details the actions to be taken by the Incident Management Team (IMT) in response to the incident (consistent with the ABU-W Crisis and Incident Management Plan); describes arrangements and reporting relationships for command, control and communication; provides interfaces to oil spill response organisations and third party support entities; and provides procedures for notifying jurisdictional authorities and other external bodies.

For this EP, a 'fit-for-purpose' approach to spill response has been adopted, with consideration of:

- the low environmental risk profile of the installation campaign utilising marine diesel oil with little risk of significant liquid hydrocarbon release, and
- NOPSEMA's acceptance criteria, including the requirement for updating of the OPEP (Regulation 14(8) of the OPGGS(E) Regulations).

The only credible source of an oil spill in relation to the installation campaign within Commonwealth waters is from project vessels. As described in **Sections 5.3.7** and 5.3.8, modelling was undertaken for two credible spill scenarios. It has been demonstrated that there is a low inherent risk of either of these scenarios occurring with the existing ConocoPhillips controls in place.

7.10.4 ABU-W Crisis and Incident Management Plan

The ABU-W Crisis and Incident Management Plan (CIMP) (ALL/HSE/ER/001) defines the organisational responsibilities, actions, reporting requirements and management processes to be applied in the event of an emergency or crisis occurring. It also provides detailed guidance and checklists for key roles in the IMT and CMT.

The CIMP provides a graduated tiered response framework which classifies incidents based on the significance of the consequences, the risks involved and potential for escalation.

Individual operational facilities have detailed emergency response and oil pollution emergency plans developed that are aligned to this framework.

The CIMP also provides detail on Incident Action Plans (IAPs), which are developed by the IMT and communicated to the ERT and CMT (where applicable). IAPs are developed using current situational awareness and provide direction to response operations.

The CIMP is reviewed on an annual basis or if a significant change has occurred to the incident management or emergency response arrangements. Exercises and drills are performed to test the emergency response arrangements and updates are made to improve the CIMP, if required.

7.10.5 Incident Management Structure

ABU-W implements a tiered Emergency Management Framework in response to incidents, which is scaled in accordance with operational requirements. The Framework is based on the Incident Command System (ICS), and is compatible with the Australasian Inter-service Incident Management System (AIIMS) and National Plan for Maritime Environmental Emergencies (National Plan).

The structure of the Framework and the teams activated at various incident classifications is shown in **Figure 7-6**. Roles and responsibilities for crisis and incident management are described below. Additional detail on response considerations and objectives are provided in the ConocoPhillips CIMP (ALL/HSE/ER/001) and the Barossa Gas Export Pipeline Installation OPEP (BAA-100 0330 - **Appendix H**).

7.10.6 Incident Management Team

In the event of an emergency, the ConocoPhillips ABU-W IMT will be mobilised. The IMT consists of Tactical Command, Operational, Planning, Logistic, and Support personnel. It is responsible for providing advice, logistical support and managing the operational and technical aspects of an incident response in support of the Emergency Response Team (ERT). In the case of a hydrocarbon spill from a vessel, the Vessel Master is the key member of the ERT and manages the shipboard response via the vessel SOPEP. The roles and responsibilities of key members of the IMT are defined in the Crisis and Incident Management Plan (ALL/HSE/ER/001). During an incident, whenever any command or control position is transferred from one person to another, a formal handover will occur to ensure continuity during the response.

Two specialist Operations Section Chiefs exist within the IMT. One Operations Section Chief specialises in Production emergencies and the other in drilling / exploration. The nature of the emergency will determine which Operations Section Chief is mobilised, however, both can be used if required to provide additional support (**Figure 7-7**).

Note: Barossa Liaison Officer interfaces between Barossa Project impacted groups and the ABU-W IMT to ensure that appropriate and timely support is provided in the event an emergency.

The IMT objectives are to:

- provide timely operational support to the ERT;
- protect employees, contractors and members of the public from injury or illness because of an incident;
- minimise injury to people and damage to assets and the environment;
- liaise with appropriate support agencies to assist ERT members in emergency situations;
- develop an Incident Action Plan (IAP);
- complete incident related communication and notifications to external parties; and
- provide regular information updates to the CMT.

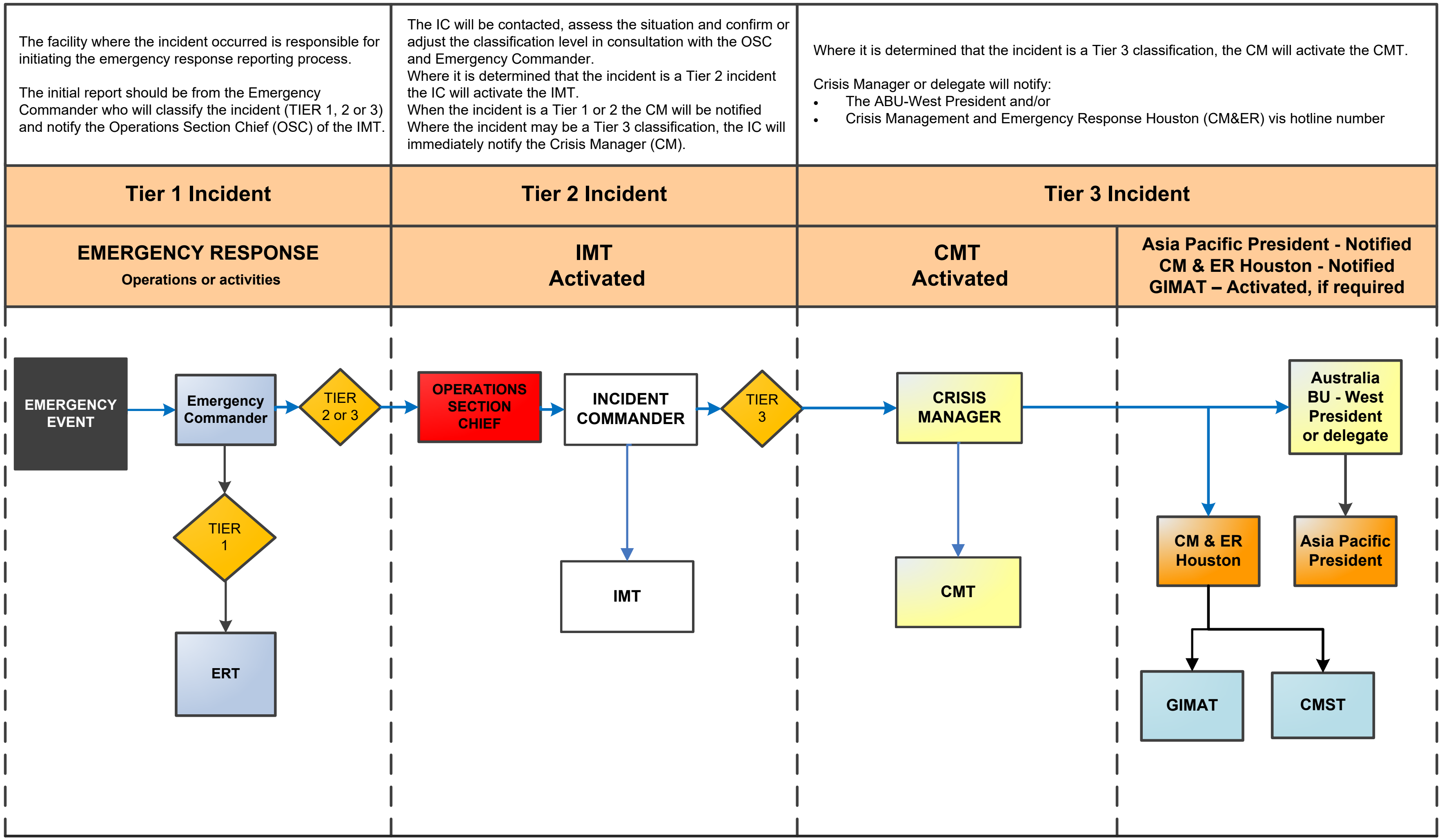


Figure 7-6: ConocoPhillips ABU-W tiered incident response framework

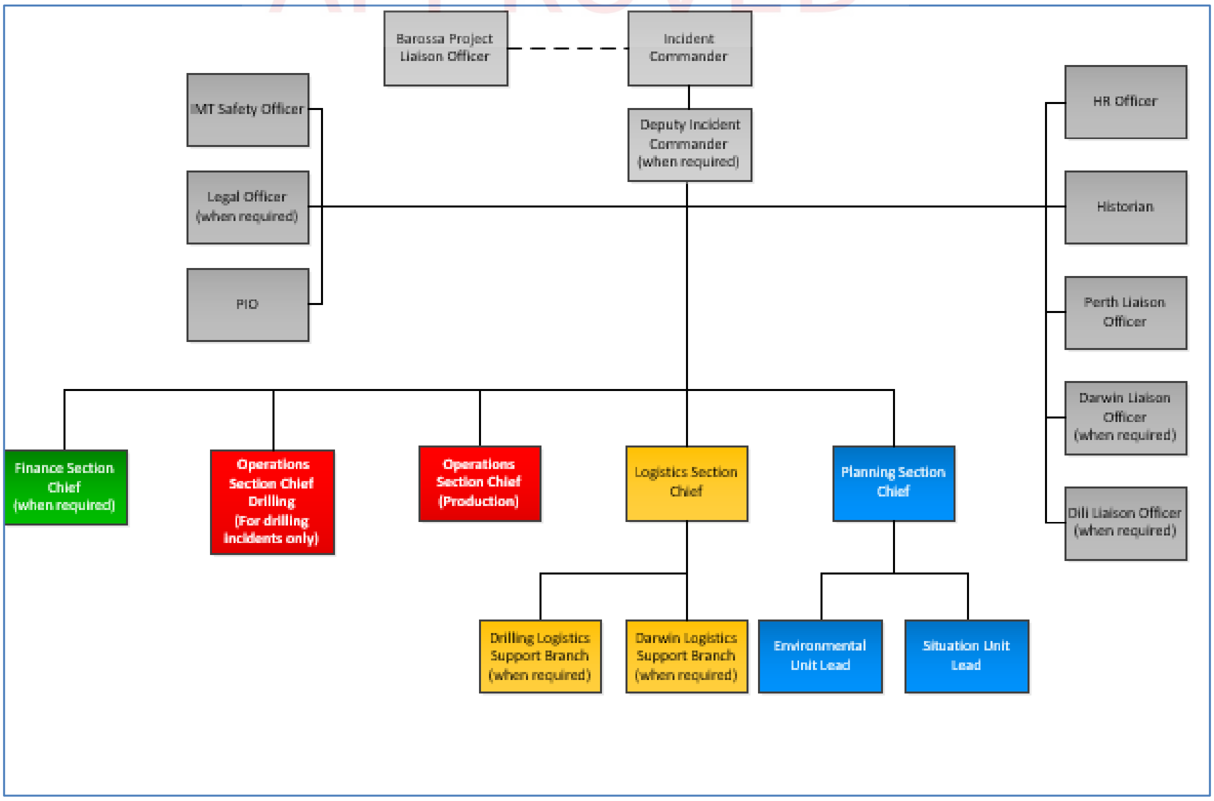


Figure 7-7: IMT structure

IMT Composition

To provide effective support and advice to the ERT at the site or facility, the IMT for Tier 2 and 3 incidents will be made up of the following roles and can be scaled up or down as required:

- Incident Commander (Deputy Incident Commander when required);
- Barossa Liaison Officer;
- Operations Section Chief;
- Planning Section Chief;
- Logistics Section Chief (Supplemented by Logistics Support as required);
- Liaison Officer (Darwin Liaison Officer when required);
- Safety Officer;
- Situation Unit Leader;
- Environmental Unit Lead;
- Public Information Officer;
- HR Officer;
- Legal Officer (As required).
- Finance Section Chief (As required); and
- Historian.

Key roles and responsibilities for ConocoPhillips personnel for incident response are outlined in **Table 7-6** and **Section 7.10.**

Table 7-6: Roles and responsibilities of key IMT personnel

Role	Responsibilities
Incident Commander	• Overall management of incident response operations • Assess the situation and confirm or adjust the classification (tier) level in consultation with the Operations Section Chief and Emergency Commander • Notify the Crisis Manager of event and initial response tier • Set objectives for IMT • Confirm Incident Action Plan (IAP) is being developed and approve IAP • Validate that relevant regulators and other authorities have been notified • Consider and request Global Incident Management Assist Team (GIMAT) support via Houston • Approve Incident Demobilisation Plan
Barossa Liaison Officer	• Barossa Liaison Officer interfaces between Barossa Project impacted groups and the ABU-W IMT to ensure that appropriate and timely support is provided in the event an emergency.
Operations Section Chief	• Assist in classifying the emergency (Tier 1,2,3) in consultation with the site Emergency Commander and maintain open line of communication • Inform Incident Commander of emergency notification and tier level and maintain an open line of communication • Provide overview of response operations at initial IMT brief • Communicate incident updates provided by the Emergency Commander to IMT through meetings and team briefs • Provide incident details to the Planning Section Chief and Situation Unit Lead for development of Initial IAP and help develop incident objectives and strategies • Determine operational areas e.g. staging areas, forward command, incident area, oiled wildlife receiving and demobilisation areas • Contribute to the preparation and implementation of the Incident Demobilisation Plan
Planning Section Chief	• Consider incident escalation potential and predication for incident • Develop Initial IAP in conjunction with Operations Section Chief and Situation Unit Lead • Liaise with Logistics, Safety Officer and Environment Unit Leads as to requirements to complete response strategies • Facilitate/Chair IMT meetings • Monitor situation reports and update Emergency Operations Centre (EOC) status displays with additional information and adjust IAP as necessary • Prepare the Incident Demobilisation Plan
Logistics Section Chief	• Source all logistical requirements to complete response operations, including personnel, equipment and supplies for ongoing incidents.

Role	Responsibilities
	• Upon approval from IC, source third party resources (e.g. vessels, helicopters) to assist in response operations • Liaise with Planning Section Chief on specialist resource requirements being considered in response strategies. Verify availability as this may affect strategy selection
Environment Unit Lead	• Activate oil spill response organisations upon approval of the IC • Notify external agencies and regulators of spill (as detailed in activity-specific OPEPs) • Undertake operational Net Environmental Benefit Analysis

7.10.6.1 Crisis Management Team

The CMT, under the leadership of the Crisis Manager, is responsible for the overall management of the incident from a strategic, legal, ethical and public image perspective. The structure of the CMT is illustrated in **Figure 7-8.**

The primary objectives are to:

- provide strategic guidance and support to the IMT as required;
- consider the strategic, legal and public image aspects of the incident;
- attend to all public media issues;
- develop a Crisis Management Plan to coordinate all actions;
- communicate with internal and external stakeholders;
- notify Crisis Management and Emergency Response – Houston, as appropriate; and
- comply with applicable regulatory requirements in an emergency situation.

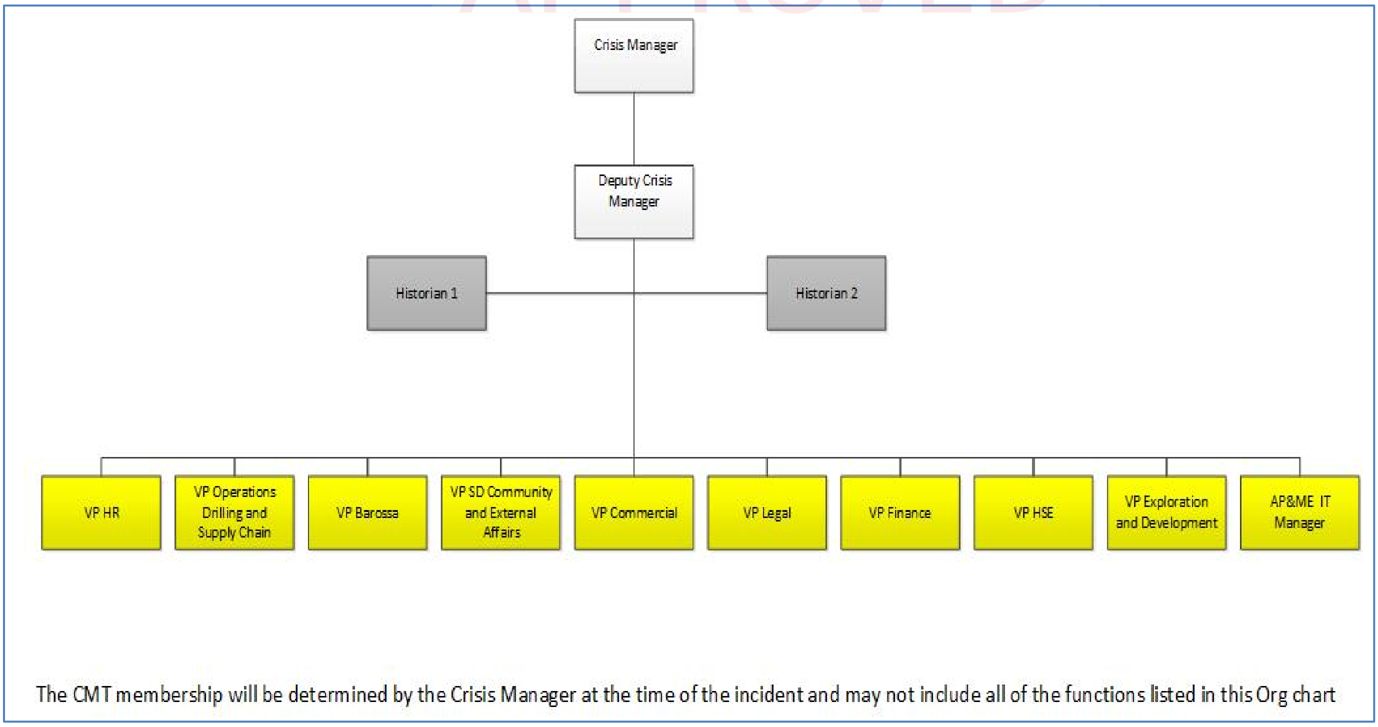


Figure 7-8: CMT structure

7.10.6.2 Global Incident Management Assist Team

The GIMAT is a specialist incident management team. Members are located globally and can be readily mobilised to support and integrate into a business unit IMT that requires additional resources to manage the incident or is required to maintain sustained IMT operations over an extended duration incident.

GIMAT personnel are skilled in specific incident management disciplines that enhance the capabilities and capacity of the IMT. The key role of the GIMAT is to support the ABU-W IMT with specialist functions. The GIMAT is not responsible for taking control of an incident from ABU-W, however will provide comprehensive support to ensure that IMT activities are undertaken effectively.

7.10.7 IMT Roles Responsibilities and Training

Spill response training is provided to key roles within the ConocoPhillips IMT. ConocoPhillips maintains competent and trained response capability to ensure an emergency management and response capacity can be maintained. Training requirements and core competencies for ConocoPhillips key IMT response staff are outlined in **Table 7-6**. Additional detail on the listed training packages and drills is provided below:

- IMT Induction Computer Based Training (CBT) Module includes, but is not limited to the following content:
  - ConocoPhillips emergency response standards, philosophies and principles;
  - Emergency Response and Management Groups;
  - Overview of IMT structure within ConocoPhillips;
  - Overview of IMT checklists;
  - Corporate resources (e.g. GIMAT);
  - Initial response and assessment and Planning P;

  - Communications.
- ISC 100 and 200 training (Online CBT or face-to-face);
- ConocoPhillips induction package (face-to-face) includes, but is not limited to the following content:
  - IMT roles and responsibilities;
  - Emergency Operations Centre (EOC) operation;
  - Incident Action Plan software;
  - IMT Tier 1-2 desktop drill or exercise.
- Oil spill management computer-based training module includes, but is not limited to the following content:
  - ConocoPhillips Emergency Management Framework, including plans and processes;
  - Context – hydrocarbon spills (international and Australia);
  - Australian response arrangements;
  - Government, industry and AMOSC response;
  - Response planning;
  - Hydrocarbon spills and the environment;
  - Response issues;
  - Response options and implementation.
- IMT Tier 1-2 desktop drill
  - Undertake an incident and hydrocarbon spill assessment process;
  - Develop an IAP that includes hydrocarbon spill response options;
  - Undertake preliminary planning for the implementation of those options.
- IMT Tier 2 exercise (hydrocarbon spill scenario on a rotational basis)
  - Undertake an incident assessment process;
  - Develop an IAP;
  - Undertake preliminary planning for the implementation of those options;
  - Interface with CMT.

Role and responsibilities for the IMT are outlined in **Table 7-7**.

Table 7-7: IMT training summary

Role	Induction CBT Module	ICS 100 and 200	ConocoPhillips induction package (face-to-face)	Oil spill management CBT module	IMT Tier 1-2 desktop drill or exercise
Incident Commander	Initial	Initial	Initial	Initial	Annual
Operations Section Chief	Initial	Initial	Initial	Initial	Annual
Planning Section Chief	Initial	Initial	Initial	Initial	Annual
Logistics Section Chief	Initial	Initial	Initial	Not required	Annual
Safety Officer	Initial	Initial	Initial	Not required	Annual*
Liaison Officer	Initial	Initial	Initial	Not required	Annual*
Environmental Unit Leader	Initial	Initial	Initial	Initial	Annual
Historian	Initial	Initial	Initial	Not required	Annual*
Situation Unit Lead	Initial	Initial	Initial	Not required	Annual*
Human Resource Officer	Initial	Initial	Initial	Not required	Annual *
Public Information Officer	Initial	Initial	Initial	Not required	Annual*

Initial: required when personnel commence IMT position. **Annual:** personnel holding this IMT position will need to undertake this training/drill annually. * This position is required to participate in an annual exercise or drill, but this may not always be a hydrocarbon spill scenario.

Table 7-8: Oil pollution response EPOs, EPSs and MCs

Environmental Performance Outcome	Performance Standard	Measurement Criteria
Environmental Performance – Monitor and Evaluate		
EPO IS 4 Maintain situational awareness and inform IMT decision making using monitor and evaluate tactics	***EPS IS 4.1*** IMT to undertake fate and weathering modelling to estimate the current and projected weathering of the spill	***MC IS 4.1.1*** Records demonstrate fate and weathering modelling (ADIOS2) undertaken within 2 hours of IMT activation
	EPS IS 4.2 IMT to select appropriate monitor and evaluate tactics based on the nature and scale of the spill.	***MC IS 4.2.1*** Records demonstrate monitor and evaluate response option decision-making by the IMT are appropriate for the nature and scale of the spill.
	EPS IS 4.3 Use monitor and evaluate data to periodically reassess the spill and modify the response, using the IAP	***MC IS 4.3.1*** Records demonstrate monitor and evaluate data incorporated into the IAP
	EPS IS 4.4 ConocoPhillips to maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of monitor and evaluate tactics	***MC IS 4.4.1*** Records demonstrate that ConocoPhillips maintains contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of monitor and evaluate tactics
Environmental Performance – Wildlife Response		
EPO IS 5 Locate, identify and apply suitable response tactics to wildlife to prevent them from being contacted by oil or treat them if already contacted by oil (if deemed to result in a net environmental benefit)[6]	***EPS IS 5.1*** Establish Wildlife Branch if monitor and evaluate activities and/or operational monitoring have confirmed that wildlife are at risk of being contacted or have already been contacted by the spill	***MC IS 5.1.1*** Records demonstrate that Wildlife Branch established if wildlife impacts confirmed via monitor and evaluate or operational monitoring activities

[6] Capture and cleaning of oiled wildlife may result in additional stress and mortality than oil pollution alone. ConocoPhillips will determine during implementation of the OWR as to whether capture and cleaning of oiled wildlife will result in a net environmental benefit. This will be considered during the operational NEBA.

Environmental Performance Outcome	Performance Standard	Measurement Criteria
	EPS IS 5.2 Conduct oiled wildlife operations in accordance with ConocoPhillips' OWR – Implementation Plan (ALL/HSE/PLN/025)	***EPS 5.2.1*** Records demonstrate that oiled wildlife operations were conducted in accordance with ConocoPhillips' OWR – Implementation Plan (ALL/HSE/PLN/025)
Environmental Performance – Operational and Scientific Monitoring		
EPO IS 6 Implement relevant OMPs and SMPs	***EPS IS 6.1*** IMT will ensure operational and scientific monitoring initiation criteria are reviewed during the initial IAP and subsequent IAPs, and if any criteria are met, the relevant OMPs and/or SMPs will be activated.	***MC IS 6.1.1*** Records demonstrate that the IMT reviewed operational and scientific monitoring initiation criteria during the initial and subsequent IAPs, and when criteria were met, the relevant OMP and/or SMP was activated
	EPS IS 6.2 ConocoPhillips maintains the capability and capacity to deliver the OSMP through: • OSMP Implementation Plan describes the process for implementing the OSMP • Individual OMP and SMP methodology describe data acquisition techniques, personnel and equipment required to conduct OMPs and SMPs ConocoPhillips maintains access to OSMP resources through contracts with service and equipment providers	***MC IS 6.2.1*** Records demonstrate OSMP carried out in accordance with the following: • OSMP Implementation Plan • Individual OMP and SMP methodologies Service provider and equipment provider contracts in place and maintained.
Environmental Performance – Waste Management		
EPO IS 7 Collect, manage, transport and dispose of waste produced from response options to minimise secondary contamination of sensitive receptors	***EPS IS 7.1*** Use the ConocoPhillips ABU-W Waste Management Plan as guidance to collect, manage, transport and dispose of waste produced from response options	***MC IS 7.1.1*** Records demonstrate that the ConocoPhillips ABU-W Waste Management Plan was used as guidance to collect, manage, transport and dispose of waste produced from response options

Environmental Performance Outcome	Performance Standard	Measurement Criteria
	EPS IS 7.2 Waste management, storage, transport and disposal will comply with relevant legislation, conventions and standards, including: • Relevant NT and Commonwealth Regulations, including: - Marine Order 91 (Marine pollution prevention – oil) (as appropriate for vessel class) - Waste Management and Pollution Control Act (NT)	***MC IS 7.2.1*** Records demonstrate waste generated during a hydrocarbon spill response is managed, stored, transported and disposed of in accordance with relevant legislations, conventions and legislation, including: • Marine Order 91 • Waste Management and Pollution Control Act 2015
	EPS IS 7.3 ConocoPhillips to maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of waste management activities	***MC IS 7.3.1*** Records demonstrate that ConocoPhillips maintains contracts with waste management service providers capable of handling the types and volumes of wastes generated.

7.10.8 Operational and Scientific Monitoring Plan

ConocoPhillips' ABU Operational and Scientific Monitoring Program (OSMP) (ALL/HSE/PLN/032) describes a program of monitoring oil pollution that will be adopted in the event of a hydrocarbon spill incident (tier 2 or 3) to marine or coastal waters. The OSMP is the principal tool for determining the extent, severity, and persistence of environmental impacts from a marine hydrocarbon spill and informing remediation activities.

The OSMP is structured so that it can provide a flexible framework that can be adapted to individual spill incidents. The OSMP provides an overarching framework, applicable to all assets where ConocoPhillips is the Nominated Titleholder.

7.10.8.1 Operational Monitoring Focus Areas

Operational monitoring is undertaken during the course of a spill and comprises physical, chemical and environmental assessments. Operational monitoring collects information about the spill and associated response activities to aid situational awareness, planning and decision making for executing spill response or clean-up activities. Information collected from operational monitoring provides details about the extent and quantity of contamination and the effectiveness of response activities. This information includes monitoring the properties of the hydrocarbons released, including the state of weathering, bioavailability and spatial extent of the spill. Continued operational monitoring is used to determine the point at which no further environmental improvement outcomes can be achieved through continued response implementation. This monitoring will then finish when the spill response is terminated, usually because response objectives were met, and/or scientific monitoring was initiated.

7.10.8.2 Scientific Monitoring Focus Areas

Scientific monitoring focuses on the short- and long-term environmental impact assessment. It may occur in parallel to operational monitoring and can continue for some time after the spill event. Scientific monitoring addresses defined objectives and collects information to determine the potential short- and long-term and/or ongoing environmental impact attributable to the spill or the associated response activities and informs the requirements for scientific research and any potential remediation activity.

7.10.8.3 Operational Monitoring Reporting

Operational monitoring reporting will be provided on a daily basis to the IMT to maintain situational awareness and inform response option planning. Scientific monitoring reporting requirements will be specific to the individual monitoring plans initiated and are likely to include interim reports. The terms of responsibilities, report templates, schedule, quality assurance/quality control and peer review (if required) will be agreed with the nominated Environmental Service Provider(s) engaged to implement the individual monitoring plans.

Operational and scientific monitoring results will be discussed with relevant stakeholders as identified at the time. Monitoring reports will be shared with regulatory agencies/authorities if requested and inputs received from stakeholders will be evaluated and where practicable, will be used to refine the ongoing spill response and/or ongoing operational and/or scientific monitoring. The form, frequency, and content of discussions and reporting will be appropriate to the nature and scale of the incident.

7.10.8.4 Personnel and Response Readiness

ConocoPhillips has a number of existing contracts, master service agreements, and business support relationships and alliances with service providers in place to provide support in the event of a spill, as outlined in the OPEP (Appendix H), and additional contracts will be in place with Environmental Service Providers prior to the commencement of the activity, to deliver the OMPs and SMPs as required. The OSMP includes an implementation plan together with individual operational and scientific monitoring plans.

Indicative OSMP mobilisation time frames for personnel and resources are included in **Appendix F**.

7.10.8.5 Initiation and Termination of the OSMP

Criteria for initiating and terminating individual monitoring plans are provided in Appendix F. The final decision on activation and termination of the monitoring plans will be signed off by the ConocoPhillips IC, in consultation with the ConocoPhillips Environment Unit Lead. Additional stakeholders that may be consulted on initiation and termination include the following:

- AMSA if the spill is from a vessel;
- AMOSC and Environmental Service Providers;
- WA and/or NT DoT personnel if the spill has entered, or has the potential to enter State or Territory waters;
- DoEE, if Matters of National Environmental Significance are predicted to be affected; and
- WA and/or NT Fisheries Department's and AFMA.

7.10.9 Cyclone and Severe Weather Response

Cyclones and other severe weather events are a potential risk to the safety and health of personnel.

The timing of pipeline installation activities may overlap with the cyclone season (November to April, with most cyclones occurring between January and March). Vessel contractors must have a Cyclone Response Plan in place outlining the processes and procedures that would be implemented during a cyclone event, which will be reviewed and accepted by ConocoPhillips.

Activity vessels will receive daily forecasts from the BoM. If a cyclone (or severe weather event) is forecast, the path and its development will be plotted and monitored using the BoM data. If there is the potential for the cyclone (or severe weather event) to affect pipeline installation activities, the Cyclone Response Plan will be actioned. If required, vessels can transit away from the proposed track of the cyclone (or severe weather event).

7.10.10 Emergency and Spill Response Drills, Exercises and Audits

Exercises and drills are conducted annually to test the arrangements of the OPEP. The exercises are scheduled in the Crisis and Emergency Management Training Schedule which is located in the ABU Annual Exercise Plan folder, and include a number of exercise types, as outlined in **Table 7-9**.

Table 7-9: Exercise Types

Exercise Type	Description
Notification drill	Test procedures to notify and activate the IMT, oil spill response organisations, third party providers and regulators

Exercise Type	Description
Desktop drill	Normally involves interactive discussions of a simulated scenario amongst IMT members, but does not involve the mobilisation of personnel or equipment
Incident Management Exercise	Involves IMT activation to establish command, control, and coordination of a Tier 2 or 3 incident. Can simulate several different aspects of an oil spill incident and may involve third parties

The of this testing is to confirm that the response arrangements and capability in place is available when needed and function as intended. As part of the exercise process, ConocoPhillips prepares a number of documents to ensure drills and exercises are well planned, conducted and evaluated. To support this, the following documents are used:

- ABU-W Exercise Scope Document – provides background context to the exercise, outlines the exercise need, aim, objectives, details of the scenario, participating groups and agencies, exercise deliverables and management structure. This document can be used to engage a third-party contractor to assist in conducting the exercise.
- Exercise plan and instructions – provide instructions and 'play' (including any injects) for conducting the exercise.
- Post exercise report – includes an after-action review of the exercise, evaluating how the exercise performed against meeting its aim and objectives.

ConocoPhillips routinely undertakes post-exercise debriefings following Tier 2-3 OPEP exercises and drills to identify opportunities for improvement and communicate lessons learned. All actions that are derived from drills and exercises including debriefs are documented in the HSE Action Tracking System.

The following exercises and drills will be conducted to specifically test response preparedness outlined within the scope of the OPEP (**Appendix H**):

- test of arrangements when they are introduced or significantly amended;
- test of arrangements if a new location or activity is added to the EP after response arrangements have been tested, and before the next test is conducted;
- IMT desktop exercise conducted at least annually. This desktop exercise will test the arrangements in place for a Tier 2 or Tier 3 level spill as defined in the OPEP (BAA-100 0330). Where response arrangements are the same for a number of activity-specific OPEPs, one exercise may be used to test these response arrangements for these OPEPs at the same time.

8 STAKEHOLDER CONSULTATION

In accordance with the requirements of Regulations 11A and 14(9) of the OPGGS(E) Regulations, ConocoPhillips has consulted with interested and relevant stakeholders while preparing this EP.

This section outlines ConocoPhillips' stakeholder consultation principles, approach and methodology, how these were applied to this specific consultation program, the outcomes achieved and how stakeholders will be consulted on an ongoing basis.

ConocoPhillips has considered and addressed all feedback as appropriate and provided a detailed summary table supported by all relevant correspondence records.

8.1 Approach and objectives

ConocoPhillips understands the importance of thorough, meaningful and ongoing consultation with stakeholders as part of its social licence to operate and fulfilment of regulatory commitments. Our approach to consultation is embedded in our SPIRIT Value of integrity, which states that we will be ethical and trustworthy in our relationships with stakeholders.

ConocoPhillips' 'Principles for Effective Non-Financial Stakeholder Engagement' provide corporate guidance and expectations and commit ConocoPhillips to:

- proactively identifying and engaging with stakeholders at an early stage;
- including stakeholders in the design and implementation of the engagement process;
- listening to and understanding stakeholders' interests, concerns and culture;
- communicating openly and transparently;
- seeking solutions that create mutually beneficial business and engagement approaches and build long-term value for both the Company and our stakeholders; and
- following through on our commitments and being accountable for the results, both internally and externally.

This approach is implemented through ConocoPhillips' stakeholder management standards, systems and practices and reflective of approaches commonly adopted by the oil and gas industry, within Australia and internationally.

More specifically, it addresses stakeholder consultation requirements for EPs established under OPGGS (E) Regulation 11A and 14(9) and aligns with NOPSEMA's consultation guidance on the application of the Regulations. The key sources of guidance for stakeholder engagement used by ConocoPhillips are summarised in **Table 8-1**.

Table 8-1: Stakeholder engagement guidance sources

Internal	• Corporate Principles for Stakeholder Engagement • Corporate Stakeholder Engagement Action Plan
External	• Australian regulatory agencies (legislation and guidelines) – NOPSEMA, NT Department of Primary Industry and Resources, AFMA • Australian industry organisations (principles and methodology) – APPEA • International organisations (guidelines) – IPIECA, American Petroleum Institute, International Finance Corporation, International Association for Public Participation

ConocoPhillips is committed to ensuring that stakeholders are kept informed of its activities and that clear response mechanisms are in place to receive feedback on relevant issues to inform development of each EP. ConocoPhillips's HSE Management System establishes, at Element 11, the requirements for engagement with stakeholders during the HSE function conducting its activities. The HSE and External Relations functions work in collaboration to ensure the relevant regulations and associated consultation and content guidance provided by NOPSEMA and other relevant organisations are understood and followed.

ConocoPhillips has been a titleholder and operator of the exploration, appraisal and development activities supporting the Barossa Project since 2004, developing relationships with a range of stakeholders. These include Commonwealth and NT Government departments, commercial fishing associations and licence holders, scientific and educational organisations (including recognised experts), spill response agencies, local business associations, other oil and gas industry operators, contractors and non-government organisations.

Based on its history of proactive consultation, ConocoPhillips believes stakeholders largely support development of the Barossa Project and the continued economic benefits it will deliver to Australia, in particular Darwin and the NT. Engagement since 2012 has included the provision of information and opportunities for discussion with stakeholders on the plans to develop the Barossa area as the source for a potential future backfill gas supply for the Darwin LNG facility. This engagement included consultation during development of EPs for appraisal drilling campaigns in 2012/13 and 2016 and a marine seismic survey in 2016 and during the development of the Barossa OPP over 2017/18.

The Barossa Gas Export Pipeline Installation EP is the first EP prepared since acceptance of the OPP. The consultation program for the EP, which commenced in mid-January 2019, was designed to meet the following objectives:

- update stakeholders on the future plans for development and consultation to be conducted over a period of years;
- explain the scope of activities to be covered in the EP;
- explain how ConocoPhillips will identify and mitigate potential risks that may impact stakeholders;
- obtain information and advice regarding oil spill response resources and capability;
- understand any concerns, objections or claims that stakeholders may have in relation to the EP;
- address stakeholder concerns arising from the EP and requirements for ongoing consultation; and
- inform stakeholder/s about how their concerns have been addressed and how they will be represented to NOPSEMA in the EP.

The minimum period that should be afforded stakeholders for consultation on proposed activities prior to an EP's submittal to the regulator is not mandated in the governing regulations. As per NOPSEMA's guidelines, ConocoPhillips determined an appropriate timeframe based on the nature of the proposed activity and our understanding of the likely issues and concerns that may be raised by stakeholders and need to be addressed and discussed with them. In the case of this EP, a 20-week consultation period was determined as appropriate considering the nature and scale of the activity.

8.2 Identification and classification

Consistent with Regulation 11A of the OPGGS(E) Regulations, ConocoPhillips must define stakeholders as either 'relevant' or 'interested'. The Regulations state that 'relevant' stakeholders are:

- persons or organisations whose functions, interests or activities may be affected by the pipeline activities to be carried out under the EP; (in this instance the activity means the pipeline installation); and
- those that have a regulatory role (Commonwealth or State/Territory).

Prior to development of the EP, ConocoPhillips reviewed its stakeholder database to verify all existing stakeholders that would be relevant to this activity and ensure any new stakeholders were captured.

An internal exercise then identified potential stakeholder-specific issues that needed to be addressed and cross-referenced these with the outcomes from the ENVID workshop and risk assessment conducted as part of the EP preparation process. Around 100 stakeholders were identified, with just over 50 of these considered 'relevant' for this EP.

Stakeholder groups identified included Commonwealth Government Departments and Agencies, fishing industry associations, commercial fishing licence-holders and guided fishing companies operating close to the gas export pipeline within Commonwealth Waters. Spill response agencies with a role to play should an incident occur during the proposed activities were also consulted during preparation of the OPEP.

Issues, risks and opportunities associated with the gas export pipeline installation activities were mapped to stakeholders' interests. To ensure consistency with regulatory requirements, ConocoPhillips adapted its categorisation and definition of stakeholder groups to broadly align with those used by NOPSEMA.

Within the broad stakeholder groupings, the following list of stakeholders was identified as being interested or relevant for Commonwealth waters and NT Coastal Waters (for the OPEP).

Table 8-2: Full list of stakeholders

Organisation	Stakeholder Group
Relevant	
A. Raptis & Sons Pty Ltd	Industry
Amateur Fishermen's Association of the Northern Territory (AFANT)	Other marine users
Aquarium Fishery NT Commercial License Holders	Industry
Arafura Bluewater Charters	Industry
Austfish Pty Ltd	Industry
Austral Fisheries Pty Ltd	Industry
Australia Bay Seafoods	Industry
Australian Fisheries Management Authority (AFMA)	Commonwealth Government (Govt.)
Australian Marine Conservation Society	Associations
AMOSC	OPEP
AMSA	Commonwealth Govt/OPEP
Australian Southern Bluefin Tuna Industry Association	Industry Associations
Bathurst Island Lodge	Other marine users
Beach Energy	Industry
Clearwater Island Lodge	Other marine users

Organisation	Stakeholder Group
Commonwealth Fisheries Association	Industry Associations
Darwin Port Corporation	NT Govt/OPEP
Demersal Fishery NT Commercial License Holders	Industry
Department of Agriculture and Water Resources, Commonwealth	Commonwealth Govt
Department of Defence (including Australian Hydrographic Service and Maritime Border Command)	Commonwealth Govt
Department of Environment and Natural Resources (Marine Ecosystems), NT	NT Govt
Department of Foreign Affairs and Trade	Commonwealth Govt
Department of Industry, Innovation and Science	Commonwealth Govt
Department of Infrastructure, Planning and Logistics NT	OPEP
Department of Primary Industry and Resources (Fisheries) NT	NT Govt
Department of Primary Industry and Resources (Mines and Energy) NT	NT Govt
Department of the Environment and Energy (including Parks Australia)	Commonwealth Govt
ENI Australia	Industry
Environment Centre, NT	Associations
Fischer, Horst (commercial fishing license holder)	Industry
INPEX	Industry
Jamaclan Marine Services	Industry
Melbana Energy	Industry
Member for Arafura, NT	NT Govt
Monsoon Aquatics	Industry
Neptune Energy	Industry
Northern Land Council	Associations
Northern Prawn Fishery (NPF)	Industry Associations
Northern Territory Guided Fishing Industry Association (NTGFIA)	Industry Associations
Northern Territory Seafood Council (NTSC)	Industry Associations
Northern Trawl Owners Association	Industry Associations
Northern Wildcatch Seafood Australia	Industry
NT Ports and Marine (Melville Island)	Industry
Office of the Minister for Primary Industry and Resources, NT	NT Govt
Office of the Minister for Environment and Natural Resources, NT	NT Govt
Offshore Net and Line Fishery Commercial License Holders	Industry
Oil Spill Response Ltd	OPEP
Origin Energy	Industry
Paspaley Pearling Company	Industry

Organisation	Stakeholder Group
Pearl Oyster Fishery Commercial License Holders	Industry
Santos	Industry
Sea Turtle Foundation	Associations
Shell Australia	Industry
Spanish Mackerel Fishery (NT) License Holders	Industry
Tellurian Inc	Industry
Timor Reef Fishery License Holders	Industry
Tiwi Island Adventures	Other marine users
Tiwi Land Council	Other marine users
WA Seafoods	Industry
Interested	
Aboriginal Areas Protection Authority	Associations
Australian Institute of Marine Science	Research
Australian Petroleum Production and Exploration Association	Industry Associations
Centre for Whale Research	Research
Chamber of Commerce NT	Associations
Charles Darwin University	Research
Clearwater Island Lodge	Other marine users
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Research
Department of Environment and Natural Resources, NT	NT Govt
Department of resources, Energy and Northern Australia	Commonwealth Govt
Department of the Chief Minister NT	NT Govt
Department of Tourism and Culture, NT	NT Govt
Department of Trade and Business Innovation NT	NT Govt
Edith Cowan University	Research
Environmental Defenders Office NT	Non-Government Organisation (NGO)
Environmental Protection Authority NT	NT Govt
Federal Member for Solomon NT	Commonwealth Govt
Fisheries Research Development Council NT	Research
Geoscience Australia	Commonwealth Govt
Monash University	Research
NOPTA	Commonwealth Govt
Office of Aboriginal Affairs	NT Govt
Office of the Chief Minister NT	NT Govt
Office of the Leader of the Opposition NT	NT Govt

Organisation	Stakeholder Group
Office of the Minister for Energy and Environment Cwlth	Commonwealth Govt
Office of the Minister for Environment and Natural Resources NT	NT Govt
Office of the Minister for Indigenous Affairs Cwlth	Commonwealth Govt
Office of the Minister for Industry, Innovation and Science Cwlth	Commonwealth Govt
Office of the Minister for Infrastructure, Planning and Logistics NT	NT Govt
Office of the Minister for Primary Industry and Resources NT	NT Govt
Office of the Minister for Resources and Northern Australia Cwlth	Commonwealth Govt
Office of the Minister for Tourism and Culture, NT	NT Govt
Office of the Minister for Trade, Business and Innovation, NT	NT Govt
Office of the Senator for the Northern Territory	Commonwealth Govt
Pearl Producers Association	Industry Associations
Pendoley Environmental	Research
RPS Group	OPEP
Shadow Minister for Industry, Innovation and Science Cwlth	Commonwealth Govt
Shadow Minister for Resources and Northern Australia Cwlth	Commonwealth Govt
Shadow Parliamentary Secretary for Northern Australia Cwlth	Commonwealth Govt
WA Fishing Industry Council (WAFIC)	Industry Associations
Whale and Dolphin Conservation (WDC)	NGO
Wilderness Society	NGO
World-Wide Fund for Nature (WWF)	NGO

8.3 Methods and Tools

ConocoPhillips is mindful of NOPSEMA guidance which advises that the time required for consultation varies depending on the individual circumstances of the relevant person, the proposed activity, the extent of potential impact to that relevant person and the level of information that has been provided.

For this EP, ConocoPhillips built flexibility into the timeframe and processes to incorporate the differing requirements of stakeholders and incorporated the updated requirements around sensitive information contained in Regulation 4 of the OPGGS (E) Regulations. Each stakeholder providing feedback was asked to advise ConocoPhillips if any information provided during consultation was sensitive information which should not be published.

During the consultation period, ConocoPhillips gave all stakeholders an appropriate time to assess the information provided and consider ConocoPhillips' responses. Stakeholder engagement occurred over 20 weeks in three stages:

- Initial feedback period for all interested and relevant stakeholders including an additional week for any late feedback - 15 January 2019 to 19 February 2019 (approximately five weeks);
- Direct follow-up by ConocoPhillips with all relevant stakeholders – 19 February to 16 April 2019 (approximately eight weeks); and

- Additional time for all relevant stakeholders to provide comment and a final period of direct follow-up (approximately seven weeks to 30 April 2019).

Throughout this entire period feedback from stakeholders was considered at any time up to the final weeks of the EP's preparation for submittal, i.e. four weeks after the 20-week period.

In mid-January a fact sheet was initially provided under covering email or letter to all 'relevant' and 'interested' stakeholders. The information provided included:

- A project overview, including the development concept;
- The project's current status;
- The proposed pipeline route, installation, operational area and timing/schedule;
- The regulatory and consultation process; and
- Detailed links to relevant sections of the accepted OPP.

In addition to this fact sheet, tailored information on issues and concerns of relevance to the commercial fishing industry was provided to all commercial fishing stakeholders, including government departments, at the request of the WA Fishing Industry Council and the NT Fishing Industry Council.

ConocoPhillips responded via email to all correspondence and proactively sought meetings with relevant stakeholders with direct activities in or adjacent to the proposed pipeline installation area. The co-ordinates of the proposed pipeline route were provided to all commercial fishing industry stakeholders.

ConocoPhillips then conducted direct follow-up via phone and email contact with all 'relevant' stakeholders resulting in a range of meetings. During this period ConocoPhillips left detailed messages when unable to contact stakeholders and continued to respond via email to all feedback.

During consultation, most stakeholders did not provide any written feedback. Where stakeholders did provide written feedback, the consultation is summarised in **Table 8-3** at the end of this section and full records provided in **Appendix E**.

If a comment was provided by a stakeholder during a meeting or phone discussion but not followed-up by the stakeholder with an email, ConocoPhillips initiated its own summary of the issues raised and its assessment back in writing to the stakeholder.

All relevant/interested stakeholders who raised either written or verbal issues, concerns or claims during the consultation process were provided with written details, where required, indicating how their concerns had been or would be addressed.

Throughout the consultation process, ConocoPhillips sought to provide fully considered and appropriate written responses to issues as soon as possible, dependant on the nature of the required response and the information that was available to be provided.

If responses could not be provided within the original advised response period, ConocoPhillips advised stakeholders as such and provided an update to the stakeholder as to when a written response would be provided.

Following the direct follow-up period, ConocoPhillips also prepared a consolidated document on the issues raised and responses provided and published this on its external website along with the power point presentation that had been provided at stakeholder meetings.

ConocoPhillips sent further correspondence to all relevant stakeholders providing further opportunity to comment, advising that information was also available on the website and following this conducted direct follow-up with several stakeholders.

At the end of this period all stakeholders were advised that the EP was in its final stage of preparation and were thanked for their input. All stakeholder feedback received over the duration of the stakeholder engagement program has been recorded and is stored in ConocoPhillips' records management system. A record of all relevant meeting notes, phone calls and email exchanges, along with copies of project letters and fact sheets have been incorporated in **Appendix E**: Stakeholder Consultation to this EP.

8.4 Consultation Outcomes

The majority of stakeholders did not have specific issues or concerns, as evidenced by the detailed consultation summary and records of correspondence.

Many of the 'relevant' stakeholders engaged via phone call advised they were only likely to provide feedback via email if they had concerns. Others advised that if an email had not been provided it could be assumed there were no concerns.

Of the 100 stakeholders, 19 raised issues or concerns or sought additional information. Meetings were conducted with 17 of these stakeholders and written responses were provided by ConocoPhillips to all.

There were three areas of concern raised:

1) impacts and risks to the seabed and nearby habitat due to pipeline installation;
2) impacts and risks to other vessels and activities being conducted at the same time in the same area as installation was occurring; and
3) impacts and risks to the marine environment generally, but specifically due to installation occurring partly within a marine park and occurring during increased periods of turtle activity.

The following is a summary of the consultation outcomes for the key stakeholder groups while further detail for every stakeholder is provided in the stakeholder consultation table at the end of this section.

8.4.1 Commonwealth Government

A total of ten Commonwealth Government departments were contacted, the AFMA, the AMSA and Parks Australia within the DoEE. Nine offices of Ministerial and other political officeholders were also contacted.

Consultation principally occurred with Parks Australia via the pipeline licence application (**Section 2.1.4.1**), but the agency was also provided opportunity to provide feedback on the EP.

One agency, the Department of Agriculture and Water Resources, sought further information on biosecurity arrangements while AFMA provided advice on fisheries to be consulted. ConocoPhillips provided timely responses and no further action was required for these stakeholders for the preparation of the EP.

8.4.2 NT Government

While the scope of activities for this EP is entirely in Commonwealth Waters, ConocoPhillips contacted 11 NT Government departments, including the Mines and Energy and Fisheries divisions of the Department of Primary Industry and Resources, the Environment division of the Department of Environment and Natural Resources and the Darwin Ports Corporation. Eight offices of Ministerial and other political officeholders were also contacted.

ConocoPhillips initiated meetings with four departments - Fisheries; Infrastructure, Planning and Logistics, Mines and Energy; and Darwin Port.

The Department of Fisheries provided information on additional fishing licence-holders to be consulted and fishing activity periods and productive areas. In addition to answering the Department's specific queries in writing, ConocoPhillips provided the department with the tailored information provided to commercial fishing licence holders on their relevant issues and concerns. No further issues or concerns were raised by the Department.

The other three meetings were primarily information-sharing and did not raise any issues or concerns. The four departments will be involved in future discussions with ConocoPhillips related to the planning of pipeline installation activities.

8.4.3 Industry Associations

Of the nine industry associations contacted, eight represent commercial fishing licence-holders. Four of the nine associations, Northern Prawn Fishery Industry (NPFI), NTSC, WAFIC and NTGFIA, responded to ConocoPhillips' requests for feedback.

The WAFIC and the NTSC requested that tailored information addressing issues and concerns of relevance to the commercial fishing industry also be prepared by ConocoPhillips and provided to the associations.

ConocoPhillips provided this information to both the associations and all commercial fishing stakeholders, including licence-holders, along with coordinates for the proposed pipeline route.

The WAFIC advised it was not a relevant stakeholder for the activity covered by this EP while the NTSC did not notify ConocoPhillips of any issues or concerns.

A meeting was held with the NT Guided Fishing Industry Association at which the following issues and concerns were raised:

1) impacts and risks to the seabed and nearby habitat due to pipeline installation, and
2) impacts and risks to other vessels and activities being conducted at the same time in the same area as installation was occurring.

The NPFI raised the same issues in writing to ConocoPhillips with specific concerns raised for prawn stocks and habitat and sawfish populations.

ConocoPhillips responded in writing to all concerns. In addition, ConocoPhillips committed to ongoing consultation with the Northern Prawn Fishery Industry with regard to the safe interaction of vessels and activities during the pipeline installation once further detail and clarity around timeframe was available.

8.4.4 Industry/Business

Commercial fishing interests are the key industry stakeholders in their capacity as co-users of the Commonwealth waters within which the gas export pipeline is located. ConocoPhillips provided initial and tailored written information to more than 40 licence-holders across all relevant fisheries and followed-up with phone calls to 12 businesses or individuals and their relevant association representatives.

Meetings were conducted with five businesses: Austral Fisheries, NT Spanish Mackerel Fishery representatives and three guided fishing operators located on the Tiwi Islands, Bathurst Island Lodge, Clearwater Islands Resort and Tiwi Island Adventures.

At all five meetings the following issues and concerns were raised:

- impacts and risks to the seabed and nearby habitat due to pipeline installation; and
- impacts and risks to other vessels and activities being conducted at the same time in the same area as installation was occurring.

Each stakeholder also had specific questions related to their operations and areas of activity, further details of which are provided in the stakeholder consultation table at the end of this section.

ConocoPhillips responded in writing to all concerns. Two stakeholders advised they were satisfied with the responses while no further issues or concerns were raised by the other two stakeholders.

In addition, ConocoPhillips committed to ongoing consultation all the stakeholders regarding the safe interaction of vessels and activities during the pipeline installation once further detail and clarity around timeframe was available.

The other main industry with interests and/or operations in the area is the oil and gas industry and 11 companies were contacted. Again, the limited number that responded advised they had no concerns or would only respond if they had concerns or queries.

8.4.5 Other Marine Users

Recreational fishing and military exercises are the other key activities that are or can be active in the area. The recreational fishing representative organisation, AFANT, raised similar issues and concerns to commercial fishing stakeholders while the Commonwealth Department of Defence did not raise any concerns or queries.

A meeting was held with AFANT at which the organisation also sought information on the rationale for the pipeline route partly traversing a marine park and expressed the importance of ConocoPhillips communicating relevant information and outcomes with stakeholders.

ConocoPhillips responded in writing to all AFANT concerns and the stakeholder did not raise any further issues or concerns.

ConocoPhillips committed to ongoing communication on its activities and consultation on the safe interaction of vessels and activities during the pipeline installation once further detail and clarity around timeframe was available.

8.4.6 Environmental Interest Groups

Nine environmental interest groups were provided written information and follow-up was made by phone to five of these, including the three NT-based organisations that had previously made submissions on the Offshore Project Proposal.

Two organisations, the Australian Marine Conservation Society and the Environment Centre NT, requested a joint meeting with ConocoPhillips to discuss its concerns related to the following:

- impacts and risks to the seabed and nearby habitat due to pipeline installation;
- impacts and risks to the marine environment generally, but specifically due to installation occurring partly within a marine park and occurring during increased periods of turtle activity; and
- impacts and risks to marine fauna due to increased vessel movements.

The stakeholders were specifically concerned that pipeline installation should not occur in a marine park nor during any turtle inter-nesting periods.

ConocoPhillips responded in writing to all the concerns raised and the stakeholders did not raise any further issues or concerns. ConocoPhillips committed to ongoing communication on its activities to the stakeholders.

8.4.7 Indigenous Groups

The Tiwi Islands are the nearest land mass to the pipeline route in Commonwealth Waters. ConocoPhillips has been consulting with the Tiwi Land Council (TLC), the governing indigenous-based organisation for the Islands, on an ongoing basis since late 2016.

This engagement included two workshops held in 2018 to verify desktop studies and gain a deeper understanding of the environmental, social, cultural and economic sensitivities for the Tiwi Islands through direct engagement. The initial workshop was held on 25 October with Traditional Owners identified by the TLC while the second workshop, held on 13 December, was more targeted and attended by TLC marine and land rangers. The information gained was used in the preparation of the OPEP supporting this EP.

Both the TLC and the Northern Land Council (NLC) were then consulted for the EP during the formal consultation period that commenced in January 2019. The NLC advised it was happy to be considered an ‘interested’ stakeholder only provided consultation was occurring with the TLC and it (the TLC) was satisfied with the process and ConocoPhillips’ responses.

A meeting with the TLC to discuss the gas export pipeline installation EP discussed the TLC’s issues and concerns related to impacts and risks to the seabed and nearby habitat and turtle activity due to pipeline installation.

ConocoPhillips responded in writing to all the concerns raised and the TLC advised it was satisfied with the responses. ConocoPhillips is committed to ongoing dialogue with the TLC on the gas export pipeline installation and all activities associated with the Barossa Project.

8.4.8 Research/Education Groups

Six research and/or education organisations with interests in Commonwealth and/or NT Waters were provided written information and follow-up was made by phone to two with no responses received. A meeting was held with a representative of Edith Cowan University at the request of the Australian Marine Conservation Society and no issues or concerns were raised.

8.4.9 Summary

ConocoPhillips’ view is that all stakeholders have been provided information in a fair and reasonable timeframe for the discussion and assessment of all issues raised during the course of the consultation period, and that this has been accurately represented in the EP, as presented in the detailed summary of consultation.

The consultation records demonstrate the lengths to which ConocoPhillips has undertaken its regulatory responsibilities and applied its corporate principles to ensure stakeholders, in particular co-users with the same access rights to conduct activities in the marine environment, are fully informed and aware of how the issues they have raised have been addressed by ConocoPhillips in the EP that will be presented to the regulator.

Of the 19 stakeholders that raised issues and concerns or sought additional information, nine advised they were happy with the responses provided by ConocoPhillips. The other stakeholders were followed-up by ConocoPhillips directly and did not raise any further issues or concerns.

ConocoPhillips has committed to ongoing communication and consultation with those stakeholders who have indicated they will or may be operating in the area and have particular concerns related to vessel interaction as well as those stakeholders with interest in how ConocoPhillips will manage the impacts and risks of its activities to the marine environment.

8.5 Ongoing Process

ConocoPhillips is committed to ongoing consultation in relation to the progress of pipeline installation activities as part of a broader commitment to thorough stakeholder engagement around its operations. An important aspect of this approach is to understand from each stakeholder how they wish to be consulted. ConocoPhillips is committed to ongoing consultation with all stakeholders relevant to the future installation of the gas export pipeline. This will occur in three ways:

- gas export pipeline installation activity notification;

- regular activity updates; and
- general enquiry process.

As operator of the Barossa Project and other oil and gas activities offshore of the NT, ConocoPhillips expects to be undertaking a number of activities over coming years that will require frequent stakeholder consultation. With a high number of common stakeholders across these activities, ConocoPhillips plans to introduce a quarterly stakeholder update covering all current and future activities. It is expected that the first update will be published in Q1 2020. ConocoPhillips will use the quarterly updates to complement, not replace, stakeholder consultation requirements in Regulations 11A and 14(9) of the OPGGS(E) Regulations.

8.5.1 Pipeline installation activity notification

ConocoPhillips will directly advise (via email) all interested and relevant stakeholders that the full EP is available on the NOPSEMA website once it has been published and then accepted.

Relevant stakeholders who have identified themselves or been identified by ConocoPhillips as other users/potential users of the marine environment will be contacted as part of an ongoing consultation process that may include meetings and/or email communication, depending on the discussions with each stakeholder.

In addition to regular meetings that may be held with specific stakeholders, ConocoPhillips will provide quarterly updates starting well before any activities may commence. A dedicated Barossa email address will continue to be made available at all times for any queries regarding the activity.

Prior to commencement of the installation activities, ConocoPhillips will make direct contact with its relevant stakeholders to inform them that the activity will be occurring. This is followed up by an email advice and meetings as required to all potential users of the area including commercial fishers.

This notification will advise stakeholders of the names of the vessels and who will be undertaking the work on ConocoPhillips behalf and all notifications are also provided to the Australian Hydrological Service and AMSA for Commonwealth waters and the Darwin Harbour Master for NT waters prior to and during the duration of the activities in compliance with all maritime safety and navigation procedures.

The steps below detail ConocoPhillips approach to consultation closer to the period when the activities will take place.

Lead-up Period:

- provide a latest version of a Stakeholder Communication and Consultation Plan to stakeholders (via email) three weeks prior to commencement date of activity;
- provide notification to AHS and AMSA three (3) weeks prior to commencement date of activity;
- provide a weekly activity update to stakeholders (via email) with information to include the status of approvals, details of the vessels undertaking the activities, and the proposed schedule, starting two weeks prior to commencement date of activity;
- follow-up telephone contact with stakeholders who have not responded to email prior to commencement date of activity; and
- manage stakeholder queries (via email/phone; fortnightly teleconference and, separate meeting if required) as per assessment process stated below.

Activity Period:

- provide weekly status report, including information regarding activity progress, look-ahead for coming week and vessel interactions to stakeholders via email;

- provide opportunity for stakeholders to have direct access to ConocoPhillips representatives to discuss any concerns; and
- manage stakeholder queries (via email/phone; weekly teleconference and, separate meeting if required) as per assessment process stated below.

Post Activity Period:

- provide notification (via email) to stakeholders that activity has been completed; and
- manage stakeholder queries (via email/phone; meeting if required) as per enquiry communication and consultation process below.

8.5.2 General Enquiries Process

At all times ConocoPhillips manages external enquiries and concerns on an ongoing basis through active and transparent engagement to ensure issues are identified and resolved in a mutually satisfactory manner. Stakeholders are encouraged to make contact with ConocoPhillips directly and immediately if a concern is identified. For the Barossa Project's activities, a specific email address will continue to be used and regularly monitored.

After queries are received, they are forwarded to ConocoPhillips' External Relations (ER) Function to be formally recorded. ER and the Function directly responsible for the activity, in this case HSE, have joint responsibility to ensure the enquiry is appropriately assessed, answered and recorded within appropriate timeframes.

Under this general process for all external inquiries, ConocoPhillips endeavours to acknowledge receipt of an enquiry within one working day and seeks to address all correspondence in a timely manner, based on the complexity of the required response, and in accordance with the provision of an open feedback mechanism as defined within performance standards commonly adopted internationally by the oil and gas industry. Under this process, stakeholders are advised in a timely manner when they can expect to have their query answered in writing.

The flow chart below (**Figure 8-1**) shows the Communication and Enquiry Management Process that is used by ConocoPhillips to address external inquiries. This process will be used for management of enquiries from all identified stakeholders and the general public related to the pipeline's installation activities.

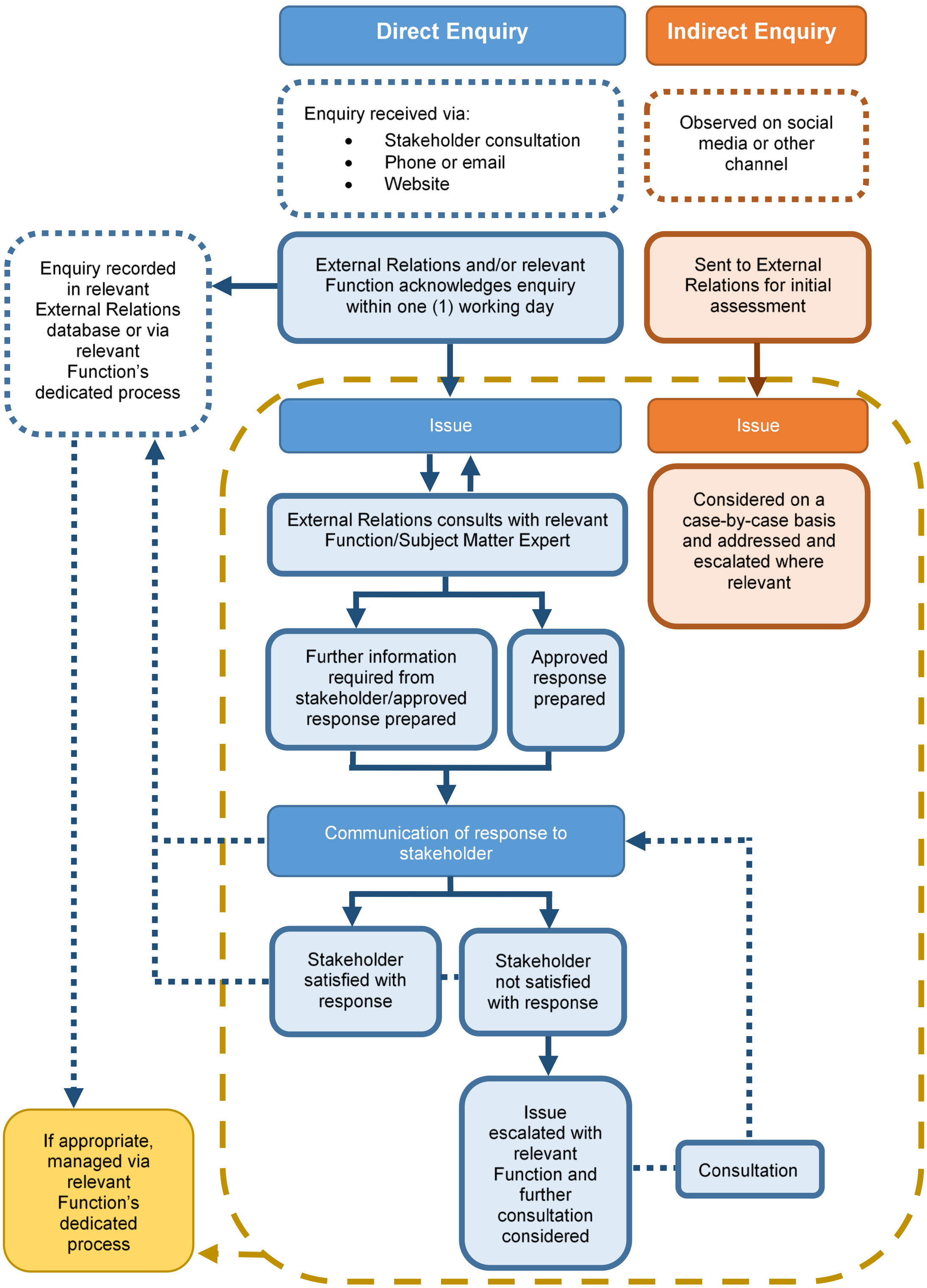


Figure 8-1: Communications and enquiries flowchart

8.6 Consultation Summary Table

A detailed summary of the consultation conducted for this EP is provided in **Table 8-3**. The table include dates of meetings, telephone discussions and written communications; the issues, objections and claims raised by stakeholders; how ConocoPhillips has assessed this information; and ConocoPhillips' response to each issue, objection and claim.

Every effort has been undertaken to ensure the table, while a summary, represents a true and accurate reflection of the consultation undertaken and views expressed by stakeholders and ConocoPhillips for every interaction listed.

Table 8-3: Stakeholder consultation summary table

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
Relevant Stakeholders				
A Raptis and Sons				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to OPP sections. Initial feedback was requested by 19 February 2019	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21 Feb 2019	Telephone discussion and follow-up email provided by ConocoPhillips with pipeline route coordinates. Raptis advised if it had not responded by now, it meant they had no concerns.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Amateur Fisherman's Association NT (AFANT)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019	The following information was provided by ConocoPhillips to the stakeholder in response to the issues and concerns raised at a meeting held on 19 March (see entry in left column): **1 Impact in Marine Park and Habitat Protection Zone** ConocoPhillips identified several preliminary pipeline routes following a review of available information on the bathymetry, seabed topography and underlying geology relevant to each route. This was done during the early design phases of the Barossa Project and included a range of contingencies to account for uncertainty around the requirements of the Project. Given several pipeline routes were under consideration, the Barossa OPP that was published for public comment allowed for a number of potential route alignments within a pipeline corridor, both within and outside the Oceanic Shoals marine park. These potential pipeline routes were subject to further survey and engineering studies to determine their technical feasibility. Based on the additional work, the previously considered routes to the alternative western tie-in point on the Bayu-Undan pipeline (the western route alignment within the marine park) were ruled out as not being technically feasible due to the presence of significant seabed features and highly irregular seabed topography along the southern section of that alignment that could not be avoided. Dropping this western route alignment also had the advantage of minimising the length of pipeline route that	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1 and 3) did not result in any specific amendments to the EP. The issues and concerns related to communications (2, 4 and 5) helped inform the commitments ConocoPhillips has made in the ongoing communications process.	ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
31 Jan 2019	ConocoPhillips phoned and left message to offer meeting in Darwin the following week. No response received.			
21 Feb 2019	Telephone discussion and follow-up email with pipeline route coordinates sent by ConocoPhillips. Meeting to be held.			
19 Mar	Meeting held in Darwin with AFANT representative.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
2019		overlaps the Oceanic Shoals marine park and allowed for a much narrower pipeline corridor to be defined in the Barossa OPP. As a result, three candidate pipeline routes were the subject of a feasibility and practicability assessment. Within the Oceanic Shoals marine park: • Two central route alignments (excluding the original preliminary pipeline route) within the Oceanic Shoals marine park that intersect the multiple use zone and HPZ of the Oceanic Shoals marine park, tying into the existing Bayu-Undan to Darwin pipeline at the preferred eastern tie-in location. Outside the Oceanic Shoals marine park HPZ: • An eastern route alignment, i.e. crossing the shallow water area located between the marine park and the Tiwi Islands. This route would require secondary stabilisation of the pipeline due to the relatively shallow and rugose seabed. Secondary stabilisation methods could include rock dumping, pre-lay and post-lay trenching or dredging, resulting in greater environmental impact. Engineering and design activities have focused on the two central route alignments within the Oceanic Shoals marine park HPZ (the proposed route and the discounted central route alignment). Seabed conditions and expected span rectifications were considered to be similar for both of the routes, with the proposed route being selected as it achieves the following benefits: • minimises the area that the pipeline route needs to overlap the Oceanic Shoals marine park HPZ • minimises the amount of seabed installation required and eliminates secondary stabilisation requirements for pipeline installation (which would be required to install the pipeline along the eastern route alignment located in the shallow water area outside the marine park HPZ) • minimises, as much as practicable, the installation of the pipeline over areas of seabed that are associated with the seafloor features/values of the shelf break and slope of the Arafura Shelf and carbonate bank and terrace system of the Van Diemen Rise KEFs • reduces inspection, maintenance and repair (IMR) requirements during operations, compared to all other alternative route alignments considered. The reduced route length and smoother seabed profile (less spans) represents the shortest length of pipeline required and minimises the amount of seabed installation and stabilisation required, requiring the shortest installation campaign, thereby minimising the time installation activities will overlap with inter-nesting habitat critical		
22 Mar 2019	ConocoPhillips emailed AFANT with list of issues/questions raised at meeting and advised we would respond in writing as soon as possible: 1. Pipeline installation activities specifically within the Marine Park and Habitat Protection Zone, the impact of these activities on the sea floor and marine environment, particularly fish and fish habitat, and how these impacts will be mitigated and managed by ConocoPhillips in terms of achieving net reduction in environmental harm 2. It is ConocoPhillips' role to properly and clearly communicate its reasons for seeking to route the pipeline through the Marine Park and HPZ and its evidence related to impacts 3. While the number of recreational fishers that would conduct activities more than 100 kms from the mainland is limited, the southern section of the pipeline route enters a pristine and highly valued fishing area and recreational fishing activities do occur there from time to time. 4. AFANT also represents charter fishing businesses, some of whom are active in the area. Their customers are recreational fishers who have paid for a remote fishing/tourism experience and do not expect to have their experience impacted by the sight of industrial activities. Therefore, advance communications by ConocoPhillips of work schedules and vessel presence will be critical. 5. Overall, public communication by ConocoPhillips of its planned activities, both prior to and during the pipeline installation, will be essential to ensure other marine users understand and have opportunity to comment on the impacts			
10 April 2019	ConocoPhillips provided written responses to the issues and concerns raised during the meeting of 19 March, noting that one of the responses included a change to the indicative schedule. ConocoPhillips had previously advised that the activities associated with the installation of the pipeline are expected to commence as early as Q1 2021 and finish as late as Q2 2023. The finish date is now 'as late as Q1 2024'. All other indicative schedule information is the same, including the duration period of approximately nine months for the activities. ConocoPhillips advised we would contact the stakeholder to check if there were any further issues or concerns.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that they did not want to be published by NOPSEMA following EP submittal.	to the survival for marine turtles. Installation and operation of a pipeline with the HPZ of the marine park is allowable with authorisation from the Director of National Parks, and ConocoPhillips has worked closely with Parks Australia to achieve this authorisation. The pipeline activities are considered to be consistent with the management objective of the HPZ within the Oceanic Shoals marine park. Although the presence of the pipeline will result in a small direct loss of benthic habitat, there will be no impact on the habitat representativeness or habitat diversity of the marine park. Where the pipeline traverses the HPZ, it is distant from seafloor features associated with the key ecological features (KEFs) considered values of the marine park. Therefore, no impacts to KEFs and values of the marine park are expected from pipeline activities within the HPZ. **2 Communications** The Barossa Gas Export Pipeline Installation EP submitted to NOPSEMA for assessment will include information updated from that previously published in the draft and accepted versions of the Barossa OPP. The Gas Export Pipeline Installation EP will be published in full by NOPSEMA on its submittal. ConocoPhillips will also provide advice of any decision by Parks Australia and link to the information provided by the agency. **3 Impact on recreational fishing** The pipeline will be constructed from carbon steel and have an external anti-corrosion coating, concrete weight coating and anodes to maintain integrity. It will be laid using a continuous assembly pipe-welding installation method with sections of pipe gradually lowered to the seabed behind the pipelay vessel using an S-lay method. This method is commonly used in offshore pipeline installation in comparable water depths. The use of dynamically positioned pipelay and support vessels will eliminate the need for anchoring during routine installation operations. The primary method of maintaining pipeline stability on the seabed, where required, will be through the concrete weight-coating. Several seabed intervention methods could be used to manage spans and stability where concrete weight-coating alone is not sufficient. These methods could include concrete mattresses, sand/grout bags, local modification to the seabed, steel structures, rock bolting and gravity anchors. Activities associated with the installation of the pipeline are expected to commence as early as Q1 2021 and finish as late as Q1 2024. It is anticipated that the pre-lay survey could commence up to nine months earlier than pipeline installation, and pre-lay span rectification may occur up to 30 days prior to pipeline installation. The total infield duration of the offshore installation activities is expected to be approximately nine months. The schedule is indicative only; exact timing and duration of the installation activities is subject to pipelay vessel availability, sea state, weather conditions and operational efficiencies. (i.e. the pipelay vessel will be present for approximately three months). Installation activities will occur within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. It is highly unlikely that the presence of the project will result in significant changes in habitat usage by marine species or to the physical environment. Within the pipeline corridor, potential impacts associated with the installation are expected to be short term and localised (within hundreds of metres) with impacts to the wider marine environment considered highly unlikely. Over the longer term, impacts over the operating life of the pipeline are expected to be minimal. The pipeline route has been refined to avoid areas of significant seabed features as much as practicable, and avoid uneven seabed features wherever possible. The benthic habitat in the vicinity of the pipeline route is widely represented in the region		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		and predominantly supports burrowers/crinoids, filter feeders and macroalgae. The following potential environmental impacts were assessed in the Barossa Offshore Project Proposal (OPP) and are being further examined during the development of the Gas Export Pipeline Installation Environment Plan (EP). Fauna Impacts to fauna such as marine turtles, cetaceans and fishes are expected to primarily be short-term displacement from the immediate vicinity of the pipeline during installation. Baseline environmental assessment has confirmed that marine mammals (cetaceans) are generally widely distributed and highly mobile in the region. Both sei and fin whales have a wide distribution throughout offshore waters and therefore may pass through the project area in low numbers. No aggregation areas or migration pathways for cetaceans occur within or in the vicinity of the proposed pipeline route. The crested tern is widespread and numerous along the NT coastline, with 20 breeding colonies reported. The colony on Seagull Island, 4km north-west of Melville Island, supports over 50,000 birds and is considered globally significant. Significant numbers of olive ridley and flatback turtles are also known to nest on the beaches of Seagull Island and on the west coast of Melville Island. A 'biologically important area' (BIA) for olive ridley turtles has been defined adjacent to this area, and the pipeline installation activities will not encroach this area. A larger area has been defined as a BIA for flatback turtles as well as 'habitat critical to the survival of flatback and olive ridley turtles'. Whilst pipeline installation activities will traverse a small part of these areas, installation activities are considered highly unlikely to impact the species use of the area as low numbers of turtles are expected in the vicinity of the pipeline due to the water depths. During the installation period, the pipelay vessel will continuously traverse along the pipeline alignment (i.e. not a stationary vessel), therefore the small area of light spill will not impact any one location for an extended duration and is not expected to have any impacts additional to existing vessel traffic traversing the area. Therefore, light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns or turtles. Underwater sound generated by installation activities may affect individuals passing through the area, however impacts at a population level are considered unlikely given the area affected is highly localised. The key noise sources associated with installation activities along the pipeline will also be relatively slow moving (approximately 3 km–5 km of the pipeline will be laid per day), thereby allowing individuals to move away from the area, and reasonably short in duration. The risk of vessel strike to marine fauna is inherent to movements of all vessel types, including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to minimise impacts from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely, and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the EPBC Regulation s2000 – Part 8 Division 8.1 Water Quality During the installation campaign project vessels will routinely discharge small volumes of treated sewage, cooling water, putrescible waste, reverse osmosis brine,		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		bilge and deck water. Any potential impacts are expected to be highly localised and temporary and will not impact environmental values/sensitivities. Given the typically small volumes and temporary (i.e. instantaneous) duration of accidental discharge events, impacts to water quality would be temporary and highly localised. Subsequently, there would be limited potential for toxicity to marine fauna due to temporary exposure and low toxicity as a result of rapid dilution. Therefore, any potential impacts to marine fauna would be limited to any individuals that may be transiting within the immediate area of the discharge (within tens to several hundred metres). After completion of installation, the pipeline will be flooded, cleaned and gauged tested (FCGT) with chemically-treated seawater (typically a mixture of biocides to prevent biofouling on the internal surfaces, an oxygen scavenger to control corrosion of the pipeline and a dye to allow for leaks to be detected during visual inspections). Approximately 16,000 m3 of treated seawater will be discharged over a 1-2-day period during cleaning, with discharges occurring at either end of the pipeline and at the seabed or the surface. The pipeline will then be left filled with treated seawater before being dewatered and conditioned with mono ethylene glycol (MEG) (to prevent hydrate or moisture formation) and nitrogen purged (to displace moisture and oxygen within the pipeline). Approximately 85,000 m3 of treated seawater will be discharged over 3-7 days during dewatering, with approximately 1,000 m3 MEG being discharged over a period of less than one day. Discharge of the dewatering fluid will only occur at the seabed through a vertically orientated diffuser at the northern end of the pipeline located in the Barossa field, which is approximately 150 km from the Tiwi Islands in ~250 m water depth. This area is also distant from known fishing activities. Following cleaning, the pipeline will be pressure tested (hydrotested) to confirm pipeline integrity. Approximately 2,000 m3 of treated seawater will be discharged over a half day period during hydrotesting, with discharges occurring at the seabed or the surface at either end of the pipeline. Impacts from treated seawater arise mainly from the addition of biocides, corrosion inhibitors, scale inhibitors and oxygen scavengers. Given the short duration of discharges and low volumes/toxicities of chemicals used for FCGT and hydrotesting, and that biocides are readily biodegradable and do not bioaccumulate, impacts from these activities are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important marine fauna. Controls to manage this risk include: • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the potential impacts of planned discharges. • Bulk dewatering will occur at the offshore endpoint of the pipeline to maximise dilution and avoid sensitive habitats and areas of higher densities of marine fauna. • Chemical injection volumes will be metered during flooding and hydrotest operations to identify leakage and trigger activity to stop, as well as to mitigate the risk of under/over-dosage of chemical. • Contracted vessel will have dedicated flood, clean, gauge, and pressure test (FCGT) procedures. • A vertically orientated diffuser will be used during dewatering to re-oxygenate treated seawater at the northern discharge point in the Barossa Field Introduced marine species There may be an increased risk of introduced marine species (IMS) colonising areas of the pipeline corridor in the shallower water depths where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks). However, the risk of this occurring is considered low given the key management controls that will be implemented throughout the life of the project including a project Quarantine		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Management Plan, and compliance with contemporary ballast water and biofouling requirements (see separate issue/response for further detail). Impacts of pipeline installation activities on fishing activities near the proposed route are expected to be localised and short-term. Activities associated with installation of the pipeline will occur within a 2 km buffer around the pipeline route, and 3 km radius around each endpoint of the pipeline. However, support vessels may transit to and from port as required (note: vessel movements to and from the operational area are outside the scope of the EP). Peak vessel activity is expected to occur during installation of the pipeline, when the pipelay vessel and a dedicated support vessel will be present in the operational area, whilst supply vessels will transit to and from the pipelay vessel regularly (expected to be daily). During the campaign, vessels will operate 24 hours a day, 7 days a week. The pipeline will overlap approximately 0.18 km2 of the area actively fished in the Northern Prawn Fishery at low intensity. The pipeline corridor does not intersect any areas trawled by the NT Demersal Fishery. Once the pipeline is operational, trawl fisheries such as the Northern Prawn Fishery and NT Demersal Fishery may be affected on an ongoing basis due to the long-term presence of the pipeline and infrastructure. Recent effort for both these fisheries is concentrated outside the Operational Area and therefore impacts are expected to be minimal. Only limited recreational fishing activity occurs in or near the operational area due to the distance from the NT mainland. Considering the relatively short duration of the pipeline installation in which higher numbers of vessels will be present), and minimal number of project related vessel movements within the pipeline corridor during operations (i.e. limited to periodic maintenance and inspection activities), the impact to commercial fishing activities from vessels movements are considered to be minor. Controls to manage this risk include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant pipeline installation activities. • Subsea infrastructure and pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The pipeline end termination (PLET) at the southern end of the Barossa pipeline where it joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with commercial fishing activities. • An ongoing communications plan will be implemented for engagement with potentially affected fishers. The temporary presence of the pipelay vessels in the operational area will not significantly increase the volume of existing vessel traffic in the area. The area west and south-west of the Tiwi Islands is subject to regular vessel traffic. Data from the Australian Maritime Safety Authority's (AMSA's) craft tracking system indicates vessel traffic routinely moving from the port of Darwin, with vessels moving north routinely navigating around the western tip of Bathurst Island at distances from shore consistent with the closest point of the pipeline corridor. Darwin will continue to be the main supply and maintenance hub for all ConocoPhillips' Australian regional offshore exploration and production operations, including the Barossa Project. ConocoPhillips will continue to engage with vessel		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		contractors regarding future port and transit plans. **4 and 5 Communications** ConocoPhillips will continue to undertake consultation with all relevant fishing stakeholders in more detail during preparation of activity-specific EPs and on an ongoing basis in the lead-up to and during all operational activities. In addition to commercial fishers this will include recreational fishers through AFANT and charter vessel operators both directly and through their association. An ongoing stakeholder engagement and communications plan is included as part of the Gas Export Pipeline Installation EP submitted to NOPSEMA for assessment. Controls to manage the risk of interaction with other vessels during pipeline installation activities include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities. • Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The PLET at the end of the gas export pipeline where the pipeline joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with fishing activities. • An ongoing communications plan will be implemented for engagement with potentially affected fishers.		
Aquarium Fishery, NT Commercial Licence Holders				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also
6 Mar 2019	ConocoPhillips provided tailored information on commercial fisheries' issues and concerns via letter, as requested by the Northern Territory Seafood Council (NTSC)			
16 April 2019	ConocoPhillips provided follow-up letter advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Arafura Bluewater Charters				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21/22 Feb 2019	ConocoPhillips left phone messages and follow-up email with pipeline route coordinates. Advised were meeting with NTGFIA representative in Darwin and would Arafura like to join the meeting or have a separate one.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Austfish				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates.			
1 Mar 2019	ConocoPhillips emailed information tailored to the commercial fishing industry			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			of pipeline installation activities as per the ongoing communications process.
Austral Fisheries				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP). The following information was provided by ConocoPhillips to the stakeholder in response to the issues and concerns raised at a meeting held on 5 February (see entry in left column): **1 Impact on sea floor and marine environment** The pipeline route has been refined to avoid areas of significant seabed features as much as practicable and uneven seabed features wherever possible. Benthic habitats within the pipeline corridor are expected to consist of predominantly burrowers/crinoids, filter feeders, macroalgae, with a substantial portion of the area also supporting no benthic habitat (approximately 81%). No significant or restricted areas of benthic habitat are known to occur. It is considered highly unlikely that the presence of the project will result in significant changes in habitat usage by marine species or to the physical environment. The pipeline will be constructed from carbon steel and have an external anti-corrosion coating, concrete weight coating and anodes to maintain integrity. It will be laid using a continuous assembly pipe-welding installation method with sections of pipe gradually lowered to the seabed behind the pipelay vessel using an S-lay method. This method is commonly used in offshore pipeline installation in comparable water depths. The use of dynamically positioned pipelay and support vessels will eliminate the need for anchoring during routine installation operations. The primary method of maintaining pipeline stability on the seabed, where required, will be through the concrete weight-coating. Several seabed intervention methods could be used to manage spans and stability where concrete weight-coating alone is not sufficient. These methods could include concrete mattresses, sand/grout bags, local modification to the seabed, steel structures, rock bolting and gravity anchors.	The stakeholder raised several issues and concerns that required consideration and written responses. The stakeholder has advised that it should be considered as consulted for this EP and did not raise any further issues and concerns. The issues and concerns related to environmental impacts and risks (1 and 2) did not result in any specific amendments to the EP. The issues and concerns related to potential interaction with commercial fishing activity (2- 5) helped inform the commitments ConocoPhillips has made in the ongoing communications process. The issues and concerns related to the Development Area (3) will also be further addressed during the consultation phase for the Development Drilling EP.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
22 Jan 2019	Austral emailed requesting the following further information to properly assess the proposed activity: co-ordinate listings and/or geo-located shapefiles for: • Gas export pipeline corridor. • Barossa proposed pipeline route. • Bayu-Undan pipeline. • Barossa offshore development area. ConocoPhillips phoned Austral to arrange meeting and advised via email that the further information requested would be provided before the meeting.			
4 Feb 2019	ConocoPhillips provided further information requested by Austral on 22 Jan via email.			
5 Feb 2019	ConocoPhillips met with Austral in Perth and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide Austral with a written summary of the issues raised during the meeting.			
13 Feb 2019	ConocoPhillips emailed Austral with summary of issues discussed at 5 Feb 2019 meeting along with PowerPoint presentation and links to Offshore Project Proposal on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested Austral advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses. ConocoPhillips advised it will also send the tailored fact sheet being prepared for the NTSC to Austral and the Northern Prawn Fishery, will ensure a direct follow-up with a specific Northern Prawn Fishery scampi fisher cited by Austral and organise another meeting with Austral in April. Issues raised: 1. Impacts of pipeline installation activities on the sea floor and marine environment, specifically related to fish, fish habitat and fishing activities. How these impacts will be mitigated and			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	managed by ConocoPhillips 2. Impacts of pipeline installation activities on fishing activities near the proposed route, i.e. exclusion areas, length of installation period, proposed period of year for installation, bearing in mind Austral's peak fishing period is September to May. How these impacts will be mitigated and managed by ConocoPhillips 3. Pipeline route is generally not a major concern. Of more concern is the Development Area which is closer to Austral's current and/or planned fishing interests and activities. The main concern is the extent of fishing area that will be unavailable as a result of exclusion zones around ConocoPhillips activities/facilities both during construction/installation and ongoing operations. 4. Austral expressed a desire to have regular, close and open consultation and potential sharing of relevant information (fishing effort, hydrographic data) of mutual benefit 5. Suggested ConocoPhillips ensure it speaks to a specific scampi fisher	Pipelay and associated offshore activities (e.g. prelay and post lay surveys) are expected to take up to nine months of offshore operations to complete. Pipeline installation activities (i.e. involving the pipelay vessel) are expected to occur over approximately three months, with installation activities occurring within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During pipeline installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. Within this corridor, potential impacts associated with the installation of pipeline infrastructure are expected to be short term and localised (within hundreds of metres) with impacts to the wider marine environment considered highly unlikely. Over the longer term, impacts over the operating life of the pipeline are expected to be minimal. Furthermore, the presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The following potential impacts on the marine environment have been assessed in the Barossa Offshore Project Proposal (OPP) (see OPP for full assessment) and will be further examined during the development of the Gas Export Pipeline Installation EP. Discharges During the installation campaign project vessels will routinely discharge small volumes of treated sewage, cooling water, putrescible waste, reverse osmosis brine, bilge and deck water. Any potential impacts are expected to be highly localised and temporary and will not impact environmental values/sensitivities. Accidental spill events associated with vessel activities have also been assessed. Given the typical small volumes and temporary (i.e. instantaneous) duration of accidental discharge events, impacts to water quality would be temporary and highly localised. Subsequently, there would be limited potential for toxicity to marine fauna due to temporary exposure and low toxicity as a result of rapid dilution. Therefore, any potential impacts to marine fauna would be limited to any individuals that may be transiting within the immediate area of the discharge (within tens to several hundred metres). Underwater noise associated with the installation vessels is also expected to be highly localised and temporary and is unlikely to impact fauna in the vicinity of installation activities. Controls to manage this risk include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 91 (Marine Pollution Prevention – Oil), 95 (Marine Pollution Prevention – Garbage) and 96 (Marine Pollution Prevention – Sewage). • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the area influenced by planned discharges and significance of any impacts. • Offshore Vessel Inspection Database (OVID) inspections will be conducted to ensure all contracted vessels have International Maritime Organisation (IMO) approved treatment systems. After completion of installation, the gas export pipeline will be flooded, cleaned and gauged tested (FCGT) with chemically-treated seawater (typically a mixture of biocides to prevent biofouling on the internal surfaces, an oxygen scavenger to control corrosion of the pipeline and a dye to allow for leaks to be detected during visual inspections). Approximately 16,000 m3 of treated seawater will be discharged over a 1-2day period during cleaning, with discharges occurring at either end of the pipeline and at the seabed or the surface. Following cleaning, the gas export pipeline will be pressure tested (hydrotested) to confirm pipeline integrity. Approximately 2,000 m3 of treated seawater will be discharged over a half day period during hydrotesting, with discharges occurring at		
1 Mar 2019	ConocoPhillips emailed tailored issues and concerns information related to commercial fishing and update re provision of specific responses to issues raised by Austral which acknowledged via email			
13 Mar 2019	ConocoPhillips provided written responses to the questions raised at the 5 February meeting and re-attached the information provided 1 March for ease of reference. ConocoPhillips advised it would contact again to see if the stakeholder required an additional meeting or had further feedback.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal. ConocoPhillips asked whether the stakeholder wanted to have another meeting and flagged the email that would be sent to all stakeholders that day.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		either end of the pipeline and at the seabed or the surface. Impacts from treated seawater arise mainly from the addition of biocides, corrosion inhibitors, scale inhibitors and oxygen scavengers. Given the short duration of discharges and low volumes/toxicities of chemicals used for FCGT and hydrotesting, and that biocides are readily biodegradable and do not bioaccumulate, impacts from these activities are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important marine fauna. Controls to manage this risk include: • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the potential impacts of planned discharges. • Bulk dewatering will occur at the offshore endpoint of the gas export pipeline to maximise dilution and avoid sensitive habitats and areas of higher densities of marine fauna. • Chemical injection volumes will be metered during flooding and hydrotest operations to identify leakage and trigger activity to stop, as well as to mitigate the risk of under/over-dosage of chemical. • Contracted vessel will have dedicated flood, clean, gauge, and pressure test (FCGT) procedures. • A vertically orientated diffuser will be used during dewatering to re-oxygenate treated seawater at the discharge point Introduced marine species There may be an increased risk of introduced marine species (IMS) colonising areas of the pipeline corridor in the shallower water depths where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks). However, the risk of this occurring is considered low given the key management controls that will be implemented throughout the life of the project including a project Quarantine Management Plan, and compliance with contemporary ballast water and biofouling requirements. Fauna Impacts to fauna such as marine turtles, cetaceans and fishes are expected to primarily be short-term displacement from the immediate vicinity of the pipeline during installation. The presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The crested tern is widespread and numerous along the NT coastline, with 20 breeding colonies reported. The colony on Seagull Island supports over 50,000 birds and is considered globally significant. Significant numbers of olive ridley turtles are known to nest on the beaches of Seagull Island and the north-west coast of Melville Island. As the physical presence of the gas export pipeline within internesting habitat critical to the survival of marine turtles has been minimised, i.e. approximately 0.0001% and 0.0015% of the internesting habitat critical to the survival of flatback and olive ridley turtles respectively, the physical presence of the gas export pipeline during is considered highly unlikely to impact the species use of the area. During the installation period, the pipelay vessel will continuously traverse along the pipeline alignment (i.e. not a stationary vessel), therefore the small area of light spill will not impact any one location for an extended duration and is not expected to have any impacts additional to existing vessel traffic traversing the area. Therefore, light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns or olive ridley turtles located on the shoreline of Seagull Island. Underwater sound generated by installation activities may affect individuals passing		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		through the area, however impacts at a population level are considered unlikely given the area affected is highly localised. The key noise sources associated with installation activities along the gas export pipeline will also be relatively slow moving (approximately 3 km–5 km of the gas export pipeline will be laid per day), thereby allowing individuals to move away from the area, and reasonably short in duration. The risk of vessel strike to marine fauna is inherent to movements of all vessel types, including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to minimise impacts from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely, and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the EPBC Regulation s2000 – Part 8 Division 8.1. **2 Impacts on commercial fishing** Impacts of pipeline installation activities on fishing activities near the proposed route are expected to be localised and short-term. Pipelay and associated offshore activities (e.g. prelay and post lay surveys) are expected to take up to nine months of offshore operations to complete. Pipeline installation activities (i.e. involving the pipelay vessel) are expected to occur over approximately three months, with installation activities occurring within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During pipeline installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. Installation of the pipeline is expected to commence as early as Q3 2021 and finish as late as Q2 2023. However, pre-lay survey could commence up to nine months earlier than pipeline installation, and pre-lay span rectification may occur up to 30 days prior to pipeline installation. The total infield duration of the offshore installation activities is expected to be approximately nine months. The schedule is indicative only; exact timing and duration of gas export pipeline installation activities is subject to pipelay vessel availability, sea state, weather conditions and operational efficiencies. (i.e. the pipelay vessel will be present for approximately three months). ConocoPhillips will continue to consult with Austral Fisheries on operational detail, including proposed timeframes and environmental factors. Peak vessel activity is expected to occur during installation of the pipeline, when the pipelay vessel and a dedicated support vessel will be present in the operational area, whilst supply vessels will transit to and from the pipelay vessel regularly (expected to be daily). During the campaign, vessels will operate 24 hours a day, 7 days a week. Activities associated with installation of the gas export pipeline will occur within a 2 km buffer around the gas export pipeline route, and 3 km radius around each endpoint of the gas export pipeline (i.e. the Operational Area). However, support vessels may transit to and from port as required (outside the scope of the EP). The pipeline will overlap approximately 0.18 km2 of the area actively fished in the Northern Prawn Fishery at low intensity. The pipeline corridor does not intersect any areas trawled by the NT demersal fishery. Once the pipeline is operational, trawl fisheries such as the Northern Prawn Fishery and NT Demersal Fishery may be affected on an ongoing basis due to the long-term presence of the pipeline and infrastructure. Recent effort for both these fisheries is concentrated outside the Operational Area and therefore impacts are expected to be minimal.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Considering the relatively short duration of the pipeline installation in which higher numbers of vessels will be present), and minimal number of project related vessel movements within the pipeline corridor during operations (i.e. limited to periodic maintenance and inspection activities), the impact to commercial fishing activities from vessels movements are considered to be minor. ConocoPhillips will continue to undertake consultation with Austral Fisheries and all relevant commercial fishing stakeholders in more detail during preparation of activity-specific EPs and on an ongoing basis in the lead-up to and during all operational activities. Controls to manage this risk include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities. • Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The PLET at the end of the gas export pipeline where the pipeline joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with commercial fishing activities. • An ongoing communications plan will be implemented for engagement with potentially affected fishers. **3 Development Area and exclusion zones** A temporary petroleum safety zone around the drill rig (500 m radius during development drilling) and pipelay vessel (500 m during installation), and exclusion zones around the offshore facilities (500m around each wellhead and the FPSO facility) in the Barossa offshore development area will exclude commercial fishing vessels from a small proportion of their current fishing and available areas. The location of the offshore facilities/infrastructure and equipment in this area does not represent a significant portion of the area commercially fished, with primary fishing effort of the Timor Reef Fishery undertaken to the south-west. The areas actively fished by the Northern Prawn Fishery in nearshore waters are a minimum of approximately 64 km from the Barossa offshore development area. Consultation with commercial fishers of the Timor Reef Fishery previously undertaken identified some concerns regarding the physical presence of vessels during periods of peak fishing activity (October and May) and the potential for disruption of their activities. Through the consultation process it was noted that potential impacts for trap fishers would have been greater if activities were over fishing grounds further to the south-west (> 50 km away). During the meeting held on 5 February 2019 Austral Fisheries advised that its activities may extend further north and ConocoPhillips will provide further assessment based on additional detailed information provided by Austral. ConocoPhillips will continue to undertake consultation with Austral Fisheries and all relevant commercial fishing stakeholders in more detail during preparation of activity-specific EPs and on an ongoing basis in the lead-up to and during all operational activities. This includes the Development Drilling EP which is relevant to the Development Area and will be prepared later in 2019 for submittal to NOPSEMA in 2020.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Controls to manage this risk include: • The project will comply with the OPGGS Act 2006 – Section 616 (2) Petroleum safety zones, which includes establishment and maintenance of a petroleum safety zone offshore structure or equipment which prohibits vessels entering or being present within the specified area without written consent. • Accepted procedures will be implemented to meet the requirements of ConocoPhillips' Marine Operations Manual (IOSC/OPS/HBK/0003), which includes details of: - roles, responsibilities and competency requirements - requirements (e.g. storage, transfer) for bulk cargo and bulk liquids (including bunker fuel) operations - general requirements for entering/departure and movement within the designated exclusion or petroleum safety zones - checklist required to be completed for vessels entering the exclusion zones in the development area - safe and sustainable dynamic positioning operations. - The Stakeholder Engagement Plan will include consultation with commercial fisheries, shipping, AHO and other relevant stakeholders operating in the vicinity of the development area to inform them of the proposed project. Ongoing consultation will also be undertaken throughout the life of the project. - Subsea infrastructure and pipelines will be clearly marked on nautical charts published by the AHO. **4 Consultation and data sharing** ConocoPhillips shares the desire for regular, close and open consultation on a regular basis. We will organise a further meeting for April at which we can discuss these arrangements. ConocoPhillips will also be available to answer enquiries from Austral Fisheries at any other time. ConocoPhillips is also happy to discuss potential sharing of relevant information with mutual benefits to both organisations. **5 Consultation with other stakeholder** ConocoPhillips has provided the scampi fisher specifically cited by Austral with the relevant information and has offered him a separate meeting to discuss the pipeline activities and preparation of the Environment Plan. The fisher will also continue to be provided with all relevant information and afforded opportunities to provide feedback.		
Australia Bay Seafoods				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. The stakeholder advised that its operations are not relevant for this activity	No response required.	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates.			
24 Feb 2019	Australia Bay Seafoods advised via email that its operations in the Demersal Fishery is not relevant for this activity. ConocoPhillips provided confirmation and advised that Timor Reef Fishery was being consulted.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			of pipeline installation activities as per the ongoing communications process.
Australian Fisheries Management Authority (AFMA), Commonwealth Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. The stakeholder advised satisfaction with the stakeholder consultation process.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
22 Feb 2019	ConocoPhillips sent follow-up email reminder re comments and advised consultation was occurring with stakeholders as advised by AFMA on its website.			
28 Feb 2019	AFMA advised it had no further comments to provide as it was satisfied with ConocoPhillips's current engagement with relevant fisheries stakeholders.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Australian Marine Conservation Society				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	The following information was provided by ConocoPhillips to this stakeholder and the Environment Centre – NT in response to the issues and concerns raised at a meeting held with both organisations on 8 February (see entry in left column): **1 and 2: Pipeline installation through marine park and Habitat Protection Zone** ConocoPhillips identified several preliminary pipeline routes following a preliminary review of available information on the bathymetry, seabed topography and underlying geology relevant to each route. This was done during the early design phases of the Barossa Project and included a range of contingencies to account for uncertainty	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1 - 5) did not result in any specific amendments to the EP. The stakeholder has expressed a general	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal.
31 Jan 2019	AMCS representative phoned ConocoPhillips to request a meeting which may also be attended by Environment Centre, NT.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	ConocoPhillips organised meeting to be held in Darwin on 8 Feb.	around the requirements of the Project. Further engineering studies were undertaken to investigate technical feasibility and a preliminary pipeline route, which included passing through the then zoned multiple use zone (now the HPZ) of the Oceanic Shoals marine park to remain in deeper water, was identified and surveyed in November 2015. In September 2016, the reports prepared as part of the independent Commonwealth Marine Reserves Review were released and recommended that part of the Oceanic Shoals marine park be re-zoned as a habitat protection zone. In response, ConocoPhillips defined and presented a broad pipeline corridor in the Barossa OPP that allowed public comment on and assessment of the acceptability of installing and operating the pipeline within this corridor. The pipeline corridor in the Barossa OPP that was published for public comment allowed for a number of the preliminary pipeline route alignments, both within and outside the Oceanic Shoals marine park which were all subject to further survey and engineering studies to determine their technical feasibility. However, possible routing alignments outside the HPZ are constrained by two critical aspects that cannot be overcome: • the presence of an inter-nesting BIA for olive ridley turtles, which ConocoPhillips has committed to avoiding for the duration of the project, including pipelay installation and operations activities (See Section 6 of the Barossa OPP) • water depths in the shallow water area to the east of the marine park HPZ areas, are as shallow as 5 m restricting vessel movements, making pipeline installation impractical. In order to progress pipeline route selection and to meet commitments made in the Barossa OPP, additional bathymetric, geophysical and environmental surveys were undertaken on the alternative route alignments (August 2017). Using the data collected, further engineering and design work was progressed and used to inform the revised pipeline corridor that was assessed and accepted in the Barossa Offshore Project Proposal (OPP). As a result of this, the original preliminary pipeline route (most westerly route within the marine park HPZ) was discounted as the two other central route alignments were considered just as feasible and would reduce the ingress of the pipeline route within the marine park HPZ. The accepted pipeline corridor only allows for further consideration of two central route alignments within the marine park HPZ, or an eastern route alignment outside the marine park HPZ through the shallow water area (if a licence from the Director of National Parks was not granted). Based on the additional work, the previously considered routes to the alternative western tie-in point on the Bayu - Undan pipeline (the western route alignment within the marine park) have been ruled out as not being technically feasible due to the presence of significant seabed features and highly irregular seabed topography along the southern section of that alignment that could not be avoided. Dropping this western route alignment also had the advantage of minimising the length of pipeline route that overlaps the Oceanic Shoals marine park and allowed for a much narrower pipeline corridor to be defined in the Barossa OPP. As a result, three candidate pipeline routes were the subject of a feasibility and practicability assessment. Within the Oceanic Shoals marine park: • Two central route alignments (excluding the original preliminary pipeline route) within the Oceanic Shoals marine park that intersect the MUZ and HPZ of the Oceanic Shoals marine park, tying into the existing Bayu-Undan to Darwin pipeline at the preferred eastern tie-in location. Outside the Oceanic Shoals marine park HPZ: • An eastern route alignment, i.e. crossing the shallow water area located between the marine park and the Tiwi Islands. This route would require secondary stabilisation of the pipeline due to the relatively shallow and rugose seabed. Secondary stabilisation methods could include rock	opposition to any oil and gas activity occurring in a marine park or during a turtle inter-nesting period. The submitted EP reflects both Parks Australia's conditions for its authorisation of entry to the marine park and HPZ and ConocoPhillips's contingency measures for the timeline for activities, dependant on the final EP conditions.	ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
8 Feb 2019	ConocoPhillips met with representatives of AMCS and Environment Centre, NT in Darwin and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide both organisations with a written summary of the issues raised during the meeting.			
13 Feb 2019	ConocoPhillips emailed AMCS and EC-NT a summary of the issues discussed at 8 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates, Pendoley report on marine turtles from OPP and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses. ConocoPhillips also advised it would follow-up with a representative of Edith Cowan University as requested by AMCS. Issues/Concerns raised: 1. Do not support the pipeline being installed through part of the habitat area for reasons of both impact to habitat and the precedent this would set 2. Would like further detail as to reasons for wanting to route the pipeline through a section of the habitat area, including assessment of the risks/impacts and mitigations proposed 3. Reiterated their concerns re the risks/impacts to turtles during inter-nesting periods but also the risks/impacts and proposed mitigations on turtle activity and movements at all times 4. Are concerned by the potential increased risk to marine fauna in particular due to the increased level of vessel traffic to and from Darwin Port and around the installation and development areas and would like further detail as to the nature and extent of this increased activity both during installation of the pipeline and drilling of wells, etc and during ongoing operations 5. Expressed the general concern at the level of emissions caused by the fossil fuel industry and reiterated that companies should be making greater efforts towards renewable energy generation. 6. Are interested in the identification of grey nurse shark(s) in the video footage taken by Jacobs and whether there is any additional research on grey nurse sharks proposed given this is considered unusual distribution for this species 7. Suggested ConocoPhillips speaks specific representative of ECU in Perth re extent and nature of whale activity in the area			
14 Mar 2019	ConocoPhillips provided written responses to the questions raised at the 8 February meeting and advised it would contact again to see if the stakeholder had further feedback			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1,			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.	dumping, pre-lay and post-lay trenching or dredging, resulting in greater environmental impact. Engineering and design activities have focussed on the two central route alignments within the Oceanic Shoals marine park HPZ (the proposed route and the discounted central route alignment). Seabed conditions and expected span rectifications were considered to be similar for both of the routes, with the proposed route being selected as it achieves the following benefits: • minimises the area that the pipeline route needs to overlap the Oceanic Shoals marine park HPZ • minimises the amount of seabed installation required and eliminates secondary stabilisation requirements for pipeline installation (which would be required to install the pipeline along the eastern route alignment located in the shallow water area outside the marine park HPZ) • minimises, as much as practicable, the installation of the pipeline over areas of seabed that are associated with the seafloor features/values of the shelf break and slope of the Arafura Shelf and carbonate bank and terrace system of the Van Diemen Rise KEFs • the proposed pipeline route will reduce inspection, maintenance and repair (IMR) requirements during operations, compared to all other alternative route alignments considered. The reduced route length and smoother seabed profile (less spans) represents the shortest length of pipeline required and minimises the amount of seabed installation and stabilisation required, requiring the shortest installation campaign, thereby minimising the time installation activities will overlap with internesting habitat critical to the survival for marine turtles. Based on all available data, information and evaluation from the surveys, engineering studies and environmental impact assessments undertaken to date, it has been concluded that the only practicable route alignment is the proposed route alignment within the HPZ. Although the eastern route alignment outside of the marine park HPZ is considered to be technically feasible, it results in greater environmental impact both to habitats and species within and outside the HPZ, and therefore is not considered a practicable route. Installation and operation of a pipeline with the HPZ of the marine park is allowable with authorisation from the Director pf National Parks. The pipeline activities are considered to be consistent with the management objective of the habitat protection zone (HPZ) within the Oceanic Shoals marine park. Although the presence of the pipeline will result in a small direct loss of benthic habitat, there will be no impact on the habitat representativeness or habitat diversity of the marine park. Where the pipeline traverses the HPZ, it is distant from seafloor features associated with the key ecological features (KEFs) considered values of the marine park. Therefore, no impacts to KEFs are expected from pipeline activities within the HPZ. Where the pipeline route traverses the HPZ, it is outside the water depths (i.e. >30 m) where the majority of flatback turtle inter-nesting activity is known to occur. Therefore, the pipeline activities are not likely to have adverse impacts to seafloor habitat considered as inter-nesting habitat critical to the survival of flatback turtles. There are no sensitive or important benthic habitats, or feeding, breeding or aggregation areas for marine fauna in the vicinity of the pipeline route that could be impacted by pipeline activities. Therefore, pipeline activities, including direct and indirect impacts from installation and operations, will not result in the destruction of seafloor habitats or impact the conservation of ecosystems within the HPZ of the Oceanic Shoals marine park. **3 Impact during turtle inter-nesting periods** Independent scientific assessment Appendix Q of the accepted OPP has concluded that the installation of the Barossa gas export pipeline is not expected to form a		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		significant risk to flatback and olive ridley turtles at a population level, as per DoEE's Significant Impact Guidelines 1.1 – Matters of National Environmental Significance based on the following points: • There is a spatial separation (approximately 10 – 20 km) between the favoured coastal Inter-nesting habitat for flatback and olive ridley turtles, and the offshore pipeline corridor. • The relatively short time frame of the pipeline installation is insignificant within the context of the long breeding period of marine turtles and so the time frame the breeding females are potentially exposed to the project is low. • Pipelay vessels are mobile and will not be on any one location for extended periods of time. Any exposure of inter-nesting females or dispersing hatchlings to project related risk will be temporary. • The seasonally dispersed nesting behaviour reduces the risk of exposure to the entire breeding population. • While migrating offshore, hatchlings will be dispersed by currents across large areas of ocean, under the influence of tides and currents which will reduce the opportunity for individuals to intercept or pool around a vessel. • Hatchlings are unable to swim against fast moving tides and currents and a few individuals might be trapped by light spill from a vessel if they are carried directly to the vessel location by tides or currents. • Hatchlings will only be able to engage in directional swimming (i.e. to actively swim directly towards a vessel light) during the few hours a day when water speeds are very slow or at slack water and will be swept away as the tide gains strength. The number of individuals potentially impacted are expected to be low. • •The current large (60 – 80 km) Biologically Important Area boundary to the north and west of Tiwi Islands can be reassessed based on recent publications that indicate internesting habitat for flatback and olive ridley turtles is in shallow water closer to shore and can be comfortably encompassed by the Contiguous Zone Boundary (24 nm, 44.5 km). **4 Impact of vessel movements** The Barossa Project OPP Section 6.4.2 commencing on page 283 provides a thorough risk assessment of vessel movements (from p.284). The in-field subsea infrastructure and gas export pipeline are unlikely to significantly affect marine fauna behaviour and movements given their location on the seabed. The risk of vessel strike to marine fauna is inherent to movements of all vessel types, including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to minimise impacts from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of project infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the OPBC Regulation s2000 – Part 8 Division 8.1. **5 Impact of increased emissions** The project will generate atmospheric emissions; mainly associated with the combustion of fuel in vessel engines (including the MODU/drill ship) and in the FPSO facility for gas/condensate processing, offshore removal of CO_2 and non-routine flaring due to process upsets or during emergency shut-in of production.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Specifically, for the gas export pipeline installation, given the short term duration of installation activities, and the frequency and short term duration of inspection, maintenance and repair activities, atmospheric emissions will be limited. The actual expected volumes will be dependent on the size of vessel, the duration of the activity and the probability of the vessel having/using a waste incinerator. Although atmospheric emissions from project vessels can result in the localised deterioration of air quality, the impact to the marine environment is considered negligible. Atmospheric emissions associated with the project will meet all regulatory source emissions standards. Engineering design of the FPSO facility will seek to reduce atmospheric and GHG emissions through energy efficient design. Combustion engines and flaring equipment will be maintained according to vendor specifications to achieve optimal performance. **6 Grey Nurse Sharks presence** There are no regionally significant feeding, breeding or aggregation areas for grey nurse sharks known to occur in the project area. The physical footprint of the project is limited to a very small proportion of the habitat available for grey nurse sharks and, therefore, displacement of individuals is unlikely. No specific actions or requirements have been identified for assessing the threat of habitat modification/degradation for grey nurse sharks as a result of development, as relevant to the project Four grey nurse sharks were observed during baseline studies at a seamount in around 130-160m water depth approximately 18 km to the west of the Barossa offshore development area. Based on the findings of the Barossa marine studies program and the species habitat preference, it is considered possible that individuals may be encountered in low numbers within the project area and area of influence. **7 Additional consultation request** ConocoPhillips met with the representative of Edith Cowan University cited by AMCS who did not provide any specific views on the proposed activity.		
Australian Marine Oil Spill Centre (AMOSC)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process. As a 'relevant' stakeholder for the OPEP, AMOSC will be provided with the approved plan.
7 Feb 2019	Follow up phone call. Stakeholder advised that they have no comment on the EP and will be involved in the preparation of ConocoPhillips's OPEP.			
12 Feb 2019	Follow up email confirming stakeholder's participation in the preparation of ConocoPhillips's OPEP and reminding stakeholder of the closing date for initial comments on the proposed EP.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Australian Maritime Safety Authority (AMSA)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process. As a 'relevant' stakeholder for the OPEP, AMSA will be provided with the approved plan.
7 Feb 2019	Follow up phone call. Advised to send follow up email.			
12 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Australian Southern Bluefin Tuna Industry Association				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Bathurst Island Lodge, Bathurst Island (Tiwi Islands)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	The following information was provided by ConocoPhillips to this stakeholder in response to the issues and concerns raised at a meeting held on 16 February (see entry in left column): **1 Risks/Impacts to marine fauna (whales and mantra rays)** Stakeholder consultation with the local Tiwi people and baseline environment assessment have confirmed that the reef manta ray (*Manta alfredi*) may be found within the southern extent of the gas export pipeline corridor given its proximity to coastal areas. Baseline environmental assessment has also confirmed that marine mammals (cetaceans) are generally widely distributed and highly mobile in the region. Both sei and fin whales have a wide distribution throughout offshore waters and therefore may pass through the project area in low numbers. No aggregation areas or migration pathways for cetaceans occur within or in the vicinity of the proposed pipeline route. Key controls to manage risks from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the OPBC Regulation s2000 – Part 8 Division 8.1. Barossa is primarily an offshore project and will not require new accommodation to be established onshore. During the installation, hook-up and commissioning phases an accommodation support vessel may be located in the offshore development area supporting several hundred personnel. The FPSO will be towed to the offshore development area and will also have accommodation for approximately 150 personnel offshore. **2 Project accommodation** The project will involve an increased number of personnel needing to transit through Darwin, particularly during the offshore installation phase. At this early planning stage, it is anticipated this increased demand would be for short-term accommodation only and could be met through existing and planned future facilities. Estimates of onshore accommodation requirements will be determined during the detailed planning stage and will be planned well in advance in consultation with local facilities. In addition to directly providing ConocoPhillips with details of business capability, Clearwater should formally register for the Barossa Project with the Industry Capability Network in the NT which will provide information and details of how to tender for any future potential accommodation needs related to the project.	The stakeholder raised issues and concerns that required consideration and written responses. The issue/concern related to environmental impacts and risks (1) did not result in any specific amendments to the EP. The other issue/concern (2) was a general one related to the project and not relevant to this EP.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
30 Jan 2019	TLC invited Lodge operators to attend meeting with ConocoPhillips in Darwin on 7 Feb. Note: Meeting with Lodge rescheduled when they were unable to attend.			
8 Feb 2019	ConocoPhillips met with representatives of Wright Expeditions, operators of Bathurst Island Lodge, in Darwin and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide the Lodge with a written summary of the issues raised during the meeting			
13 Feb 2019	ConocoPhillips emailed Wright Expeditions a summary of the issues discussed at 8 Feb 2019 meeting along with PowerPoint presentation, current pipeline route co-ordinates and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses. Issues raised: 1. Advised that manta ray migration occurs along the south coast of Bathurst Island as well as some whales passing through and the risks/impacts to this marine fauna should be understood and mitigated 2. Questioned whether ConocoPhillips may look to an area near the Bathurst Fishing Lodge for lay-down or other activities associated with the installation. If so, they would be amenable to looking at how they could accommodate this			
14 Mar 2019	ConocoPhillips provided written responses to the questions raised at the 13 February meeting and advised it would contact again to see if the stakeholder had further feedback.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Beach Energy				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a ‘relevant’ stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Feb 2019	Follow up phone call. Voicemail left.			
12 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Clearwater Island Lodge, Melville Island (Tiwi Islands)				
23 Jan 2019	ConocoPhillips phone discussion with Lodge operator to organise meeting on Melville Island and provided follow-up email with initial fact sheet/email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections.	The following information was provided by ConocoPhillips to this stakeholder in response to the issues and concerns raised at a meeting held on 6 February (see entry in left column): **1 Biosecurity measures**	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1, 2, 4 and 6) did not result in any specific amendments to the EP.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is
6 Feb	ConocoPhillips met with operators of Lodge on Melville Island and			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
2019	provided further information via PowerPoint presentation. ConocoPhillips advised it will provide the Lodge with a written summary of the issues raised during the meeting.	Ballast water discharges will comply with the requirements of the Australian Ballast Water Management Requirements, which implements the requirements of the *Biosecurity Act 2015* (Cth) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (as appropriate for vessel class) Vessels will have a suitable anti-fouling coating in accordance with the Protection of the Sea (Harmful Anti-fouling Systems) Act 2006 (Cth) (as applicable for vessel size, type and class), including Marine Order 98. Vessels will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships (as appropriate to class) including vessels having a valid IAFS Certificate. Contracted pipelay vessels will have a marine growth prevention system in place. Vessels mobilising from outside Australia or from nearshore waters within Australia will be subject to an Introduced Marine Species (IMS) risk assessment, the findings of which will determine if additional management measures are required prior to mobilisation, such as a hull inspection and cleaning as required. **2 Vessel movements** Darwin will continue to be the main supply and maintenance hub for all ConocoPhillips' regional offshore exploration and production operations, including the Barossa Project. ConocoPhillips will continue to engage with vessel contractors regarding future port and transit plans. The Tiwi Land Council has indicated a desire for ConocoPhillips to consider future use of facilities at Port Melville for any activities conducted offshore NT, not just those related to the Barossa Project. ConocoPhillips has been provided with a familiarisation of the Port Melville facilities by the Port Operator and will assess any further information that may be provided in the future. It is expected that approximately two to five vessels will enter/exit the Barossa offshore development area per week during operations, with peak numbers occurring during maintenance and shutdown periods. Although several different vessel types will be used in the Barossa offshore development area during operations, not all will be in the field simultaneously. The temporary presence of the pipelay vessels in the operational area will not significantly increase the volume of existing vessel traffic in the area. The area west and south west of the Tiwi Islands is subject to regular vessel traffic. Data from the Australian Maritime Safety Authority's (AMSA's) craft tracking system indicates vessel traffic routinely moving from the port of Darwin, with vessels moving north routinely navigating around the western tip of Bathurst Island at distances from shore consistent with the closest point of the pipeline corridor. ConocoPhillips has conducted a detailed examination of the potential impacts that may arise in the event of an accidental spill of fuel from a vessel within the operational area. Whilst the potential for such a spill occurring is considered highly unlikely, a number of controls to prevent the event or minimise impacts have been identified, including: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of navigation and emergency procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • A dedicated Oil Pollution Emergency Plan (OPEP) will be prepared and implemented throughout the gas export pipeline installation campaign. • All vessels will have a dedicated Ship Oil Pollution Prevention Plan (SOPEP). • A support vessel will be present within the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential for vessel collision. • The pipelay vessel will be double-hulled and with internal fuel tanks protected from a potential vessel collision. **3 Project logistics**	The issue/concern related to potential interaction with commercial fishing activity (5) helped inform the commitments ConocoPhillips has made in the ongoing communications process. The request for additional consultation (7) was met by ConocoPhillips. The other issue/concern (3) was a general one related to the project and not relevant to this EP.	required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
13 Feb 2019	ConocoPhillips provided Lodge operators with summary of issues at 6 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses. ConocoPhillips also advised it would ensure direct follow-up with the Member for Arafura in the NT parliament, as requested. Issues raised: 1. Requested information on the arrangements that would be in place for biosecurity protection (IMS) for vessels coming from overseas 2. The lodge utilises fishing grounds for black jewfish in Aspley Strait between Melville and Bathurst Islands and would be concerned if there were plans to utilise Port Melville and/or the Apsley Strait and the increased vessel movements that would result during development and/or operations. This would be concerning for the environment generally, for vessel interactions and risk of spills 3. If the project requires accommodation for some personnel on Melville Island the Lodge could be available. Would like to understand any future requirements. 4. Impacts of pipeline installation activities on the sea floor and marine environment, specifically related to fish, fish habitat and fishing activities near the Tiwi Islands, bearing in mind they can operate up to 40 kms away, including around Goodrich Bank and Seagull Island. How these impacts will be mitigated and managed by ConocoPhillips 5. Impacts of pipeline installation activities on fishing activities near the proposed route, specifically whether this could cause commercial fishers to move closer to the Tiwi Islands. How these impacts will be mitigated and managed by ConocoPhillips 6. Questioned if the pipeline will attract fish from other fishing grounds (specifically the areas currently utilised) or will the new pipeline create additional habitat. 7. Requested ConocoPhillips also liaise with the Member for Arafura.			
13 Mar 2019	ConocoPhillips provided written responses to the questions raised at the 13 February meeting and advised it would contact again to see if the stakeholder had further feedback. ConocoPhillips also advised that it would be meeting with the Member for Arafura as requested by the stakeholder.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.	Barossa is primarily an offshore project and is unlikely to require accommodation to be established onshore. During the installation, hook-up and commissioning phases an accommodation support vessel may be located in the offshore development area to support personnel. The FPSO will be towed to the offshore development area and will also have accommodation for approximately 150 personnel offshore. The project will involve an increased number of personnel needing to transit through Darwin, particularly during the offshore installation phase. At this early planning stage, it is anticipated this increased demand would be for short-term accommodation only and could be met through existing and planned future facilities. Estimates of onshore accommodation requirements will be determined during the detailed planning stage and will be planned well in advance in consultation with local facilities. In addition to directly providing ConocoPhillips with details of business capability, Clearwater should formally register for the Barossa Project with the Industry Capability Network in the NT which will provide information and details of how to tender for any future potential accommodation needs related to the project. **4 Impact on sea floor and marine environment** The pipeline route has been refined to avoid areas of significant seabed features as much as practicable and uneven seabed features wherever possible. Benthic habitats within the pipeline corridor are expected to consist of predominantly burrowers/crinoids, filter feeders, macroalgae, with a substantial portion of the area also supporting no benthic habitat (approximately 81%). No significant or restricted areas of benthic habitat are known to occur. It is considered highly unlikely that the presence of the project will result in significant changes in habitat usage by marine species or to the physical environment. The pipeline will be constructed from carbon steel and have an external anti-corrosion coating, concrete weight coating and anodes to maintain integrity. It will be laid using a continuous assembly pipe-welding installation method with sections of pipe gradually lowered to the seabed behind the pipelay vessel using an S-lay method. This method is commonly used in offshore pipeline installation in comparable water depths. The use of dynamically positioned pipelay and support vessels will eliminate the need for anchoring during routine installation operations. The primary method of maintaining pipeline stability on the seabed, where required, will be through the concrete weight-coating. Several seabed intervention methods could be used to manage spans and stability where concrete weight-coating alone is not sufficient. These methods could include concrete mattresses, sand/grout bags, local modification to the seabed, steel structures, rock bolting and gravity anchors. Pipelay and associated offshore activities (e.g. prelay and post lay surveys) are expected to take up to nine months of offshore operations to complete. Pipeline installation activities (i.e. involving the pipelay vessel) are expected to occur over approximately three months, with installation activities occurring within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During pipeline installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. Within this corridor, potential impacts associated with the installation of pipeline infrastructure are expected to be short term and localised (within hundreds of metres) with impacts to the wider marine environment considered highly unlikely. Over the longer term, impacts over the operating life of the pipeline are expected to be minimal. Furthermore, the presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The following potential impacts on the marine environment have been assessed in the Barossa OPP (see OPP for full assessment), and will be further examined during the development of the Gas Export Pipeline Installation EP:		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Discharges During the installation campaign project vessels will routinely discharge small volumes of treated sewage, cooling water, putrescible waste, reverse osmosis brine, bilge and deck water. Any potential impacts are expected to be highly localised and temporary and will not impact environmental values/sensitivities. Accidental spill events associated with vessel activities have also been assessed. Given the typical small volumes and temporary (i.e. instantaneous) duration of accidental discharge events, impacts to water quality would be temporary and highly localised. Subsequently, there would be limited potential for toxicity to marine fauna due to temporary exposure and low toxicity as a result of rapid dilution. Therefore, any potential impacts to marine fauna would be limited to any individuals that may be transiting within the immediate area of the discharge (within tens to several hundred metres). Underwater noise associated with the installation vessels is also expected to be highly localised and temporary and is unlikely to impact fauna in the vicinity of installation activities. Controls to manage this risk include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 91 (Marine Pollution Prevention – Oil), 95 (Marine Pollution Prevention – Garbage) and 96 (Marine Pollution Prevention – Sewage). • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the area influenced by planned discharges and significance of any impacts. • Offshore Vessel Inspection Database (OVID) inspections will be conducted to ensure all contracted vessels have International Maritime Organisation (IMO) approved treatment systems. After completion of installation, the gas export pipeline will be flooded, cleaned and gauged tested (FCGT) with chemically-treated seawater (typically a mixture of biocides to prevent biofouling on the internal surfaces, an oxygen scavenger to control corrosion of the pipeline and a dye to allow for leaks to be detected during visual inspections). Approximately 16,000 m3 of treated seawater will be discharged over a 1-2day period during cleaning, with discharges occurring at either end of the pipeline and at the seabed or the surface. Following cleaning, the gas export pipeline will be pressure tested (hydrotested) to confirm pipeline integrity. Approximately 2,000 m3 of treated seawater will be discharged over a half day period during hydrotesting, with discharges occurring at either end of the pipeline and at the seabed or the surface. Impacts from treated seawater arise mainly from the addition of biocides, corrosion inhibitors, scale inhibitors and oxygen scavengers. Given the short duration of discharges and low volumes/toxicities of chemicals used for FCGT and hydrotesting, and that biocides are readily biodegradable and do not bioaccumulate, impacts from these activities are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important marine fauna. Controls to manage this risk include: • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the potential impacts of planned discharges. • Bulk dewatering will occur at the offshore endpoint of the gas export pipeline to maximise dilution and avoid sensitive habitats and areas of higher densities of marine fauna. • Chemical injection volumes will be metered during flooding and hydrotest operations to identify leakage and trigger activity to stop, as well as to mitigate the risk of under/over-dosage of chemical. • Contracted vessel will have dedicated flood, clean, gauge, and pressure test (FCGT) procedures.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		• A vertically orientated diffuser will be used during dewatering to re-oxygenate treated seawater at the discharge point Introduced marine species There may be an increased risk of introduced marine species (IMS) colonising areas of the pipeline corridor in the shallower water depths where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks). However, the risk of this occurring is considered low given the key management controls that will be implemented throughout the life of the project including a project Quarantine Management Plan, and compliance with contemporary ballast water and biofouling requirements. Fauna Impacts to fauna such as marine turtles, cetaceans and fishes are expected to primarily be short-term displacement from the immediate vicinity of the pipeline during installation. The presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The crested tern is widespread and numerous along the NT coastline, with 20 breeding colonies reported. The colony on Seagull Island supports over 50,000 birds and is considered globally significant. Significant numbers of olive ridley turtles are known to nest on the beaches of Seagull Island and the north-west coast of Melville Island. As the physical presence of the gas export pipeline within internesting habitat critical to the survival of marine turtles has been minimised, i.e. approximately 0.0001% and 0.0015% of the internesting habitat critical to the survival of flatback and olive ridley turtles respectively, the physical presence of the gas export pipeline during is considered highly unlikely to impact the species use of the area. During the installation period, the pipelay vessel will continuously traverse along the pipeline alignment (i.e. not a stationary vessel), therefore the small area of light spill will not impact any one location for an extended duration and is not expected to have any impacts additional to existing vessel traffic traversing the area. Therefore, light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns or olive ridley turtles located on the shoreline of Seagull Island. Underwater sound generated by installation activities may affect individuals passing through the area, however impacts at a population level are considered unlikely given the area affected is highly localised. The key noise sources associated with installation activities along the gas export pipeline will also be relatively slow moving (approximately 3 km–5 km of the gas export pipeline will be laid per day), thereby allowing individuals to move away from the area, and reasonably short in duration. The risk of vessel strike to marine fauna is inherent to movements of all vessel types, including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to minimise impacts from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely, and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the EPBC Regulation s2000 – Part 8 Division 8.1.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Some of the shoals/banks in close proximity to the pipeline corridor, such as Shepparton Shoal, Marie Shoal and Goodrich Bank, may be temporarily affected by increased sediment levels. Considering the expected short duration of increased sedimentation at any one area, and that these areas have naturally highly turbid environments meaning that benthic habitats in these areas are likely to have a natural resilience to higher sediment/turbid conditions, significant impacts are considered unlikely. The outcomes of the pre-lay surveys will be used to further inform final route optimisation and reduce environmental impacts. **5 Impact on fishing activities** Impacts from interactions from project infrastructure and vessel movements with other marine users, including commercial fishers, throughout the project are considered remote given the relatively minor physical scale of the offshore infrastructure and presence of project-related vessels, combined with the relatively low level of activity within the open offshore waters of the project area. The impacts of pipeline installation activities on fishing activities near the proposed route are therefore expected to be localised and short-term. Pipelay and associated offshore activities (e.g. prelay and post lay surveys) are expected to take up to nine months of offshore operations to complete. Pipeline installation activities (i.e. involving the pipelay vessel) are expected to occur over approximately three months, with installation activities occurring within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During pipeline installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. Installation of the pipeline is expected to commence as early as Q3 2021 and finish as late as Q2 2023. However, pre-lay survey could commence up to nine months earlier than pipeline installation, and pre-lay span rectification may occur up to 30 days prior to pipeline installation. The total infield duration of the offshore installation activities is expected to be approximately nine months. The schedule is indicative only; exact timing and duration of gas export pipeline installation activities is subject to pipelay vessel availability, sea state, weather conditions and operational efficiencies. (i.e. the pipelay vessel will be present for approximately three months Peak vessel activity is expected to occur during installation of the pipeline, when the pipelay vessel and a dedicated support vessel will be present in the operational area, whilst supply vessels will transit to and from the pipelay vessel regularly (expected to be daily). During the campaign, vessels will operate 24 hours a day, 7 days a week. Activities associated with installation of the gas export pipeline will occur within a 2 km buffer around the gas export pipeline route, and 3 km radius around each endpoint of the gas export pipeline (i.e. the Operational Area). However, support vessels may transit to and from port as required (outside the scope of the EP). Considering the relatively short duration of the pipeline installation in which higher numbers of vessels will be present), and minimal number of project related vessel movements within the pipeline corridor during operations (i.e. limited to periodic maintenance and inspection activities), the impact to commercial fishing activities from vessels movements are considered to be minor. ***6 Habitat creation*** *A number of studies have been conducted to investigate this question, for example a recent publication in the journal Continental Shelf Research "Using industry ROV videos to assess fish associations with subsea pipelines" (McLean et al, 2017). The presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna* **7 Additional consultation request**		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		ConocoPhillips has provided the relevant information to the Member for Arafura and will be meeting with him on 18 March to receive any direct feedback he may have. He will be provided with relevant information and opportunities to provide input on an ongoing basis.		
Commonwealth Fisheries Association (CFA)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Darwin Port				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	ConocoPhillips provided the following responses to the issues and concerns raised: **1 Vessel movements and supply base.** ConocoPhillips Response: The attached presentation contains the currently available information on vessels. It is too early at this point in time to provide DIPL and Darwin Port with specific vessel details and movements. ConocoPhillips will keep DIPL and Darwin Ports informed as part of ongoing stakeholder consultation. **2 Darwin LNG second train**. ConocoPhillips Response: It is ConocoPhillips' priority to ensure that gas is available to backfill the existing capacity at DLNG as the Bayu-Undan field declines. The proposed Barossa development is being progressed as a backfill option to keep DLNG supplied with gas for another 20 plus years. Favourable results from our activities and from others in northern Australia, combined with the right economic conditions and cost structure, may potentially support future expansion of DLNG. We will continue to investigate how cost structure changes could be achieved, to allow expansion of DLNG to become a competitive future option.	The stakeholder's issues and concerns were assessed to have been presented as additional information requests. Both requests helped inform the commitments ConocoPhillips has made in the ongoing communications process.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the
7 Feb 2019	Follow up phone call. Voicemail left.			
8 Feb 2019	Phone call with stakeholder. Stakeholder advised that they will review fact sheet and provide any feedback by 19 Feb 2019.			
12 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
2 April 2019	Meeting held in Darwin with representatives of Darwin Port and NT Department of Planning, Infrastructure and Logistics.			
4 April 2019	ConocoPhillips provided a summary via email of the issues/concerns raised at the 2 April meeting and ConocoPhillips' responses (refer column right) and the presentation that was talked through at the meeting. The issues/concerns raised were as follows:			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	1. DIPL would like more detail on vessel movements and is keen for ConocoPhillips to use Darwin Port as a supply base. 2. DIPL asked if the Barossa development would lead to a second train being built at Darwin LNG. ConocoPhillips also advised stakeholder if they have further questions to please email or phone.			ongoing communications process. As a 'relevant' stakeholder for the OPEP, they will also be provided with the approved plan.
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Demersal Fishery, NT Commercial Licence-holders				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised by any licence holder or their representative body, the NTSC. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Mar 2019	Letter and commercial fishing issues sent			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
Department of Agriculture and Water Resources, Commonwealth Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	The following information was provided by ConocoPhillips to the stakeholder in response to the issues and concerns raised (see entry in left column): **Biosecurity management** The EP to be submitted will detail the management controls that will be implemented throughout the installation campaign and current controls proposed to manage ballast water management and biofouling include: • Ballast water discharges will comply with the requirements of the Australian Ballast Water Management Requirements, which implements the requirements of the *Biosecurity Act 2015* (Cth) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (as appropriate for vessel class) • Vessels will have a suitable anti-fouling coating in accordance with the Protection of the Sea (Harmful Anti-fouling Systems) Act 2006 (Cth) (as applicable for vessel size, type and class), including Marine Order 98. • Vessels will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships (as appropriate to class) including vessels having a valid IAFS Certificate. Contracted pipelay vessels will have a marine growth prevention system in place. • Vessels mobilising from outside Australia or from nearshore waters within Australia will be subject to an IMS risk assessment, the findings of which will determine if additional management measures are required prior to mobilisation, such as a hull inspection and cleaning as required. • The pipelay vessel stinger (equipment on the pipelay vessel that is used to lower the pipeline to the seafloor) will be raised above water level during vessel transit to the Operational Area so any potential IMS attached to the stinger will perish.	The issues and concerns raised by the stakeholder have informed the commitments by ConocoPhillips related to biosecurity management.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
8 Feb 2019	Follow up phone call with stakeholder. Stakeholder requested copy of fact sheet to be emailed to them. Stakeholder was interested in biosecurity management and recommended ConocoPhillips review and implement the Department's Offshore Instillation Biosecurity Guide.			
12 Feb 2019	Follow up email attaching fact sheet, providing an activity overview and reminding stakeholder of the closing date for initial comments on the proposed EP.			
14 Feb 2019	Email from stakeholder recommending ConocoPhillips follows the Australian Ballast Water Management Requirements and the Biofouling guidelines for offshore petroleum industries, which includes having a Biofouling Management Plan and Biofouling Record Book for each vessel used on the project.			
14 Mar 2019	ConocoPhillips email confirming that the Gas Export Pipeline Installation Environment Plan to be submitted will detail the management controls that will be implemented throughout the installation campaign and current controls proposed to manage ballast water management and biofouling, including following the Australian Ballast Water Management Requirements and the Biofouling guidelines for offshore petroleum industries, which includes having a Biofouling Management Plan and Biofouling Record Book for each vessel used on the project.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Department of Defence (including Australian Hydrographic Service and Marine Border Command), Commonwealth Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested	No issues and concerns raised	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	by 19 February 2019.			feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
16 Jan 2019	AHS acknowledged receipt of email.			
25 Feb 2019	Follow up phone call to DoD. Stakeholder requested fact sheet to be emailed again. ConocoPhillips sent reminder email with initial fact sheet with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections.			
26 Feb 2019	Follow up phone call to AHS. Stakeholder requested fact sheet to be emailed again. ConocoPhillips sent reminder email with initial fact sheet with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections.			
26 Feb 2019	Follow up phone call to MBC. Stakeholder advised that they will follow-up internally and respond to the Barossa email address if any issues.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
17 April 2019	AHO acknowledgement that ConocoPhillips's email had been received by the AHO and the data supplied would be registered, assessed, prioritised and validated in preparation for updating 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.			
Department of Environment and Energy (including Parks Australia), Commonwealth Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	The following confirmations were provided by ConocoPhillips to the stakeholder in response to the issues and concerns raised (see entry in left column): • The final EP will reflect compliance with all the obligations and considerations cited by the DNP in its comments, including the following: – Obligations included in the Class Approval (and Conditions) and the Licence (PA2018-00041-1) granted by the DNP authorising installation	The issues and concerns raised by the stakeholder have informed the commitments by ConocoPhillips related to proposed activity in the Oceanic Shoals Marine Park. The submitted/final EP will reflect compliance with all the obligations and considerations cited by the DNP.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised and has made the relevant inclusions to the submitted EP. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.	and operation of the pipeline in the Oceanic Shoals Marine Park Multiple Use Zone and Habitat Protection Zone – Consideration of information on values of the Marine Park provided in the North Marine Parks Network Management Plan 2018 and its accompanying Guidance Note and the Australian Marine Parks Science Atlas. • The submitted EP will identify and manage the potential impacts and risks on marine park values to an acceptable level and consider all options to avoid them or reduce them to as low as reasonably practicable and demonstrate that the activity will not be inconsistent with the management plan, including the condition (specifically cited in the DNP's comments) that pipeline installation must not anchor in the Habitat Protection Zone (IUCN IV) – Zone 2 unless it is required in an emergency. • The notification requirements and requests [1 (a) and (b), 2 and 3 (a), (b) and (c)] cited by DNP in its comments will be reflected in the submitted EP and Oil Pollution Emergency Plan and will also be addressed in the notification procedures that will be developed for the pipeline installation activities.		provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is accepted and provide access to the full EP. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process and the DNP's specific notification requirements.
29/30 April	Parks Australia asked ConocoPhillips via email whether the request for stakeholder comment is a direct request for comment from the Director of National Parks (DNP) as a 'relevant person' as required to be provided by the titleholder/company to NOPSEMA as part of the EP to show relevant person consultation has been undertaken. If so, Parks Australia requested additional time to respond given that the Easter/Anzac day break has made it difficult to prepare a response by the requested deadline. ConocoPhillips advised that the DNP is considered as a relevant person and happy to provide an extension to the DNP to respond by Friday 17 May			
24 May 2019	Email received from Parks Australia in response to ConocoPhillips's requests for feedback: • Noted the proposed activity is located in the Oceanic Shoals Marine Park, part of the North Network of Marine Parks. • Noted the *North Marine Parks Network Management Plan 2018* provides information on values for the marine park. • Advised that in preparing the EP for submittal to NOPSEMA, ConocoPhillips is expected to consider the impacts and risks of activities in the context of the Management Plan objectives and values, including representativeness of the relevant values and activity footprint on the representative area of the Australian marine park. • Advised that specific values for the Oceanic Shoals Marine Park include (but are not limited to): – carbonate bank and terrace systems of the Van Diemen Rise—an area characterised by terraces, banks, channels and valleys supporting sponges, soft coral, polychaetes, ascidians, turtles, snakes and sharks; – carbonate bank and terrace system of the Sahul Shelf—an area characterised by terraces, banks, channels and valleys, supporting sponges, soft corals, sessile filter feeders, polychaetes and ascidians; – pinnacles of the Bonaparte Basin—an area that contains the largest concentration of pinnacles along the Australian margin, where local upwellings of nutrient-rich water attract aggregations of fish, seabirds and turtles; and – shelf break and slope of the Arafura Shelf—an area characterised by continental slope, patch reefs and hard			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	substrate pinnacles that support over 280 demersal fish species. • Advised that, in the context of the management plan objectives and values, the EP should: - identifies and manages the impacts and risks on marine park values to an acceptable level and has considered all options to avoid them or reduce them to as low as reasonably practicable. - clearly demonstrates that the activity will not be inconsistent with the management plan. • Noted that, consistent with the management plan, any vessels used for or in connection with the pipeline installation must not anchor in the Habitat Protection Zone (IUCN IV) – Zone 2 unless it is required in an emergency. • Advised the following notification requirements for the EP: 1. The DNP requests that in the EP, the titleholder define as a reportable environmental incident, any incidents of pollution or loss of articles or equipment that have caused, or have potential to cause, moderate to significant environmental damage to a marine park or its values. The DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. As such, if the titleholder is required to notify NOPSMEA of any reportable environmental incident within or likely to impact on a marine park: (a) notice of such an incident should be reported to the DNP's 24 hour Marine Compliance Duty Office as soon as is possible on 0419 293 465. The notification should include: – titleholder details – time, location and description of the incident (including name of marine park likely to be affected and what pollutants, articles or equipment have been lost in the park) – proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc) – contact details for the response coordinator. (b) provide any report prepared by the titleholder in accordance with the OPGGS Act about the incident must be provided to the DNP at the same time that such report is given to NOPSEMA. 2. The DNP request that the titleholder inform the DNP of the full details of any suspected contravention of the OPGGS Act relating to undertaking activities within the Habitat Protection Zone that are the subject of the EP and the Parks Australia licence (PA2018-00041-1), within			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	24 hours of becoming aware of any such suspected contravention. 3. The DNP requests: (a) notification of the date that the pipeline installation works will commence at least 10 days prior to the start date. (b) notification of the completion of the pipeline installation within 10 days of the date of completion. (c) details of any vessels used for, or in connection with, the installation activities within the marine park at the time the DNP is notified of the commencement of the activity.			
18 June 2019	ConocoPhillips provided response via email to Parks Australia's comments of 24 May (as per column right).			
Department of Environment and Natural Resources (Marine Section), NT Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs.
4 Feb 2019	DENR Environment Division provided response letter on behalf of Dep't, Minister and NT-EPA acknowledging the Development Area is outside NT jurisdiction and it has no comments on the installation of the pipeline at this time.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Department of Foreign Affairs and Trade (DFAT), Commonwealth Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
26 Feb 2019	Follow up phone call. Voicemail left.			prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
28 Feb 2019	DFAT called and advised they will follow up internally and respond to the Barossa email if any issues.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Department of Industry, Innovation and Science (DIIS), Commonwealth Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also
6 Feb 2019	Follow up phone call. DIIS advised no comments.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1,			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Department of Infrastructure, Planning and Logistics (Marine Transport), NT Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	ConocoPhillips provided the following responses to the issues and concerns raised: **1 Vessel movements and supply base.** ConocoPhillips Response: The attached presentation contains the currently available information on vessels. It is too early at this point in time to provide DIPL and Darwin Port with specific vessel details and movements. ConocoPhillips will keep DIPL and Darwin Ports informed as part of ongoing stakeholder consultation. **2 Darwin LNG second train**. ConocoPhillips Response: It is ConocoPhillips' priority to ensure that gas is available to backfill the existing capacity at DLNG as the Bayu-Undan field declines. The proposed Barossa development is being progressed as a backfill option to keep DLNG supplied with gas for another 20 plus years. Favourable results from our activities and from others in northern Australia, combined with the right economic conditions and cost structure, may potentially support future expansion of DLNG. We will continue to investigate how cost structure changes could be achieved, to allow expansion of DLNG to become a competitive future option.	The stakeholder's issues and concerns were assessed to have been presented as additional information requests. Both requests helped inform the commitments ConocoPhillips has made in the ongoing communications process.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process. As a 'relevant' stakeholder for the OPEP, they will also be provided with the approved plan.
7 Feb 2019	Follow up phone call. Voicemail left.			
12 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
12 Feb 2019	Email response from stakeholder advising that they will provide any comments by 19 Feb 2019.			
18 Feb 2019	Voicemail left by stakeholder. Follow up call and voicemail left for stakeholder.			
21 Feb 19	Follow up phone call. Stakeholder sought clarification of the location of activities. ConocoPhillips advised pipeline route is in Commonwealth waters. Stakeholder advised they are interested in a meeting.			
26-27 Mar 19	ConocoPhillips follow up call to set up time for a meeting. ConocoPhillips followed up with email providing suggested dates and times. Email response from Stakeholder to confirm meeting on 2 April 2019.			
2 April 2019	Meeting held in Darwin with representatives of Darwin Port and NT Department of Planning, Infrastructure and Logistics.			
4 April 2019	ConocoPhillips provided a summary via email of the issues/concerns raised at the 2 April meeting and ConocoPhillips' responses (refer column right) and the presentation that was talked through at the meeting. The issues/concerns raised were as follows: 3. DIPL would like more detail on vessel movements and is keen for ConocoPhillips to use Darwin Port as a supply base. 4. DIPL asked if the Barossa development would lead to a second train being built at Darwin LNG. ConocoPhillips also advised stakeholder if they have further questions to please email or phone.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Department of Primary Industry and Resources (Fisheries), NT Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	ConocoPhillips provided the following responses to the issues and concerns raised **1 Small Pelagic Fishery** ConocoPhillips has provided relevant information to the stated licence-holder and advised we are available to meet. The licence-holder has not responded to date. ConocoPhillips will continue consultation with licence-holders and their representative organisations and respond to any further information provided by the Department. **2 Demersal trap fisher** ConocoPhillips has provided relevant information to the stated licence-holder)and advised we are available to meet. The licence-holder has not responded to date. ConocoPhillips will continue consultation with licence-holders and their representative organisations and respond to any further information provided by the Department. **3 Assistance Program information** ConocoPhillips thanks the Department for the information which was provided as an FYI. **4 Fish/fish habitat study** AIMS is currently developing the scope of this project. AIMS and ConocoPhillips will work with the Department and with the Tiwi Land Council to develop and finalise the project scope over the coming months. **5 Peak fishing times** ConocoPhillips will continue consultation with licence-holders and their representative organisations and respond to any further information provided by the Department. **6 Development Area and Timor Reef Fishery** The Barossa offshore development area, within which the FPSO facility and development wells will be located, is approximately 27 km from the nearest shoals/banks. The location of the offshore facilities/infrastructure and equipment in this area does not represent a significant portion of the area commercially fished, with primary fishing effort of the Timor Reef Fishery undertaken to the south-west. The areas actively fished by the Northern Prawn Fishery in nearshore waters are a minimum of approximately 64 km from the Barossa offshore development area. Consultation with commercial fishers of the Timor Reef Fishery previously undertaken identified some concerns regarding the physical presence of vessels during periods of peak fishing activity (October and May) and the potential for disruption of their activities. Through the consultation process it was noted that	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to potential impacts on commercial fishing activities (1, 2, 5 and 6) helped inform the consultation process and the commitments ConocoPhillips has made in the ongoing communications process. Issues 3 and 4 were of a general nature and not related to this activity.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
23 Jan 2019	Department provided the following response via email: 1. Notes the six affected NT Fisheries are noted in Section 5.7.12 of the Environment Plan and there is the possibility of disruption to fishery activities during the construction phase. Encourages ConocoPhillips to provide good communications to the commercial fishers though the NTSC of its activities, prior to and during the construction phase of the pipeline to allow commercial fishers to plan fishing in activities outside of the construction area and affected pipeline corridor. 2. Notes the management of invasive marine species in Section 6 of the EP in relation to drilling platforms at the well site and vessels supporting drilling and pipeline installation. While those areas are generally in water depths where the risk is low, ballast management and antifouling are still of vital importance in case any of the vessels are required to dock at ports in the NT where the risk for possible IMS introduction will increase.			
30 Jan 2019	ConocoPhillips phone call with Department and follow-up email advising that a formal reply will be provided and will include further information re the consultation process with commercial fishers. ConocoPhillips asked if the Department could provide further input via a meeting to assist ConocoPhillips with the preparation of tailored information for the NTSC			
4 Feb 2019	Phone and email exchange with the Department to confirm meeting in Darwin.			
7 Feb 2019	ConocoPhillips met with Department and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide Department with a written summary of the issues raised during the meeting as well as those raised in email of 23 Jan.			
13 Feb 2019	ConocoPhillips provided Department with summary of issues at 7 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response

	response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses.
	
	Further Issues raised:
	1. A permit is in the process of being granted for a Small Pelagic Fishery Development close to the west coast of the Tiwi Islands. The Dep't will check internally whether there are any specific concerns related to this
	2. Within the Demersal Fishery there is one additional trap fisher that ConocoPhillips may not be aware of and the Dep't will check internally whether there may be any specific concerns related to his potential activity
	3. The department has recently provided catch and effort data to Parks Australia to develop a compensation scheme for fisheries affected by the new zoning of marine parks. The 'Fisheries Assistance Program' is currently being finalised. The Department will investigate whether information can be provided to ConocoPhillips.
	4. The Department advised that the department was still interested in progressing the AIMS fish/fish habitat study and enquired about ConocoPhillips's understanding of its status
	5. Discussed peak fishing times for each fishery. The Department advised that there tends to be less fishing in the wet season, but fishing occurs in the Timor Reef Fishery year round and will send additional information regarding peak fishing times.
	6. The Department noted that the development area is within the Timor Reef Fishery and that this is a highly fished, highly productive area.
		potential impacts for trap fishers would have been greater if activities were over fishing grounds further to the south-west (> 50 km away).
		
		A temporary petroleum safety zone around the drill rig (500 m radius during development drilling) and pipelay vessels (500 m during installation), and exclusion zones around the offshore facilities (500m around each wellhead and the FPSO facility) in the Barossa offshore development area will exclude commercial fishing vessels from a small proportion of their current fishing and available areas
		
		ConocoPhillips will continue to undertake consultation with Timor Reef Fishery licence-holders and their representative organisations in more detail during preparation of activity-specific EPs and on an ongoing basis in the lead-up to and during all operational activities. This includes the Development Drilling EP which is relevant to the Development Area and will be prepared later in 2019 for submittal to NOPSEMA in 2020.
		
		Controls to manage risks include:
		• The project will comply with the OPGGS Act 2006 – Section 616 (2) Petroleum safety zones, which includes establishment and maintenance of a petroleum safety zone offshore structure or equipment which prohibits vessels entering or being present within the specified area without written consent.
		• Accepted procedures will be implemented to meet the requirements of ConocoPhillips' Marine Operations Manual (IOSC/OPS/HBK/0003), which includes details of:
		  – roles, responsibilities and competency requirements
		  – requirements (e.g. storage, transfer) for bulk cargo and bulk liquids (including bunker fuel) operations
		  – general requirements for entering/departure and movement within the designated exclusion or petroleum safety zones
		  – checklist required to be completed for vessels entering the exclusion zones in the development area
		  – safe and sustainable dynamic positioning operations.
		• The Stakeholder Engagement Plan will include consultation with commercial fisheries, shipping, AHO and other relevant stakeholders operating in the vicinity of the development area to inform them of the proposed project. Ongoing consultation will also be undertaken throughout the life of the project.
		• Subsea infrastructure and pipelines will be clearly marked on nautical charts published by the AHO.
		
		In addition to the above answers, ConocoPhillips provided the Department with a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries which had been supplied to the NTSC and relevant commercial fishing licence-holders.
		
		The summary outlined the following potential impacts to commercial fishers:
		• Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers.
		• Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline.
		• Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests).
		• Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision.
		
		The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).		

14 Feb 2019	Department provided additional advice via email: • The small pelagic fisherman does fish off the south-west end of the Tiwis where the proposed pipeline will run. • Asked whether ConocoPhillips had included a specific Cairns-based vessel in the trap boats • Clarified that the trap and trawlers are going all year round with a bit of a peak for demand before Christmas • Provided information on Fisheries Business Assistance Program in relation to marine parks ConocoPhillips advised that both licence-holders specifically mentioned by the Department were provided with the initial information on 16 Jan and would be followed-up. Dep't provided further contact details for the fishers.			
1 Mar 2019	ConocoPhillips advised via email that it should have the information in relation to the issues discussed at the February meeting ready to send within the week. ConocoPhillips also provided the information tailored to the commercial fishing industry that was prepared for the NTSC			
14 Mar 2019	ConocoPhillips provided written responses to the questions raised at the 13 February meeting and advised it would contact again to see if the stakeholder wanted to meet again or had further feedback. The Department acknowledged receipt with no further comments.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Department of Primary Industry and Resources (Mines and Energy), NT Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Feb 2019	Follow up phone call and email. DPIR interested in briefing on the Barossa project. ConocoPhillips to follow up in the week beginning 11 Feb 2019 with suggested dates. DPIR advised that the Member for Arafura is interested in a briefing on ConocoPhillips engagement with Tiwi Island stakeholders. ConocoPhillips advised that we will offer a meeting with the Member for Arafura.			
13 Feb 2019	Email exchange to clarify scope of DPIR's interest for proposed meeting.			
14 Feb 2019	Email from DPIR confirming no specific interest in meeting to discuss the Gas Export Pipeline environment plan and that a general meeting with ConocoPhillips scheduled for mid-March will suffice for a broader update on the Barossa Project.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
Eni Australia				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
8 Feb 2019	Follow up phone call. Voicemail left.			
12 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Environment Centre – Northern Territory				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	Please see entry for AMCS (above) as this stakeholder raised exactly the same issues and concerns at a joint meeting held with ConocoPhillips on 8 February and were provided with the same responses.	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1 - 5) did not result in any specific amendments to the EP. The stakeholder has expressed a general opposition to any oil and gas activity occurring in a marine park or during a turtle inter-nesting period. The submitted EP reflects both Parks Australia's conditions for its authorisation of entry to the marine park and HPZ and ConocoPhillips's contingency measures for the timeline for activities, dependant on the final EP conditions.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
31 Jan 2019	AMCS representative phoned ConocoPhillips to request a meeting which may also be attended by Environment Centre, NT. ConocoPhillips organised meeting to be held in Darwin on 8 Feb.			
8 Feb 2019	ConocoPhillips met with representatives of AMCS and Environment Centre, NT in Darwin and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide both organisations with a written summary of the issues raised during the meeting.			
13 Feb 2019	ConocoPhillips emailed AMCS and EC-NT a summary of the issues discussed at 8 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates, Pendoley report on marine turtles from OPP and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	further detail. ConocoPhillips advised it would ensure all items are covered in our responses. ConocoPhillips also advised it would follow-up with Edith Cowan University as requested. Please see entry for AMCS (above) as both stakeholders raised the same issues and concerns at the meeting held with ConocoPhillips on 8 February.			
14 Mar 2019	ConocoPhillips provided written responses to the questions raised at the 8 February meeting and advised it would contact again to see if they had further feedback.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Fischer Wholesale / H & T Investments Pty Ltd				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
27 Feb 2019	ConocoPhillips emailed tailored information sent to NTSC			
6 Mar 2019	Other registered companies included in letter with tailored information sent to NTSC			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
INPEX				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Feb 2019	Follow up phone call. Will review and advise any comments.			
7 Feb 2019	Phone call received advising no issues to raise.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Melbana Energy				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also
6 Feb 2019	Follow up phone call. Stakeholder advised no impact on their activities.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1,			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Member for Arafura				
14 Feb 2019	ConocoPhillips phoned stakeholder. Stakeholder expressed interest in meeting and requested ConocoPhillips to provide further information and meeting date suggestions via email.	ConocoPhillips provided the following response in response to the issues and concerns raised: **1 Pipeline Route** ConocoPhillips can confirm there are no plans to route the pipeline anywhere other than within the operational area identified on the map included in the Notice of Consultation fact sheet provided to all stakeholders as part of the current EP consultation. This map is labelled 'Proposed gas export pipeline route within the pipeline corridor presented in the accepted OPP' and is identical to the pipeline corridor map published in the accepted Offshore Project Proposal in March 2018. As per the OPP accepted by the offshore regulator, NOPSEMA, the final pipeline route must be within the published, accepted corridor. **2 Potential dredging** ConocoPhillips can confirm the pipeline installation activities are not related in any way to potential future dredging in the area to accommodate large vessels at Port Melville for the woodchip industry. The largest vessel that will be involved in the pipeline installation activities is the pipelay vessel and this vessel will not enter Port Melville. **3 Consultation** ConocoPhillips will continue to undertake consultation with all relevant fishing and other Tiwi-based stakeholders in more detail during preparation of activity-specific EPs and on an ongoing basis in the lead-up to and during all operational activities. Controls to manage the impact of vessel movements during pipeline installation activities include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities.	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1,2 and 4) did not result in any specific amendments to the EP. The issue/concern related to communications (3) helped inform the commitments ConocoPhillips has made in the ongoing communications process. The other considerations raised in issue 4 were of a general project nature.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
15 Feb 2019	ConocoPhillips provided initial fact sheet and pipeline GPS coordinates via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections			
18 Feb 2019	Thanks re info			
19-22 Feb 2019	Organising meeting			
19 March 2019	Meeting held			
22 March 2019	ConocoPhillips provided a summary of the issues that were raised and discussed during the 19 March meeting and a copy of the presentation and advised we would provide written responses. Issues raised: 1. ConocoPhillips to confirm that there are no plans to route the pipeline anywhere other than within the operational area identified on the map provided. The Member for Arafura said he had seen some previous material several years ago that showed a potential route across the Tiwi islands. 2. ConocoPhillips to advise whether its pipeline installation activities are related in any way to potential future dredging in the area to accommodate large vessels for the woodchip industry 3. ConocoPhillips to ensure it continues to communicate with all involved stakeholders in and around the Tiwi Islands 4. The project is welcome and any opportunities for local companies to provide goods and services to the project, including Port Melville for refuelling, etc should be investigated and promoted			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
10 April 2019	ConocoPhillips provided written responses to the questions raised at the 8 February meeting and advised it would contact again to see if they had further feedback. ConocoPhillips also advised in a further email that one of the responses include a change to the indicative schedule. We previously advised that the activities associated with the installation of the pipeline are expected to commence as early as Q1 2021 and finish as late as Q2 2023. The finish date is now 'as late as Q1 2024'. All other indicative schedule information is the same, including the duration period of approximately nine months for the activities.	• Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The PLET at the end of the gas export pipeline where the pipeline joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with fishing activities. An ongoing communications plan will be implemented for engagement with commercial and recreational fishers and charter fishing operators. **5 Future social/economic benefits**		
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.	ConocoPhillips acknowledges that the Tiwi Land Council has indicated a desire for the company to consider future use of facilities at Port Melville for any activities conducted offshore NT. ConocoPhillips has been provided with a familiarisation of the facilities by the Port Operator and will continue to assess further information from the Operator. In the event a company contracted to provide vessels to the Barossa Project did advise a desire to utilise Port Melville, ConocoPhillips would expect the company and the port operator to liaise at the earliest possible stage with relevant stakeholders at the Tiwi Islands. Barossa is primarily an offshore project and is unlikely to require new accommodation to be established onshore. During the installation, hook-up and commissioning phases an accommodation support vessel may be located in the offshore development area. The FPSO will be towed to the offshore development area and will also have accommodation for approximately 150 personnel offshore. The project will involve an increased number of personnel needing to transit through Darwin, particularly during the offshore installation phase. At this early planning stage, it is anticipated this increased demand would be for short-term accommodation only and could be met through existing and planned future facilities. Estimates of onshore accommodation requirements will be determined during the detailed planning stage and will be planned well in advance in consultation with local facilities. In addition to directly providing ConocoPhillips with details of business capability, we encourage any local businesses with potential capability to formally register for the Barossa Project with the Industry Capability Network in the NT which will provide information and details of how to tender for any future potential accommodation needs related to the project. Barossa's major offshore infrastructure is likely to be built at a suitably equipped major construction facility and transported and installed at the offshore development area. However, with such a large development, opportunities will exist for smaller/domestic companies to sub-contract for specific equipment and services. Opportunities for increased local employment during the development phase will primarily occur during the installation, hook-up and commissioning phases of the project, both offshore and in Darwin for supporting logistics. ConocoPhillips places a high priority on purchasing goods and services locally and providing local suppliers with the opportunity to participate in projects through a competitive bid process. The approved Australian Industry Participation (AIP) Plan now in place for the Barossa Offshore Project states how Barossa provides "full, fair and reasonable opportunity" to Australian industry to supply goods and services to the project and includes an indicative list of opportunities for the supply of goods and services. Additional to the AIP Plan, we have a general commitment to provide local contractors with information about employment and supply opportunities. As part of this commitment we seek to provide real opportunities to Indigenous persons and businesses to compete for the supply of goods and services to the Project, provided they are offered on competitive terms and conditions. Contractors that include an		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Indigenous Content Proposal (ICP) as part of any contractual offers are favourably considered. As the Operator of DLNG, ConocoPhillips has made a long-term commitment to training and employing a residential workforce with numerous programs to develop local skills, including early career traineeships, graduate programs and operations pathways. • ConocoPhillips' residential workforce policy requires our DLNG staff to live in Darwin, injecting local jobs and global expertise into the region • This is supported by our Darwin Operations Trainee Academy (DOCTA) program, which trains NT residents with skills in related trades to be LNG plant operators. To be eligible for DOCTA, candidates must have lived in the NT for several years. • This program has proved to be a successful long-term investment for ConocoPhillips, with local recruits tending to prefer to stay in the local area and having longer term employment. • For the NT, it has been beneficial to the local economy, resulting in greater local investment and capacity building for NT residents. We are particularly driven to support capacity building programs that develop skills which lead to career pathways in our industry. Through our community investments, we prioritise education programs in Australia that: • Engage secondary school students in science, technology, engineering and maths (STEM) disciplines • Focus on introducing primary school students to science and maths • Enable access to industry related skills and training-based programs • Support diversity and gender in the areas above • Support Indigenous communities in the areas above (NT)		
Monsoon Aquatics				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email and letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21/22 Feb 2019	ConocoPhillips left phone message. No response received.			
27 Feb 2019	ConocoPhillips emailed tailored information sent to NTSC			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Neptune Energy				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a ‘relevant’ stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Feb 2019	Follow up phone call. Voicemail left.			
12 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Northern Prawn Fishery				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	ConocoPhillips initially pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1) did not result in any specific amendments to the EP. The issues and concerns related to installation activities and potential interaction with commercial fishing activity (2 and 3) helped inform the commitments ConocoPhillips has made in the ongoing communications process.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs.
12 Feb 2019	ConocoPhillips left phone message with Northern Prawn Fishery advising consultation process to date and will follow-up the following week re a meeting.			
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates and request to meet.			
26 Feb 2019	Northern Prawn Fishery thanked ConocoPhillips for the co-ordinates but advised they had been requested previously and not provided therefore more time was required to respond. ConocoPhillips advised this was fine and was happy to provide more time for the Northern Prawn Fishery to respond. Northern Prawn Fishery advised that the placement of this pipeline has the potential to considerably impact on both Northern Prawn			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	Fishery prawn and scampi fishing grounds/operations so it was important they continue to be involved in this discussion.	In addition, ConocoPhillips provided the fooling responses to issues and concerns raised by the stakeholder in its letter of 30 April: With regard to habitat disturbance, ConocoPhillips believes there is sufficient information available to understand the potential environmental impacts associated with pipeline installation activities. We have utilised this information in our EP and have summarised key information below in order to address NPFI's concerns. In terms of disruption to, or displacement of, Northern Prawn commercial fishing activities during pipeline installation activities, while we have responded with what we believe is relevant information, we think it would be beneficial to discuss this with NPFI in more detail to help us better understand NPFI's members' activities, so that we can fully understand and assess any potential for vessel interaction during installation. **1 Habitat Disturbance** ConocoPhillips presented a 'pipeline corridor' in the Barossa Offshore Project Proposal (OPP) and has subsequently refined the proposed pipeline route based on further surveys and engineering studies. The pipeline route selected minimises the amount of seabed installation required and eliminates secondary stabilisation requirements for pipeline installation, thus minimising potential seabed disturbance. Based on mapped and modelled benthic habitat classifications, the benthic habitats along the gas export pipeline route are largely bare sediments (82.1%), with relatively small areas of burrowers / crinoids (12.6%) and filter feeders (5.3%). All of these habitat types are well represented throughout the region; these habitats along the gas export pipeline route are not unique or regionally significant. Potential impacts associated with pipeline installation are expected to be short term and localised (within hundreds of metres of the pipeline), with impacts to the wider marine environment considered highly unlikely. Over the longer term, impacts associated with operating the pipeline are expected to be minimal. Given the low sensitivity and broad regional representation of the habitats within the gas export pipeline route, the potential impacts associated with installation of the gas export pipeline are considered to be minor, mainly due to the length of the pipeline (262 km) and subsequent total area of potential disturbance (approximately 29 ha). As identified in the OPP, it is expected that sawfish may be found within the southern end of the pipeline corridor. The Sawfish and River Sharks Recovery Plan identifies habitat degradation and modification as one of the principal threats to these species, and the Gas Export Pipeline Installation EP specifically addresses this potential impact. **Installation Activities** ConocoPhillips appreciates NPFI's concern regarding disruption to, or displacement of, Northern Prawn commercial fishing activities during pipeline installation activities and wishes to further discuss the information presented so we can more fully understand NPFI's members' activities. We note NPFI's request that all pipeline installation activity is undertaken outside of Northern Prawn fishing seasons. At this early planning stage, the exact timing and duration of pipeline installation activities is subject to pipelay vessel availability, sea state, weather conditions and operational efficiencies. Activities associated with installation of the pipeline will occur within a 2 km buffer around the pipeline route, and 3 km radius around each endpoint of the pipeline. There will be a 500 m safety exclusion zone around the pipelay vessel during installation activities. ConocoPhillips will undertake consultation with all relevant commercial fishing stakeholders on an ongoing basis in the lead-up to the pipeline installation activities to ensure disruption is minimised. In the event that pipeline installation activities overlap with Northern Prawn fishing seasons, ConocoPhillips is keen to engage with		As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
27 Feb 2019	ConocoPhillips provided the information provided to the NTSC on commercial fisheries' issues and concerns relevant to the Barossa Gas Export Pipeline Installation and the PPT presentation used in discussions with Austral Fisheries management, NT-based Spanish Mackerel licence holders and the NT Department of Fisheries.			
27 Mar 2019	ConocoPhillips follow up phone call. Left voicemail referring to email on 27 Feb 2019. Asked whether Stakeholder had any questions and if they would like to meet.			
16 Apr 2019	ConocoPhillips follow up phone call. Left voicemail referring to advice from stakeholder on 26 Feb 2019 that they wished to provide comments on the EP and requesting comments be provided as soon as practicable.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal. Northern Prawn Fishery responded that it would definitely review and get additional Northern Prawn Fishery comments to ConocoPhillips before end of April.			
30 April 2019	ConocoPhillips received letter from NPFI via email with the following issues and concerns: The proposed pipeline will be installed through very productive fishing grounds for the Northern Prawn Fishery and also areas inhabited by endangered sawfish species. 1 The OPP states that based on habitat preferences of sawfish "it is highly unlikely that sawfish will occur" within the area of the project including the pipeline and corridor. Sawfish are known to occur in various habitat types across northern Australia. There are four species of sawfish in Australia, all inhabit the inshore and offshore waters of the Northern Prawn Fishery including the area of the proposed pipeline and when they do so depends on their life stage (i.e. pups inhabit riverine habitat and move offshore as juveniles/sub-adults). Sawfish have been recorded by Northern Prawn Fishery operators and prawn broodstock collectors in the proposed pipeline installation area for many years and recently in significant numbers west of Bathurst Island. This could indicate an aggregation site for			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	breeding and/or feeding though this is currently unknown. The immediate and long-term impacts of habitat disturbance on the sawfish in this area could be significant and NPFI is concerned that due consideration has not been given to this in the Environment Plan. NPFI invests considerable time and resources to better understand sawfish populations, mitigate interactions with the species and protect important sawfish habitat. 2 The proposed pipeline will be installed through fishing grounds accessed by many Northern Prawn Fishery operators during both of the fishing seasons (figure supplied). NPFI has previously expressed concern about the immediate and future impacts of seabed disturbance on the prawn stocks, including spawning and the recruitment to fishing grounds, given the lack of information on the impact of such activity on crustacean. NPFI reiterates those concerns and urges ConocoPhillips to take all measures to minimise and mitigate impacts on both Northern Prawn Fishery fishing operations and prawns stock in the area as much as possible. NPFI also would encourage investment by ConocoPhillips in research to better understand the impacts of its activities on prawn stocks and TEP species such as sawfish. 3 To minimise impacts on Northern Prawn Fishery fishing operations, NPFI would request that all pipeline installation activity is undertaken outside of Northern Prawn Fishery fishing seasons. The fishery is currently closed from 16th June to 31st July and from 1 December to 1 April each year. NPFI will be seeking compensation from ConocoPhillips on behalf of the Northern Prawn Fishery Statutory Fishing Rights holders should there be any disruption to, or displacement of, Northern Prawn commercial fishing activities from the establishment of the proposed pipeline.	the Northern Prawn Fishery Industry to identify arrangements to ensure we can safely share this environment. As advised above, ConocoPhillips would also like further engagement with the NPFI to better understand NPFI member's activities and any concerns on how the presence of the pipeline may affect the Northern Prawn Fishery on an ongoing basis. Further detail related to both the issues you have raised was previously provided and has again been included with this response. The issues are also addressed in a consolidated FAQ developed from all stakeholder feedback and responses available on our website at this address: http://www.conocophillips.com.au/what-we-do/our-projects-activities/barossa-project/environment/		
1/2 May 2019	Attempted call and email by ConocoPhillips asking whether NPFI would like to have a meeting and that we will start preparing a written response. Email exchange to organize meeting.			
21 May 2019	ConocoPhillips provided written response to the issues and concerns raised.			
30 May 2019	Meeting held between ConocoPhillips and NPFI to discuss issues/concerns raised and ongoing engagement process.			
12 June 2019	ConocoPhillips emailed meeting notes and requested NPFI review for accuracy and add any other relevant information. ConocoPhillips advised we would then provide further response. Discussion points from meeting: 1 ConocoPhillips provided an overview of the investment decision timeframe for the Barossa Project with a final investment decision expected by Q1 2020. The decision is also dependent on Darwin LNG first selecting Barossa as the future gas supply to backfill its facility. 2 The Barossa Gas Export Pipeline (GEP) corridor presented in the OPP in March 2018 has since been refined to a preferred pipeline route. The pipeline route selection process considered a number of factors, including environmental. The final route selected is the most favourable from an environmental, engineering and economic perspective and removes the need to trench, which will reduce benthic disturbance. We are now preparing an Environment Plan (EP) to specifically address installation of the preferred pipeline route.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	3 ConocoPhillips advised that we will also be preparing a number of other activity specific EPs and will be in touch with NPFI at a later date to provide details regarding these activities. ConocoPhillips noted that the next EP will be for drilling of the production wells, which will occur in the development area of the Barossa field, and advised that we will shortly commence stakeholder consultation regarding this EP. 4 ConocoPhillips reiterated that the pipelay will take around three (3) months at a rate of 3-5 km/day depending upon the pipelay vessel contracted. The pipelay vessel will constantly be moving and will have a 500 metre exclusion zone around it. ConocoPhillips clarified that once the pipeline was in place there will be no ongoing exclusion zone around the infrastructure. 5 NPFI reiterated its response to ConocoPhillips (dated 30 April 2019) that its primary concerns are interruption to fishing activities during installation and operations and potential impacts on prawn habitat and sawfish. 6 NPFI indicated that fishing activity at the northern end of the proposed pipeline route is predominately for scampi. Banana prawn fishing traditionally commences in the Gulf of Carpentaria region in April with vessels then moving west towards the Bonaparte and Melville statistical areas. 7 NPFI also mentioned that there are two (2) broodstock vessels that operate within a discreet area towards the southern end of the proposed pipeline route. NPFI indicated that fishing tended to occur in the same grounds each season. ConocoPhillips reiterated that we would like to better understand when, during the two fishing seasons, NPFI member vessels operate within the proposed pipeline route, and how our activities might interrupt fishing activities, including broodstock collection. 8 ConocoPhillips reiterated that there would be a 500 m exclusion zone around the pipelay vessel as it moved along the pipeline, but no exclusion along the pipeline on an ongoing basis. ConocoPhillips would like to work closely with NPFI when we are closer to installation to understand how we can best manage potential access issues during installation. With regard to impacts on habitat, ConocoPhillips advised that the chosen pipeline installation method is unlikely to result in significant modification to benthic habitat, and that this will be addressed in the EP. 9 In terms of impacts on sawfish, NPFI indicated that they had seen a spike in the number of sawfish being picked up as bycatch towards the southern end of the proposed Barossa pipeline. The NPFI is working with CSIRO and CDU researchers to identify the particular species of sawfish and to understand if the increased number of interactions represents a possible aggregation/migration area. This research is expected to produce initial findings in the next 6-12 months. NPFI indicated a willingness to make swordfish interaction data available to ConocoPhillips as confidential information. 10 The NPFI has also worked with AFMA to place tighter regulations on broodstock vessels and increase monitoring and reporting efforts on sawfish interactions. ConocoPhillips advised that we have identified that sawfish may occur in the pipeline installation area, especially the southern section, and will address this in the EP. ConocoPhillips also advised that we are interested in the research conducted to date and would be grateful for more details.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	11 NPFI expressed an interest in temperature and bathymetry data captured by ConocoPhillips for its Barossa baseline studies, and ConocoPhillips will investigate if collected information can be made available to NPFI. 12 ConocoPhillips and NPFI agreed to regular meetings on the proposed Barossa development activities as information on the timing of infrastructure installation and drilling activities becomes clearer. The meetings would also continue discussion around options to a) safely share areas where pipeline installation and fishing activities may overlap and b) assist the NPFI in responding to ConocoPhillips requests for information.			
Northern Territory Seafood Council (NTSC)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a ‘relevant’ stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21/22 Jan 2019	NTSC copied into emails between WAFIC and ConocoPhillips (see WAFIC entry)			
25 Jan 2019	NTSC responded via email stating it agreed with WAFIC suggestion of a bespoke fact sheet addressing commercial fishing issues and concerns rather than asking for review of the fact sheet provided on 16 Jan and noted it was ConocoPhillips’s role to address upfront any potential issues which may negatively impact the commercial fishing sector and to address these potential issues to ALARP level upfront as part of ConocoPhillips’s consultation with potentially affected commercial fishers. Advised it would be appreciated if a factsheet outlining issues, concerns and potential issues of relevance to the commercial fishing sector could be provided and in what timeframe.			
30 Jan 2019	ConocoPhillips emailed advising that it would be able to provide a tailored fact sheet in mid to late February based on the potential issues as ConocoPhillips understands them based on previous consultations. ConocoPhillips also asked NTSC to advise if it would like to meet in the meantime.			
19 Feb 2019	Further attempt made by ConocoPhillips via phone to contact NTSC			
27 Feb 2019	ConocoPhillips provided the information requested by the NTSC on commercial fisheries’ issues and concerns relevant to the Barossa Gas Export Pipeline Installation and the PPT presentation used in discussions with Austral Fisheries management, NT-based Spanish Mackerel licence holders and the NT Department of Fisheries. The pipeline co-ordinates were also provided. ConocoPhillips advised that the information had also been provided to all relevant commercial fishery licence-holders. As per the usual practice we will also provide the issues and concerns information to NTSC’s licence-holder lists, as per the NTSC’s requested process. ConocoPhillips advised representatives would be in Darwin on Darwin on March 18/19/20 if NTSC was available to meet, otherwise we would work with NTSC on a convenient date.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
27 Mar 2019	ConocoPhillips follow up phone call. Left message referring to email on 27 Feb 2019. Asked whether Stakeholder had any questions and if they would like to meet.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Northern Wildcatch Seafood Australia				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates.			
1 Mar 2019	ConocoPhillips provided the information on commercial fisheries' issues and concerns relevant to the Barossa Gas Export Pipeline Installation and a reminder to provide any feedback.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	should not be published by NOPSEMA following EP submittal.			
NT Guided Fishing Industry Association (NTGFIA)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	ConocoPhillips provided the following responses to the issues and concerns raised: **1 Interaction with fishing activities** The pipeline will be constructed from carbon steel and have an external anti-corrosion coating, concrete weight coating and anodes to maintain integrity. It will be laid using a continuous assembly pipe-welding installation method with sections of pipe gradually lowered to the seabed behind the pipelay vessel using an S-lay method. This method is commonly used in offshore pipeline installation in comparable water depths. The use of dynamically positioned pipelay and support vessels will eliminate the need for anchoring during routine installation operations. The primary method of maintaining pipeline stability on the seabed, where required, will be through the concrete weight-coating. Several seabed intervention methods could be used to manage spans and stability where concrete weight-coating alone is not sufficient. These methods could include concrete mattresses, sand/grout bags, local modification to the seabed, steel structures, rock bolting and gravity anchors. Activities associated with the installation of the pipeline are expected to commence as early as Q1 2021 and finish as late as Q1 2024. It is anticipated that the pre-lay survey could commence up to nine months earlier than pipeline installation, and pre-lay span rectification may occur up to 30 days prior to pipeline installation. The total infield duration of the offshore installation activities is expected to be approximately nine months. The schedule is indicative only; exact timing and duration of the installation activities is subject to pipelay vessel availability, sea state, weather conditions and operational efficiencies. (i.e. the pipelay vessel will be present for approximately three months). Installation activities will occur within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. It is highly unlikely that the presence of the project will result in significant changes in habitat usage by marine species or to the physical environment. Within the pipeline corridor, potential impacts associated with the installation are expected to be short term and localised (within hundreds of metres) with impacts to the wider marine environment considered highly unlikely. Over the longer term, impacts over the operating life of the pipeline are expected to be minimal. The pipeline route has been refined to avoid areas of significant seabed features as much as practicable, and avoid uneven seabed features wherever possible. The benthic habitat in the vicinity of the pipeline route is widely represented in the region and predominantly supports burrowers/crinoids, filter feeders and macroalgae. The following potential environmental impacts were assessed in the Barossa Offshore Project Proposal (OPP) and are being further examined during the development of the Gas Export Pipeline Installation Environment Plan (EP). Fauna Impacts to fauna such as marine turtles, cetaceans and fishes are expected to primarily be short-term displacement from the immediate vicinity of the pipeline during installation. Baseline environmental assessment has confirmed that marine mammals (cetaceans) are generally widely distributed and highly mobile in the region. Both sei and fin whales have a wide distribution throughout offshore waters and therefore may pass through the project area in low numbers. No aggregation areas or migration pathways for cetaceans occur within or in the vicinity of the proposed pipeline route. The crested tern is widespread and numerous along the NT coastline, with 20	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1) did not result in any specific amendments to the EP. The issues and concerns related to potential interaction with fishing activities (2) helped inform the commitments ConocoPhillips has made in the ongoing communications process, including presenting to the association's AGM later in 2019.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
21/22 Feb 2019	Telephone discussion on 21 Feb and ConocoPhillips sent follow-up email with pipeline route coordinates and proposed meeting date in Darwin.			
14/15 Mar 2019	Phone call discussion and follow-up emails re organisation of meeting in Darwin			
19 Mar 2019	Meeting held in Darwin and presentation provided			
22 Mar 2019	ConocoPhillips provided a list to the stakeholder of the issues and concerns raised at the 19 March meeting: 1 There are fishing charter businesses on the Tiwi Islands and some mainland-based that will conduct activities from time to time around the southern section of the proposed pipeline installation area. These activities can occur at any time of the year but are more likely to occur in the earlier and later months of each year. 2 It is important that ConocoPhillips communicates its schedule and activities to marine users both in advance and during the installation program. To that end, could ConocoPhillips make a short presentation along the lines of this meeting to the Association's AGM in late October this year. ConocoPhillips asked the stakeholder to advise if any issue or concern had been missed and meanwhile ConocoPhillips would prepare written responses.			
10 April	ConocoPhillips provided written responses and reminder the stakeholder to provide further feedback if required. In the response ConocoPhillips noted that one of the responses included a change to the indicative schedule. We previously advised that the activities associated with the installation of the pipeline are expected to commence as early as Q1 2021 and finish as late as Q2 2023. The finish date is now 'as late as Q1 2024'. All other indicative schedule information is the same, including the duration period of approximately nine months for the activities.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.	breeding colonies reported. The colony on Seagull Island, 4km north-west of Melville Island, supports over 50,000 birds and is considered globally significant. Significant numbers of olive ridley and flatback turtles are also known to nest on the beaches of Seagull Island and on the west coast of Melville Island. A 'biologically important area' (BIA) for olive ridley turtles has been defined adjacent to this area, and the pipeline installation activities will not encroach this area. A larger area has been defined as a BIA for flatback turtles as well as 'habitat critical to the survival of flatback and olive ridley turtles'. Whilst pipeline installation activities will traverse a small part of these areas, installation activities are considered highly unlikely to impact the species use of the area as low numbers of turtles are expected in the vicinity of the pipeline due to the water depths. During the installation period, the pipelay vessel will continuously traverse along the pipeline alignment (i.e. not a stationary vessel), therefore the small area of light spill will not impact any one location for an extended duration and is not expected to have any impacts additional to existing vessel traffic traversing the area. Therefore, light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns or turtles. Underwater sound generated by installation activities may affect individuals passing through the area, however impacts at a population level are considered unlikely given the area affected is highly localised. The key noise sources associated with installation activities along the pipeline will also be relatively slow moving (approximately 3 km–5 km of the pipeline will be laid per day), thereby allowing individuals to move away from the area, and reasonably short in duration. The risk of vessel strike to marine fauna is inherent to movements of all vessel types, including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to minimise impacts from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely, and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the EPBC Regulation s2000 – Part 8 Division 8.1 Water Quality During the installation campaign project vessels will routinely discharge small volumes of treated sewage, cooling water, putrescible waste, reverse osmosis brine, bilge and deck water. Any potential impacts are expected to be highly localised and temporary and will not impact environmental values/sensitivities. Given the typically small volumes and temporary (i.e. instantaneous) duration of accidental discharge events, impacts to water quality would be temporary and highly localised. Subsequently, there would be limited potential for toxicity to marine fauna due to temporary exposure and low toxicity as a result of rapid dilution. Therefore, any potential impacts to marine fauna would be limited to any individuals that may be transiting within the immediate area of the discharge (within tens to several hundred metres). After completion of installation, the pipeline will be flooded, cleaned and gauged tested (FCGT) with chemically-treated seawater (typically a mixture of biocides to prevent biofouling on the internal surfaces, an oxygen scavenger to control corrosion of the pipeline and a dye to allow for leaks to be detected during visual inspections). Approximately 16,000 m^3 of treated seawater will be discharged over a 1-2-day period during cleaning, with discharges occurring at either end of the pipeline and at the seabed or the surface.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		The pipeline will then be left filled with treated seawater before being dewatered and conditioned with mono ethylene glycol (MEG) (to prevent hydrate or moisture formation) and nitrogen purged (to displace moisture and oxygen within the pipeline). Approximately 85,000 m3 of treated seawater will be discharged over 3-7 days during dewatering, with approximately 1,000 m3 MEG being discharged over a period of less than one day. Discharge of the dewatering fluid will only occur at the seabed through a vertically orientated diffuser at the northern end of the pipeline located in the Barossa field, which is approximately 150 km from the Tiwi Islands in ~250 m water depth. This area is also distant from known fishing activities. Following cleaning, the pipeline will be pressure tested (hydrotested) to confirm pipeline integrity. Approximately 2,000 m3 of treated seawater will be discharged over a half day period during hydrotesting, with discharges occurring at the seabed or the surface at either end of the pipeline. Impacts from treated seawater arise mainly from the addition of biocides, corrosion inhibitors, scale inhibitors and oxygen scavengers. Given the short duration of discharges and low volumes/toxicities of chemicals used for FCGT and hydrotesting, and that biocides are readily biodegradable and do not bioaccumulate, impacts from these activities are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important marine fauna. Controls to manage this risk include: • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the potential impacts of planned discharges. • Bulk dewatering will occur at the offshore endpoint of the pipeline to maximise dilution and avoid sensitive habitats and areas of higher densities of marine fauna. • Chemical injection volumes will be metered during flooding and hydrotest operations to identify leakage and trigger activity to stop, as well as to mitigate the risk of under/over-dosage of chemical. • Contracted vessel will have dedicated flood, clean, gauge, and pressure test (FCGT) procedures. • A vertically orientated diffuser will be used during dewatering to re-oxygenate treated seawater at the northern discharge point in the Barossa Field Introduced marine species There may be an increased risk of introduced marine species (IMS) colonising areas of the pipeline corridor in the shallower water depths where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks). However, the risk of this occurring is considered low given the key management controls that will be implemented throughout the life of the project including a project Quarantine Management Plan, and compliance with contemporary ballast water and biofouling requirements (see separate issue/response for further detail). Controls to manage this risk include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 91 (Marine Pollution Prevention – Oil), 95 (Marine Pollution Prevention – Garbage) and 96 (Marine Pollution Prevention – Sewage). • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the area influenced by planned discharges and significance of any impacts. • Offshore Vessel Inspection Database (OVID) inspections will be conducted to ensure all contracted vessels have International Maritime Organisation (IMO) approved treatment systems. Impacts of pipeline installation activities on fishing activities near the proposed route are expected to be localised and short-term. Activities associated with installation of		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		the pipeline will occur within a 2 km buffer around the pipeline route, and 3 km radius around each endpoint of the pipeline. However, support vessels may transit to and from port as required (note: vessel movements to and from the operational area are outside the scope of the EP). Peak vessel activity is expected to occur during installation of the pipeline, when the pipelay vessel and a dedicated support vessel will be present in the operational area, whilst supply vessels will transit to and from the pipelay vessel regularly (expected to be daily). During the campaign, vessels will operate 24 hours a day, 7 days a week. The pipeline will overlap approximately 0.18 km2 of the area actively fished in the Northern Prawn Fishery at low intensity. The pipeline corridor does not intersect any areas trawled by the NT Demersal Fishery. Once the pipeline is operational, trawl fisheries such as the Northern Prawn Fishery and NT Demersal Fishery may be affected on an ongoing basis due to the long-term presence of the pipeline and infrastructure. Recent effort for both these fisheries is concentrated outside the Operational Area and therefore impacts are expected to be minimal. Only limited recreational fishing activity occurs in or near the operational area due to the distance from the NT mainland. Considering the relatively short duration of the pipeline installation in which higher numbers of vessels will be present), and minimal number of project related vessel movements within the pipeline corridor during operations (i.e. limited to periodic maintenance and inspection activities), the impact to commercial fishing activities from vessels movements are considered to be minor. Controls to manage this risk include: Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant pipeline installation activities. • Subsea infrastructure and pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The pipeline end termination (PLET) at the southern end of the Barossa pipeline where it joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with commercial fishing activities. • An ongoing communications plan will be implemented for engagement with potentially affected fishers. The temporary presence of the pipelay vessels in the operational area will not significantly increase the volume of existing vessel traffic in the area. The area west and south-west of the Tiwi Islands is subject to regular vessel traffic. Data from the Australian Maritime Safety Authority's (AMSA's) craft tracking system indicates vessel traffic routinely moving from the port of Darwin, with vessels moving north routinely navigating around the western tip of Bathurst Island at distances from shore consistent with the closest point of the pipeline corridor. Darwin will continue to be the main supply and maintenance hub for all ConocoPhillips' Australian regional offshore exploration and production operations, including the Barossa Project. ConocoPhillips will continue to engage with vessel contractors regarding future port and transit plans. **2 Consultation** ConocoPhillips will continue to undertake consultation with all relevant fishing stakeholders in more detail during preparation of activity-specific EPs and on an		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		ongoing basis in the lead-up to and during all operational activities. In addition to commercial fishers this will include recreational fishers through AFANT and charter vessel operators both directly and through their association. An ongoing stakeholder engagement and communications plan will be included as part of the Gas Export Pipeline Installation EP submitted to NOPSEMA for assessment. Controls to manage the risk of interaction with other vessels during pipeline installation activities include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities. • Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The PLET at the end of the gas export pipeline where the pipeline joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with fishing activities. As part of these ongoing activities, ConocoPhillips will be pleased to attend the Association's AGM and provide a presentation.		
NT Port and Marine (Port Melville, Tiwi Islands)				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
27 Feb 2019	Follow up phone call and email with stakeholder. Stakeholder advised no issues with environment impacts to raise. Stakeholder noted interest in opportunities to support ConocoPhillips activities in and around the Tiwi Islands.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	should not be published by NOPSEMA following EP submittal.			
Office of Minister for Primary Industry and Resources, NT Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. Further consultation was conducted with the relevant departments.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Office of Minister for Environment and Natural Resources, NT Government				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. Further consultation was conducted with the relevant department.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Offshore Net and Line Fishery NT, Commercial Licence Holders				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers:	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
6 Mar 2019	Commercial fishing tailored info sent via letter to all licence-holders	• Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).		prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Oil Spill Response Ltd				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues and concerns raised	No response required.	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
7 Feb 2019	Follow up phone call. Voicemail left.			
8 Feb 2019	Phone call with stakeholder. Stakeholder advised that they will respond by the closing date if they have any comments.			
15 Feb 2019	Follow up email attaching fact sheet and reminding stakeholder of the closing date for initial comments on the proposed EP.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
Origin Energy				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Feb 2019	Follow up phone call. Voicemail left.			
7 Feb 2019	Phone conversation confirmed Origin has divested permit interests in the area and is no longer a relevant stakeholder.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Paspaley Pearling Company				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
22 Feb 2019	Attempted call by ConocoPhillips to office with no answer. ConocoPhillips provided follow-up email.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Pearl Oyster Fishery NT, Commercial Licence Holders				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Mar 2019	Commercial fishing tailored information sent via letter to all licence-holders			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Sea Turtle Foundation				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the
21/22 Feb 2019	ConocoPhillips left phone message, on-line message via website and follow-up email with pipeline route coordinates and offer of meeting.			
27 Mar 2019	Attempted phone call and follow-up email reminder			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			ongoing communications process.
Santos				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Feb 2019	Follow up phone call. Voicemail left.			
7 Feb 2019	Follow up email.			
7 Feb 2019	Emailed received confirming no feedback to provide.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Shark Fishery, NT Commercial Licence Holders				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email to representative body (NTSC) with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised. On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers:	No response required.	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by
6 Mar 2019	Commercial fishing tailored information sent via letter to all licence-holders			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.	• Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).		NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a potentially 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
Spanish Mackerel Fishery NT, Commercial Licence Holders				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP). In addition, ConocoPhillips provided the following responses to the issues and concerns raised at a meeting with the stakeholder: **1 Impacts on sea floor and marine environment** The pipeline route has been refined to avoid areas of significant seabed features as much as practicable and uneven seabed features wherever possible. Benthic habitats within the pipeline corridor are expected to consist of predominantly burrowers/crinoids, filter feeders, macroalgae, with a substantial portion of the area also supporting no benthic habitat (approximately 81%). No significant or restricted areas of benthic habitat are known to occur. It is considered highly unlikely that the presence of the project will result in significant changes in habitat usage by marine species or to the physical environment. The pipeline will be constructed from carbon steel and have an external anti-corrosion coating, concrete weight coating and anodes to maintain integrity. It will be laid using a continuous assembly pipe-welding installation method with sections of	The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1, 4, 5 and 6) did not result in any specific amendments to the EP. The issues and concerns related to potential interaction with commercial fishing activities (2 and 3) helped inform the commitments ConocoPhillips has made in the ongoing communications process. Any additional data that may be provided by the stakeholder will also help inform the ongoing communications process.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
31 Jan 2019	Chair of NTSC Mackerel Fishery Committee phoned ConocoPhillips requesting further information and meeting organised for 8 Feb in Darwin			
8 Feb 2019	ConocoPhillips met with Chair and Vice-Chair of NTSC Mackerel Fishery Committee and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide a written summary of the issues raised during the meeting.			
13 Feb 2019	ConocoPhillips provided Chair and Vice-Chair with summary of issues at 8 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested they advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses and they would also be provided with the tailored fact sheet being prepared for the NTSC. Issues raised: 1. Impacts of pipeline installation activities on the sea floor and marine environment, specifically related to fish, fish habitat and fishing activities around shoals and banks, particularly Goodrich and Marie shoals. How these impacts will be mitigated and managed by ConocoPhillips 2. Impacts of pipeline installation activities on fishing activities near the proposed route, i.e. exclusion areas, length of installation period, proposed period of year for installation. Chair and Vice-Chair advised that the proposed pipeline route closely mirrors one licence-holder (i.e. The Chairs's) fishing			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	activities, which follows a route out from Darwin north along the shoals (and as far out as the 'Timor Box'). Questioned how these impacts will be mitigated and managed by ConocoPhillips. Noted that seven boats working out of Darwin are known to work similar fishing grounds to Norm's. 3. Once the pipeline is established it's not a major concern. Of more concern is the route itself and how much it can be adjusted to accommodate the concerns of the Fishery related to proximity and impact to banks and shoals where they operate. 4. Questioned how close will pipeline come to banks and shoals, bearing mind they fish up to a dozen spots between Shepparton and Goodrich, potentially all year round 5. Also of concern is the level of noise and vessel movement etc all of which can impact on the movement of fish that are very sensitive to changes in the marine environment. 6. Questioned whether the pipeline in operation results in a higher temperature as this can help attract fish 7. Advised they could potentially share some data with ConocoPhillips 8. Chair and Vice-Chair advised that they hold eight out of 15 licences between them. However, they will liaise with other licensees and pass on information via the association/committee.	pipe gradually lowered to the seabed behind the pipelay vessel using an S-lay method. This method is commonly used in offshore pipeline installation in comparable water depths. The use of dynamically positioned pipelay and support vessels will eliminate the need for anchoring during routine installation operations. The primary method of maintaining pipeline stability on the seabed, where required, will be through the concrete weight-coating. Several seabed intervention methods could be used to manage spans and stability where concrete weight-coating alone is not sufficient. These methods could include concrete mattresses, sand/grout bags, local modification to the seabed, steel structures, rock bolting and gravity anchors. Pipelay and associated offshore activities (e.g. prelay and post lay surveys) are expected to take up to nine months of offshore operations to complete. Pipeline installation activities (i.e. involving the pipelay vessel) are expected to occur over approximately three months, with installation activities occurring within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During pipeline installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. Within this corridor, potential impacts associated with the installation of pipeline infrastructure are expected to be short term and localised (within hundreds of metres) with impacts to the wider marine environment considered highly unlikely. Over the longer term, impacts over the operating life of the pipeline are expected to be minimal. Furthermore, the presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The following potential impacts on the marine environment have been assessed in the Barossa OPP (see OPP for full assessment), and will be further examined during the development of the Gas Export Pipeline Installation EP: Discharges During the installation campaign project vessels will routinely discharge small volumes of treated sewage, cooling water, putrescible waste, reverse osmosis brine, bilge and deck water. Any potential impacts are expected to be highly localised and temporary and will not impact environmental values/sensitivities. Accidental spill events associated with vessel activities have also been assessed. Given the typical small volumes and temporary (i.e. instantaneous) duration of accidental discharge events, impacts to water quality would be temporary and highly localised. Subsequently, there would be limited potential for toxicity to marine fauna due to temporary exposure and low toxicity as a result of rapid dilution. Therefore, any potential impacts to marine fauna would be limited to any individuals that may be transiting within the immediate area of the discharge (within tens to several hundred metres). Underwater noise associated with the installation vessels is also expected to be highly localised and temporary and is unlikely to impact fauna in the vicinity of installation activities. Controls to manage this risk include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 91 (Marine Pollution Prevention – Oil), 95 (Marine Pollution Prevention – Garbage) and 96 (Marine Pollution Prevention – Sewage). • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the area influenced by planned discharges and significance of any impacts. • Offshore Vessel Inspection Database (OVID) inspections will be conducted to ensure all contracted vessels have International Maritime Organisation (IMO) approved treatment systems. After completion of installation, the gas export pipeline will be flooded, cleaned and gauged tested (FCGT) with chemically-treated seawater (typically a mixture of		
1 Mar 2019	ConocoPhillips advised via email that it should have the responses to the issues raised ready to send the NTSC within the week and, in the interim, provided the information tailored to the commercial fishing industry that was requested by the NTSC.			
6 Mar 2019	Commercial fishing tailored information sent via letter to all Spanish mackerel Fishery licence-holders			
13 Mar 2019	ConocoPhillips provided written responses and reminder the stakeholder to provide further feedback if required.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		biocides to prevent biofouling on the internal surfaces, an oxygen scavenger to control corrosion of the pipeline and a dye to allow for leaks to be detected during visual inspections). Approximately 16,000 m3 of treated seawater will be discharged over a 1-2 day period during cleaning, with discharges occurring at either end of the pipeline and at the seabed or the surface. Following cleaning, the gas export pipeline will be pressure tested (hydrotested) to confirm pipeline integrity. Approximately 2,000 m3 of treated seawater will be discharged over a half day period during hydrotesting, with discharges occurring at either end of the pipeline and at the seabed or the surface. Impacts from treated seawater arise mainly from the addition of biocides, corrosion inhibitors, scale inhibitors and oxygen scavengers. Given the short duration of discharges and low volumes/toxicities of chemicals used for FCGT and hydrotesting, and that biocides are readily biodegradable and do not bioaccumulate, impacts from these activities are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important marine fauna. Controls to manage this risk include: • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the potential impacts of planned discharges. • Bulk dewatering will occur at the offshore endpoint of the gas export pipeline to maximise dilution and avoid sensitive habitats and areas of higher densities of marine fauna. • Chemical injection volumes will be metered during flooding and hydrotest operations to identify leakage and trigger activity to stop, as well as to mitigate the risk of under/over-dosage of chemical. • Contracted vessel will have dedicated flood, clean, gauge, and pressure test (FCGT) procedures. • A vertically orientated diffuser will be used during dewatering to re-oxygenate treated seawater at the discharge point Introduced marine species There may be an increased risk of introduced marine species (IMS) colonising areas of the pipeline corridor in the shallower water depths where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks). However, the risk of this occurring is considered low given the key management controls that will be implemented throughout the life of the project including a project Quarantine Management Plan, and compliance with contemporary ballast water and biofouling requirements. Fauna Impacts to fauna such as marine turtles, cetaceans and fishes are expected to primarily be short-term displacement from the immediate vicinity of the pipeline during installation. The presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The crested tern is widespread and numerous along the NT coastline, with 20 breeding colonies reported. The colony on Seagull Island supports over 50,000 birds and is considered globally significant. Significant numbers of olive ridley turtles are known to nest on the beaches of Seagull Island and the north-west coast of Melville Island. As the physical presence of the gas export pipeline within internesting habitat critical to the survival of marine turtles has been minimised, i.e. approximately 0.0001% and 0.0015% of the internesting habitat critical to the survival of flatback and olive ridley turtles respectively, the physical presence of the gas export pipeline during is considered highly unlikely to impact the species use of the area.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		2 and 3 Pipeline installation During the installation period, the pipelay vessel will continuously traverse along the pipeline alignment (i.e. not a stationary vessel), therefore the small area of light spill will not impact any one location for an extended duration and is not expected to have any impacts additional to existing vessel traffic traversing the area. Therefore, light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns or olive ridley turtles located on the shoreline of Seagull Island. Underwater sound generated by installation activities may affect individuals passing through the area, however impacts at a population level are considered unlikely given the area affected is highly localised. The key noise sources associated with installation activities along the gas export pipeline will also be relatively slow moving (approximately 3 km–5 km of the gas export pipeline will be laid per day), thereby allowing individuals to move away from the area, and reasonably short in duration. The risk of vessel strike to marine fauna is inherent to movements of all vessel types, including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to minimise impacts from the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely, and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the EPBC Regulation s2000 – Part 8 Division 8.1. **4 Impact on shoals/banks** Some of the shoals/banks in close proximity to the pipeline corridor, such as Shepparton Shoal, Marie Shoal and Goodrich Bank, may be temporarily affected by increased sediment levels. Considering the expected short duration of increased sedimentation at any one area, and that these areas have naturally highly turbid environments meaning that benthic habitats in these areas are likely to have a natural resilience to higher sediment/turbid conditions, significant impacts are considered unlikely. The outcomes of the pre-lay surveys will be used to further inform final route optimisation and reduce environmental impacts. Impacts from interactions from project facilities/infrastructure and vessel movements with other marine users, including commercial fishers, throughout the project are considered remote given the relatively minor physical scale of the offshore facilities/infrastructure and presence of project-related vessels, combined with the relatively low level of activity within the open offshore waters of the project area impacts of pipeline installation activities on fishing activities near the proposed route are expected to be localised and short-term. Pipelay and associated offshore activities (e.g. prelay and post lay surveys) are expected to take up to nine months of offshore operations to complete. Pipeline installation activities (i.e. involving the pipelay vessel) are expected to occur over approximately three months, with installation activities occurring within a 2km corridor either side of the gas export pipeline (3km around the pipeline end termination points at both ends of the pipeline). During pipeline installation activities, a 500m safety exclusion zone will be established around the pipelay vessel. There will be no ongoing exclusion zones established around the pipeline during operations. Installation of the pipeline is expected to commence as early as Q3 2021 and finish as late as Q2 2023. However, pre-lay survey could commence up to nine months earlier than pipeline installation, and pre-lay span rectification may occur up to 30 days prior to pipeline installation.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		The total infield duration of the offshore installation activities is expected to be approximately nine months. The schedule is indicative only; exact timing and duration of gas export pipeline installation activities is subject to pipelay vessel availability, sea state, weather conditions and operational efficiencies. (i.e. the pipelay vessel will be present for approximately three months). ConocoPhillips will continue to consult with the Mackerel Fishery representatives on operational detail, including proposed timeframes and environmental factors. Peak vessel activity may occur during installation of the pipeline, when the pipelay vessel and a dedicated support vessel will be present in the operational area, whilst supply vessels will transit to and from the pipelay vessel regularly (expected to be daily). During the campaign, vessels will operate 24 hours a day, 7 days a week. Activities associated with installation of the gas export pipeline will occur within a 2 km buffer around the gas export pipeline route, and 3 km radius around each endpoint of the gas export pipeline (i.e. the Operational Area). However, support vessels may transit to and from port as required (outside the scope of the EP). Vessels operating within the pipeline corridor will typically travel at speeds slower than those operating in offshore waters, and therefore exhibit a lower risk profile in terms of collisions. Considering the relatively short duration of the pipeline installation in which higher numbers of vessels will be present), and minimal number of project related vessel movements within the pipeline corridor during operations (i.e. limited to periodic maintenance and inspection activities), the impact to commercial fishing activities from vessels movements are considered to be minor. ConocoPhillips will continue to undertake consultation with all relevant commercial fishing stakeholders in more detail during preparation of activity-specific EPs and on an ongoing basis in the lead-up to and during all operational activities. Controls to prevent or minimise impact include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of Navigation and Emergency Procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • Consultation with relevant and interested stakeholders will be undertaken in accordance with stakeholder consultation plan. • Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified prior to relevant gas export pipeline installation activities. • Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO). • The PLET at the end of the gas export pipeline where the pipeline joins the existing Bayu-Undan pipeline has been designed with anti-snag protection. • A support vessel will be present in the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential adverse interactions with commercial fishing activities. • An ongoing communications plan will be implemented for engagement with potentially affected fishers. The current proposed pipeline route is located approximately: 3.2 km from Shepparton Shoal 4.3 km from Marie Shoal 2 km from Goodrich Bank 65 km from Evans Shoal The coordinates for the proposed pipeline route have been provided to the Mackerel		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		Fishery to allow the Fishery to plot the proposed route against areas actively fished. The final pipeline route will be confirmed after the pre-lay survey has been completed. ConocoPhillips will provide the Mackerel Fishery with updated route coordinates as and when they are available. **6 Impact of noise** The area of the marine environment influenced by underwater noise associated with the installation of the gas export pipeline represents a very small proportion of the area available to be fished. No significant impacts to the catchability of fish species targeted by commercial fishers are expected given the short duration and localised nature of any potential impacts (within hundreds of metres). While underwater noise generated by installation activities may affect individuals passing through the area, impacts at a population level are considered unlikely given the area affected is localised. The key noise sources associated with installation activities along the gas export pipeline will also be relatively slow moving (approximately 3 km–5 km of the gas export pipeline will be laid per day), thereby allowing individuals to move away from the area, and reasonably short in duration as installation of the entire pipeline will take in the order of 9 months. Underwater noise from rock dumping and the placement of sand/grout bags is expected to be negligible. Surveys of the seabed using multibeam echo sounder (MBES) and side scan sonar (SSS) will occur during the pipeline installation campaign. Underwater noise will be generated by vessels and seabed intervention activities during the installation of the proposed pipeline and IMR activities during operation of the pipeline. While several support vessels will be present, the pipelay vessel will be the largest source of noise due to it being the largest vessel. The smaller support vessels will result in a negligible increase in overall noise emissions. The temporary presence of the pipelay vessels in the area will not significantly increase the volume of existing vessel traffic in the area. The area west and south west of the Tiwi Islands is subject to considerable vessel traffic. Data from the Australian Maritime Safety Authority's (AMSA's) craft tracking system indicates considerable vessel traffic routinely moving from the port of Darwin, with vessels moving north routinely navigating around the western tip of Bathurst Island at distances from shore consistent with the closest point of the pipeline corridor. These are typically commercial vessels (e.g. container vessels, tankers etc. moving to and from ports throughout southeast Asia. Vessel traffic of this nature has been operating in the region for decades. **7 Seawater temperature** During operations, the pipeline is expected to have no effect on the ambient temperature of seawater in the immediate vicinity. The presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. **8 Data sharing** ConocoPhillips would be pleased to receive any relevant data from licence-holders that could assist with our understanding of fishing activities and assist preparation of the Environment Plan. The last point (8) was noted for information only.		
Timor Reef Fishery, Commercial Licence Holders				
17 Jan 2019	ConocoPhillips provided initial fact sheet via covering letter with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	On request from the licence holders' representative body, the NT Seafood Council, ConocoPhillips pro-actively provided a summary of key concerns identified by ConocoPhillips as relevant to commercial fisheries. The summary outlined the following potential impacts to commercial fishers: • Impacts from the physical presence of the gas export pipeline installation campaign arising from interference with commercial fishing or exclusion of commercial fishers. • Impacts from planned discharges from vessels during the installation campaign and discharges from the gas export pipeline during flooding, cleaning and gauging, testing, and dewatering of the pipeline. • Impacts from the unplanned introduction of Invasive Marine Species (IMS, i.e. marine pests). • Impacts from an unplanned release of fuel from a pipelay vessel due to a vessel collision. The summary addressed each key concern by providing relevant details of the activity, potential impacts arising from the activity or risk, an assessment of potential impacts to commercial fishers and a summary of the controls which will be applied to manage impacts/risks to As Low As Reasonably Practicable (ALARP).		adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
6 Mar 2019	Commercial fishing tailored information sent via letter to all licence-holders			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Tiwi Island Adventures				
16 Jan 2019	ConocoPhillips contacted via phone and provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	ConocoPhillips provided the following responses to the issues and concerns raised at a meeting with the stakeholder: **1 Trench west of Bathurst Island** The proposed pipeline route is greater than 10 km from the trench identified by the TLC and TIA. The pipeline route has been refined to avoid areas of significant seabed features as much as practicable and uneven seabed features wherever possible. Benthic habitats within the pipeline corridor are expected to consist of predominantly burrowers/crinoids, filter feeders, macroalgae, with a substantial portion of the area also supporting no benthic habitat (approximately 81%). No significant or restricted areas of benthic habitat are known to occur. It is considered highly unlikely that the presence of the project will result in significant changes in habitat usage by marine species transiting the area or to the physical environment, such as regional currents and food resource availability. The pipeline will be constructed from carbon steel and have an external anti-corrosion coating, concrete weight coating and anodes to maintain integrity. It will be laid using a continuous assembly pipe-welding installation method with sections of pipe gradually lowered to the seabed behind the pipelay vessel using an S-lay method. This method is commonly used in offshore pipeline installation in comparable water depths. The use of dynamically positioned pipelay and support vessels will eliminate the need for anchoring during routine installation operations. The primary method of maintaining pipeline stability on the seabed, where required, will be through the concrete weight-coating. Several seabed intervention methods could be used to manage spans and stability where concrete weight-coating alone is not sufficient. These methods could include concrete mattresses, sand/grout bags, local modification to the seabed, steel structures, rock bolting and gravity anchors. Impacts to fauna such as marine turtles, cetaceans and fishes are expected to primarily be short-term displacement from the immediate vicinity of the pipeline	The stakeholder advised ConocoPhillips that it was happy with the responses to the issues and concerns raised. The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1-3) did not result in any specific amendments to the EP. The request for consultation with another organisation (7) was met by ConocoPhillips. The remaining issues and concerns (4-6) were related to the project generally.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
7 Feb 2019	ConocoPhillips met with representatives of Tiwi Island Adventures and Tiwi Land Council and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide a written summary of the issues raised during the meeting.			
13 Feb 2019	ConocoPhillips met with representatives of Tiwi Island Adventures and Tiwi Land Council and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide a written summary of the issues raised during the meeting. ConocoPhillips provided representatives of Tiwi Island Adventures and Tiwi Land Council with summary of issues at 8 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses. Issues raised: 1 Noted there was a trench approximately 20 kilometres west of Bathurst Island and questioned how close the pipeline route is to the trench and what impact there will be on the environment specifically in that area as the new operator of the Bathurst			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	Island Lodge is proposing to take people charter fishing in that area 2 Requested more detail on the proposed discharge at the tie-in point, the potential impacts and area impacted 3 Requested more detail on the precautions that will be taken to mitigate risks associated with oil leaks that could occur if vessels collide during the pipeline installation 4 Use of Port Melville is encouraged by the TLC and asked what potential there was for ConocoPhillips to utilise the Port Melville facilities for these activities. 5 Would like to further discuss the potential for local employment opportunities on the project as well as potential involvement by ConocoPhillips in community development activities on the Tiwi Islands as part of the project. Specifically mentioned Tiwi College which supports around 100 high school students via week boarding. 6 Asked about helicopter numbers and time of operations. 7 Requested ConocoPhillips liaise with new operator of Bathurst Island Lodge	during installation. The presence of the pipeline infrastructure has the potential to provide a beneficial impact over time with creation of hard substrate for the settlement, growth and colonisation by marine flora and fauna assemblages, including for fish communities and other marine fauna. The area of the marine environment influenced by underwater noise associated with the installation of the gas export pipeline represents a very small proportion of the area available to be fished. During the installation campaign project vessels will routinely discharge small volumes of treated sewage, cooling water, putrescible waste, reverse osmosis brine, bilge and deck water. Any potential impacts are also expected to be highly localised and temporary and will not affect non-transitory environmental values/sensitivities Given the short duration of the pipeline installation campaign, the minimal volumes which will be discharged from vessels and the low toxicity chemicals proposed to be used, impacts are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important species. Given the typical small volumes and temporary (i.e. instantaneous) duration of accidental discharge events, impacts to water quality would be temporary and highly localised. Subsequently, there would be limited potential for toxicity to marine fauna due to temporary exposure and low toxicity as a result of rapid dilution. Therefore, any potential impacts to marine fauna would be limited to any individuals that may be transiting within the immediate area of the discharge (within tens to several hundred metres). Controls to prevent or minimise impact include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 91 (Marine Pollution Prevention – Oil), 95 (Marine Pollution Prevention – Garbage) and 96 (Marine Pollution Prevention – Sewage). • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the area influenced by planned discharges and significance of any impacts. • Offshore Vessel Inspection Database (OVID) inspections will be conducted to ensure all contracted vessels have International Maritime Organisation (IMO) approved treatment systems. There may be an increased risk of IMS colonising areas of the pipeline corridor in the shallower water depths where there is suitable light and habitat available (particularly in the vicinity of the shoals/banks). However, the risk of this occurring is considered low given the key management controls that will be implemented throughout the life of the project including a project Quarantine Management Plan, and compliance with contemporary ballast water and biofouling requirements. During the installation period, the pipelay vessel will continuously traverse along the pipeline alignment (i.e. not a stationary vessel), therefore the small area of light spill will not impact any one location for an extended duration and is not expected to have any impacts additional to existing vessel traffic traversing the area. Therefore, light emissions from the pipelay installation vessels are not anticipated to impact the breeding population of crested terns or olive ridley turtles located on the shoreline of Seagull Island. Significant numbers of olive ridley turtles are known to nest on the beaches of Seagull Island and the north-west coast of Melville Island. As the physical presence of the gas export pipeline within internesting habitat critical to the survival of marine turtles has been minimised, i.e. approximately 0.0001% and 0.0015% of the internesting habitat critical to the survival of flatback and olive ridley turtles respectively, the physical presence of the gas export pipeline during is considered highly unlikely to impact the species use of the area. The risk of vessel strike to marine fauna is inherent to movements of all vessel types,		
14 Feb 2019	Email acknowledgement of ConocoPhillips's email of 13 Feb and advised looking forward to hearing more in relation to the questions raised and any opportunities for Tiwi employment pathways.			
14 Mar 2019	ConocoPhillips provided written responses and reminded the stakeholder to provide further feedback if required.			
18 Mar 2019	Responded advising they were happy with the responses.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		including recreational vessels, fishing vessels, passenger ships, whale-watching boats, container ships and naval ships. Impacts from the presence of offshore infrastructure and related vessels interacting with marine fauna are not considered to present a significant risk at a population level. Key controls to managing risks associated with the physical presence of offshore infrastructure and project related vessels interacting with marine fauna include: • Placement of pipeline infrastructure in areas where there are no regionally significant feeding, breeding or aggregation areas for marine mammals • Limiting the physical footprint of the pipeline area such that displacement of individual mammals is unlikely, and the likelihood of a collision is remote • Vessels travelling at relatively low speeds within operational areas • Project vessels proactively responding to potential fauna interactions in line with the requirements of the OPBC Regulation s2000 – Part 8 Division 8.1. **2 Impact/risk to environment at discharge point** After completion of installation, the gas export pipeline will be flooded, cleaned and gauged tested (FCGT) with chemically-treated seawater (typically a mixture of biocides to prevent biofouling on the internal surfaces, an oxygen scavenger to control corrosion of the pipeline and a dye to allow for leaks to be detected during visual inspections). Approximately 16,000 m3 of treated seawater will be discharged over a 1-2-day period during cleaning, with discharges occurring at either end of the pipeline and at the seabed or the surface. Following cleaning, the gas export pipeline will be pressure tested (hydrotested) to confirm pipeline integrity. Approximately 2,000 m3 of treated seawater will be discharged over a half day period during hydrotesting, with discharges occurring at either end of the pipeline and at the seabed or the surface. Impacts from treated seawater arise mainly from the addition of biocides, corrosion inhibitors, scale inhibitors and oxygen scavengers. Given the short duration of discharges and low volumes/toxicities of chemicals used for FCGT and hydrotesting, and that biocides are readily biodegradable and do not bioaccumulate, impacts from these activities are expected to be restricted to localised short-term reductions in water quality with no significant impacts to protected or commercially important marine fauna. Controls to manage risks include: • A chemical selection procedure will be applied to ensure selection preference of lowest toxicity chemicals to minimise the potential impacts of planned discharges. • Bulk dewatering will occur at the offshore endpoint of the gas export pipeline to maximise dilution and avoid sensitive habitats and areas of higher densities of marine fauna. • Chemical injection volumes will be metered during flooding and hydrotest operations to identify leakage and trigger activity to stop, as well as to mitigate the risk of under/over-dosage of chemical. • Contracted vessel will have dedicated flood, clean, gauge, and pressure test (FCGT) procedures. • A vertically orientated diffuser will be used during dewatering to re-oxygenate treated seawater at the discharge point. **3 Impact/risk from potential oil spill** ConocoPhillips has conducted a detailed examination of the potential impacts from an accidental fuel spill from installation vessels, including: • Reductions in water quality. • Direct toxic or physiological effects on marine fauna, including corals, mammals, reptiles, birds and fish. • Hydrocarbon contact with shoals/banks, reefs and islands at concentrations that will result in adverse impacts. • Changes in biological communities because of the effects on key marine		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		fauna. Although the magnitude of the potential impacts is significant, given the remote likelihood of a vessel collision occurring, the collision resulting in a fuel tank rupture and a complete release of this tank while it is at full capacity, and the management controls which will be implemented, the risk is considered medium. ConocoPhillips will continue to investigate additional controls and mitigations during the development of the EP to manage this risk. Controls to manage risks include: • Project vessels will be equipped and crewed in accordance with the Navigation Act 2012 (Cth) (as applicable for vessel size, type and class), including Marine Orders 21 (Safety of navigation and emergency procedures), 27 (Radio Equipment), 30 (Prevention of Collisions) and 71 (Masters and Deck Officers). • A dedicated Oil Pollution Emergency Plan (OPEP) will be prepared and implemented throughout the gas export pipeline installation campaign. • All vessels will have a dedicated Ship Oil Pollution Prevention Plan (SOPEP). • A support vessel will be present within the Operational Area at all times while the pipelay vessel is installing the pipeline to minimise the potential for vessel collision. • The pipelay vessel will be double-hulled and with internal fuel tanks protected from a potential vessel collision. **4 Port Melville and logistics** ConocoPhillips acknowledges that the Tiwi Land Council has indicated a desire for the company to consider future use of facilities at Port Melville for any activities conducted offshore NT. ConocoPhillips has been provided with a familiarisation of the facilities by the Port Operator and will continue to assess further information from the Operator. In the event a company contracted to provide vessels to the Barossa Project did advise a desire to utilise Port Melville, ConocoPhillips would expect the company and the port operator to liaise at the earliest possible stage with relevant stakeholders at the Tiwi Islands. Barossa is primarily an offshore project and is unlikely to require new accommodation to be established onshore. During the installation, hook-up and commissioning phases an accommodation support vessel may be located in the offshore development area. The FPSO will be towed to the offshore development area and will also have accommodation for approximately 150 personnel offshore. The project will involve an increased number of personnel needing to transit through Darwin, particularly during the offshore installation phase. At this early planning stage, it is anticipated this increased demand would be for short-term accommodation only and could be met through existing and planned future facilities. Estimates of onshore accommodation requirements will be determined during the detailed planning stage and will be planned well in advance in consultation with local facilities. **5 Local employment opportunities** In addition to directly providing ConocoPhillips with details of business capability, the Tiwi Land Council should encourage any local businesses with potential capability to formally register for the Barossa Project with the Industry Capability Network in the NT which will provide information and details of how to tender for any future potential accommodation needs related to the project. ConocoPhillips is pleased to discuss the potential for these opportunities with the Tiwi Land Council. Barossa's major offshore infrastructure is likely to be built at a suitably equipped major construction facility and transported and installed at the offshore development area. However, with such a large development, opportunities will exist for smaller/domestic companies to sub-contract for specific equipment and services. Opportunities for increased local employment during the development		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
		phase will primarily occur during the installation, hook-up and commissioning phases of the project, both offshore and in Darwin for supporting logistics. ConocoPhillips places a high priority on purchasing goods and services locally and providing local suppliers with the opportunity to participate in projects through a competitive bid process. The approved Australian Industry Participation (AIP) Plan now in place for the Barossa Offshore Project states how Barossa provides "full, fair and reasonable opportunity" to Australian industry to supply goods and services to the project and includes an indicative list of opportunities for the supply of goods and services. Additional to the AIP Plan, we have a general commitment to provide local contractors with information about employment and supply opportunities. As part of this commitment we seek to provide real opportunities to Indigenous persons and businesses to compete for the supply of goods and services to the Project, provided that they are offered on competitive terms and conditions. Contractors that include an Indigenous Content Proposal (ICP) as part of any contractual offers are favourably considered. As the Operator of DLNG, ConocoPhillips has made a long-term commitment to training and employing a residential workforce with numerous programs to develop local skills, including early career traineeships, graduate programs and operations pathways. • ConocoPhillips' residential workforce policy requires our DLNG staff to live in Darwin, injecting local jobs and global expertise into the region • This is supported by our Darwin Operations Trainee Academy (DOCTA) program, which trains NT residents with skills in related trades to be LNG plant operators. To be eligible for DOCTA, candidates must have lived in the NT for several years. • This program has proved to be a successful long-term investment for ConocoPhillips, with local recruits tending to prefer to stay in the local area and having longer term employment. • For the NT, it has been beneficial to the local economy, resulting in greater local investment and capacity building for NT residents. We are particularly driven to support capacity building programs that develop skills which lead to career pathways in our industry. Through our community investments, we prioritise education programs in Australia that: • Engage secondary school students in science, technology, engineering and maths (STEM) disciplines • Focus on introducing primary school students to science and maths • Enable access to industry related skills and training-based programs • Support diversity and gender in the areas above • Support Indigenous communities in the areas above (NT) **6 Helicopters** Helicopter transfers will occur during all stages of the project. The flight path to the development area 300 kms north of Darwin passes over Melville Island. Helicopters will fly higher than regulation heights and only in daylight hours, apart from circumstances caused by an emergency. Flight frequency can be expected to increase from low levels starting from 2021 to highest frequency during hook-up and commissioning of the facilities in the Development Area during 2023. Accurate estimates of flight frequency will be known in 2020 when tender and award of helicopter services is scheduled. **7 Consultation** ConocoPhillips has met with the Lodge's new operators and provided them with all relevant information, including direct responses to their queries. The Operators will be provided with relevant information and opportunities to provide input on an ongoing basis.		

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
Tiwi Land Council				
9-15 Aug 2018	ConocoPhillips' liaison with TLC via phone and email re attendance at TLC Executive Meeting to request permission to conduct workshop to verify and map cultural and environmental sensitivities. Meeting held with TLC Executive on 15 August 2018 at which permission for workshop mapping was granted.	The information sought by ConocoPhillips and provided during the workshops by TO and Ranger groups was fully incorporated into the mapping exercise.	The resulting maps were provided by ConocoPhillips to the TLC in digital format for use as the Council sees fit.	The information provided through the workshops assisted ConocoPhillips to verify existing database records and gather a deeper understanding of the cultural and environmental sensitivities.
25 Oct 2018	Mapping Workshop #1 conducted on Bathurst Island with representatives of Traditional Owners			
13 Dec 2018	Mapping Workshop #2 conducted on Bathurst Island with TLC Sea and Land Rangers			
19-22 Sept 2019	Mapping Workshop outcomes and produced maps presented to TLC.			
16 Jan 2019	ConocoPhillips contacted via phone and provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	Please see entry for Tiwi Island Adventures (above) as this stakeholder raised exactly the same issues and concerns at a joint meeting held with ConocoPhillips on 8 February and were provided with the same responses.	The stakeholder advised ConocoPhillips that it was happy with the responses to the issues and concerns raised. The stakeholder raised several issues and concerns that required consideration and written responses. The issues and concerns related to environmental impacts and risks (1-3) did not result in any specific amendments to the EP. The request for consultation with another organisation (7) was met by ConocoPhillips. The remaining issues and concerns (4-6) were related to the project generally.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a 'relevant' stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
30 Jan 2019	TLC invited Lodge operators to attend meeting with ConocoPhillips in Darwin on 7 Feb. Note: ConocoPhillips met with other operators separately during same week due to their availability.			
8 Feb 2019	ConocoPhillips met with representatives of Tiwi Island Adventures and Tiwi Land Council and provided further information via PowerPoint presentation. ConocoPhillips advised it will provide a written summary of the issues raised during the meeting.			
13 Feb 2019	ConocoPhillips provided representatives of Tiwi Island Adventures and Tiwi Land Council with summary of issues at 8 Feb 2019 meeting via email along with PowerPoint presentation, current pipeline route co-ordinates and links to OPP on NOPSEMA website. ConocoPhillips offered assistance to locate any specific information in the OPP. ConocoPhillips advised it would start preparing a detailed written response to the issues and requested both organisations advise if anything had been missed in the summary or they wished to add further detail. ConocoPhillips advised it would ensure all items are covered in our responses. ConocoPhillips also advised it would arrange a meeting with the new operators of Bathurst Island Lodge, as requested. For issues raised see entry above for Tiwi Island Adventures.			
14 Feb 2019	Email acknowledgement of ConocoPhillips's email of 13 Feb and advised looking forward to hearing more in relation to the questions raised and any opportunities for Tiwi employment pathways.			
14 Mar 2019	ConocoPhillips provided written responses and reminded the stakeholder to provide further feedback if required			
18 Mar 2019	TLC advised via email that they were happy with the responses.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
Top End Sports Fishing				
21 Feb 2019	Telephone discussion and ConocoPhillips sent follow-up email with initial fact sheet and pipeline co-ordinates. Stakeholder advised they were not likely to fish in the area but were happy to be kept informed.	No issues or concerns raised.	No response required.	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the preparation of all EPs. As a potentially ‘relevant’ stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			
WA Fishing Industry Council				
21 Jan 2019	ConocoPhillips emailed WAFIC to ensure our understanding that they were not relevant to the activity was correct. ConocoPhillips provided initial fact sheet to WAFIC in capacity as an ‘interested’ stakeholder, including the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. ConocoPhillips advised which organisations it was consulting with, including Commonwealth-managed fisheries (Northern Prawn , NWSTF, SBTF, WSF and WTBF) as well as NT-managed fisheries and a range of commercial licence-holders, including WA-based Austral Fisheries ConocoPhillips also advised we were happy to meet with WAFIC and/or receive any feedback and would respond.	WAFIC advised it is not a relevant or interested stakeholder for Barossa activities and had no comments. WAFIC queried and provided comments and advice re the consultation process that should be undertaken by ConocoPhillips. ConocoPhillips answered these queries and thanked WAFIC for its comments and advice and stated we would do our best to tailor the process to meet each stakeholder’s individual needs and situation, providing the specific information they require and appropriate time to respond. The NTSC agreed with WAFIC that it would prefer to receive a bespoke fact sheet addressing commercial fishing industry issues and concerns and ConocoPhillips agreed to provide this.	The stakeholder raised one issue/concern related to the consultation process and this was followed by ConocoPhillips, as requested.	ConocoPhillips believes it has conducted the appropriate consideration of the issues and concerns raised. ConocoPhillips also believes it has provided reasonable and adequate time and information for the stakeholder to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA.

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	WAFIC provided email response confirming it was not a relevant or interested party to the activity and noted the following: • If the EMBA extends into WA waters then the fisheries which are in part or all of the EMBA need to be addressed within the EP. They do not need to be consulted with. • The NT Seafood Council would be a key part of ConocoPhillips consultation process. • ConocoPhillips consultation needs to be updated and addressed to the needs of key offshore stakeholders – i.e. bespoke fact sheets addressing issues and concerns of the commercial fishing sector – not a "one size fits all" technical jargon infused information document seeking commercial fisher review. • It is the role of Conoco Phillips to address upfront any potential issues which may negatively impact the commercial fishing sector and to address these potential issues to ALARP level upfront as part of the consultation with potentially affected commercial fishers.			
22 Jan 2019	ConocoPhillips provided further information re consultation being followed in response to WAFIC emails of 21 and 22 Jan which queried the process being followed.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal			
WA Seafoods				
16 Jan 2019	ConocoPhillips provided initial fact sheet via covering email with the following information: project overview; development concept; current status; pipeline route, installation, operational area and timing/schedule; regulatory and consultation process; and links to Offshore Project Proposal sections. Initial feedback was requested by 19 February 2019.	No issues or concerns raised.	No response required	No issues/concerns have been raised. ConocoPhillips believes it has provided the stakeholder with reasonable and adequate time and information to provide feedback and no further action is required prior to EP submittal. ConocoPhillips will advise the stakeholder when an EP is first published by NOPSEMA at the commencement of the assessment process and when the EP is accepted by NOPSEMA. The stakeholder will continue to be notified of Barossa activities through project updates and provided opportunity to provide feedback during the
21/22 Feb 2019	ConocoPhillips left phone message and follow-up email with pipeline route coordinates.			
16 April 2019	ConocoPhillips provided follow-up email advising that it was seeking to finalise preparation of the EP prior to its submittal for formal assessment to NOPSEMA. ConocoPhillips advised that Information provided to individual stakeholders during the consultation period had been summarised and consolidated on the ConocoPhillips website and provided the			

Date	Contact made/feedback received/issues raised	ConocoPhillips assessment of issues raised	ConocoPhillips response (including outcomes proposed/achieved)	Summary of ConocoPhillips assessment and response
	website address. Stakeholder was advised that the documentation on the ConocoPhillips website included a new potential end date of Q1, 2024 in the indicative schedule for the pipeline installation activities, rather than the previously advised Q3, 2023, but this did not alter the previously advised overall activity timeframe of nine months. ConocoPhillips advised that as project planning progressed, the timeframe for installation activities would firm up, and we would provide more specific timelines. Any further feedback was requested by 30 April 2019 and stakeholder should advise any information previously provided that should not be published by NOPSEMA following EP submittal.			preparation of all EPs. As a potentially ‘relevant’ stakeholder, they will also be engaged by ConocoPhillips in advance of pipeline installation activities as per the ongoing communications process.

9 REFERENCES

Abascal, F.J., Quintans, M., Ramos-Cartelle, A., Mejuto, J., 2011. Movements and environmental preferences of the shortfin mako, *Isurus oxyrinchus*, in the southeastern Pacific Ocean. Marine biology 158, 1175–1184.

Anderson, T.J., Nichol, S., Radke L., Heap, A.D., Battershill, C., Hughes, M., Siwabessy, P.J., Barrie, V., Alvarez de Glasby, B., Tran, M., Daniell, J., Shipboard Party, 2011. Seabed Environments of the Eastern Joseph Bonaparte Gulf, Northern Australia. GeoScience Australia, Canberra, Australia.

ANZECC & ARMCANZ, Agriculture and Resource Management Council of Australia and New Zealand, 2000. Australian and New Zealand guidelines for fresh and marine water quality. Volume 1. The guidelines. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

Austin, M.E., G.A. Warner G.A, McCrodan A., 2012. Underwater Sound Propagation Acoustics Technical Report: Maersk Oil Kalaallit Nunaat A/S 2012 3D Seismic Program Block 9 (Tooq). Version 2.0. Technical report by JASCO Applied Sciences for Golder Associates A/S and Golder Associates Ltd. http://naalakkersuisut.gl/~/media/Nanoq/Files/Hearings/2012/Offentliggorelse%202011%2015/Answers/Bilag/M%C3%A6rsk%20EIA%20ENG%20Appendix%20D%201.pdf.

Aubé, M.; Franchomme-Fosse, L.; Robert-Staehler, P.; Houle, V. Light pollution modelling and detection in a heterogeneous environment: Toward a night-time aerosol optical depth retreival method. Proc. SPIE 2005, 5890, 248–256, doi:10.1117/12.615405.

Asia-Pacific Applied Science Associates (APASA), 2012. Drill Cuttings and Muds Discharge Modelling Study for Appraisal Drilling Campaign in Permit NT/P 69, Bonaparte Basin. Prepared for ConocoPhillips Australia Pty Ltd, Perth, Western Australia.

Australian Maritime Safety Authority, 2013a. Technical guideline for the preparation of marine pollution contingency plans for marine and coastal facilities. Australian Maritime Safety Authority, Canberra.

Australian Maritime Safety Authority, 2013b. Technical guideline for the preparation of marine pollution contingency plans for marine and coastal facilities. Australian Maritime Safety Authority, Canberra.

Bamford, M., Watkins, D., Bancroft, W., Tischler, G., Wahl, J., 2008. Migratory shorebirds of the East Asian-Australasian flyway: population estimates and internationally important sites. Wetlands International - Oceania, Canberra.

Bannister, J., Kemper, C.M., Warneke, R.M., 1996. The action plan for Australian cetaceans. Australian Nature Conservation Agency, Canberra.

Bartol, S.M., Musick, J.A., Lenhardt, M.L., 1999. Auditory evoked potentials of the loggerhead sea turtle (Caretta caretta). Copeia 3: 836-840.

Bartol, S.M. and D.R. Ketten. 2006. Turtle and tuna hearing. In: Swimmer, Y. and R. Brill. Volume December 2006. NOAA Technical Memorandum NMFS-PIFSC-7. 98-103 p. http://www.sefsc.noaa.gov/turtles/TM_NMFS_PIFSC_7_Swimmer_Brill.pdf#page=108.

BERR (2008). Department for Business, Enterprise and Regulatory Reform (BERR), (2008). Review of cabling techniques and environmental effects applicable to the offshore wind farm industry. Technical Report January 2008.

Best, P.B., 1977. Two allopatric forms of Bryde's whale off South Africa, Report of the International Whaling Commission (Special Issue 1).

Best, P.B., Butterworth, D.S., Rickett, L.H., 1984. An assessment cruise for the South African inshore stock of Bryde's Whales (*Balaenoptera edeni*) (Report of the International Whaling Commission).

Bond, T., Partridge, J.C., Taylor, M.D., Langlois, T.J., Malseed, B.E., Smith, L.D., McLean, D.L., 2018. Fish associated with a subsea pipeline and adjacent seafloor of the North West Shelf of Western Australia. Marine Environmental Research. https://doi.org/10.1016/j.marenvres.2018.08.003

Brewer, D., Lyne, V., Skewes, T., Rothlisberg, P., 2007. Trophic systems of the North-west Marine Region. CSIRO Marine and Atmospheric Research, Cleveland.

Bruce, B., 2013. Shark futures: a synthesis of available data on mako and porbeagle sharks in Australiasian waters. Current and future directions (Tactical Research Fund No. FRDC 2011/045). Fisheries Research and Development Corporation, Canberra.

Bruce, B.D., 2008. The biology and ecology of the white shark, *Carcharodon carcharias*, in: Camhi, M.D., Pikitch, E.K., Babcock, E.A. (Eds.), Sharks of the Open Ocean : Biology, Fisheries and Conservation. Blackwell Publishing Limited, Oxford, pp. 69–81.

Bruce, B.D., Stevens, J.D., Malcolm, H., 2006. Movements and swimming behaviour of white sharks (*Carcharodon carcharias*) in Australian waters. Marine Biology 150, 161–172.

Bureau of Meteorology, 2019. Climate Data Online [WWW Document]. Climate data online. URL http://www.bom.gov.au/climate/data/ (accessed 1.24.18).

Bureau of Meteorology (BOM), 2017. Tropical Cyclones in the Northern Territory [WWW Document]. Bureau of Meteorology. URL http://www.bom.gov.au/cyclone/about/northern.shtml (accessed 11.1.17).

Burgess, K.B., Couturier, L.I.E., Marshall, A.D., Richardson, A.J., Weeks, S.J., Bennett, M,B., 2016. Manta birostris, predator of the deep? Insight into the diet of the giant manta ray through stable isotope analysis. Royal Society Open Science. doi:10.1098/rsos.160717

Cardno, 2013. Water quality and subtidal sedimentation monitoring program baseline report, Ichthys Nearshore Environmental Monitoring Program. Cardno Pty Ltd, St Leonards.

Centre for Environment, Fisheries and Aquaculture Science (CEFAS), 2017. Hazard Assessment, Chemical Hazard and Risk Management (CHARM) _ Definitive Ranks Lists of Registered Products [WWW Document]. URL https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/hazard-assessment-process/

Cerchio, S, Andrianantenaina, B, Lindsay, A, Rekdahl, M, Andrianarivelo, N, Rasoloarijao, T, 2015. Omura's whales (*Balaenoptera omurai*) off northwest Madagascar: ecology, behaviour and conservation needs | Royal Society Open

Science [WWW Document]. URL https://royalsocietypublishing.org/doi/10.1098/rsos.150301 (accessed 2.1.19).

Chatto, R., Baker, B., 2008a. The distribution and status of marine turtle nesting in the Northern Territory (Technical Report No. 77). Department of Natural Resources, Environment, the Arts and Sport, Darwin.

Chatto, R., Baker, B., 2008b. The distribution and status of marine turtle nesting in the Northern Territory (Technical Report No. 77). Department of Natural Resources, Environment, the Arts and Sport, Darwin.

Chevron Australia Pty Ltd, 2015. Gorgon gas development and Jansz feed gas pipeline: Long-term marine turtle management plan. Chevron Australia Pty Ltd, Perth.

Chorney, N.E., Warner, G.A., MacDonnell, J. T., McCrodan, A., Deveau, T.J., McPherson, C.R., O'Neill, C., Hannay D.E., Rideout, B., 2011. Underwater Sound Measurements. In: Reiser, C.M., D.W. Funk, R. Rodrigues, and D.E. Hannay (eds.). Marine mammal monitoring and mitigation during marine geophysical surveys by Shell Offshore Inc. in the Alaskan Chukchi and Beaufort Seas, July-October 2010: 90-day report. LGL Report P1171E–1. Report from LGL Alaska Research Associates Inc. and JASCO Applied Sciences for Shell Offshore Inc., National Marine Fisheries Service (US), and US Fish and Wildlife Service. 240 pp plus appendices. http://www.nmfs.noaa.gov/pr/pdfs/permits/shell_90day_report2010.pdf.

Clark, C. W., Ellison, W. T., Southall, B. L., Hatch, L., Van Parijs, S. M., Frankel, A., Ponirakis, D., 2009. "Acoustic masking in marine ecosystems: Intuitions, analysis, and implication." Marine Ecology Progress Series 395: 201-222.

Coastal Frontiers 2017. Request for approval, Geophysical Survey Activities near Encinitas, CA. http://www.slc.ca.gov/Programs/OGPP/Survey/2017/CoastalFrontiers_PreSurveyNotification_DecJan1718.pdf

Coles, R.G., L.J. McKenzie, G. De'ath, A.J. Roelofs, Lee Long, 2009. Spatial distribution of deepwater seagrass in the inter-reef lagoon of the Great Barrier Reef World Heritage Area. Marine Ecology Progress Series. 392:57-68

Colman, L.P., Sampaio, C.L.S., Weber, M.I., de Castilhos, J.C., 2014. Diet of olive ridley sea turtles, *Lepidochelys olivacea*, in the waters of Sergipe, Brazil. Chelonian Conservation and Biology 13, 266–271. https://doi.org/10.2744/CCB-1061.1

Commonwealth of Australia, 2009. National Biofouling Management Guidance for the Petroleum Production and Exploration Industry. https://www.marinepests.gov.au/sites/default/files/Documents/petroleum-exploration-biofouling-guidelines.pdf

Commonwealth of Australia, 2015a. Conservation management plan for the blue whale: A recovery plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2015-2025. Department of the Environment, Canberra.

Commonwealth of Australia, 2015b. Wildlife conservation plan for migratory shorebirds. Department of the Environment, Canberra.

Commonwealth of Australia, 2017a. Recovery plan for marine turtles in Australia 2017-2027. Department of the Environment and Energy, Canberra.

Commonwealth of Australia, 2017b. National Strategy for Reducing Vessel Strike on Cetaceans and Other Marine Megafauna. Department of the Environment and Energy, Canberra.

Commonwealth of Australia, 2019. National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Department of the Environment and Energy, Canberra

ConocoPhillips (2019a). Tiwi Islands Sensitivity Mapping. Unpublished report prepared by Jacobs for ConocoPhillips. Document Number BAA-200 0255 Rev 0. 29 August 2019.

ConocoPhillips (2019b). Barossa Pipeline Mass Flow Excavation Sediment Modelling (under preperation).

Corkeron, P.J., Morissette, N.M., Porter, L., Marsh, H., 1997. Distribution and status of hump-backed dolphins *Sousa chinensis* in Australian waters. Asian Marine Biology 14, 49–59.

Department of Environment and Energy (DoEE), 2019. Species Profiles and Threats Database (SPRAT) [WWW Document]. URL http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Department of Primary Industries and Fisheries, n.d. Customary Fisheries Management (Factsheet). Department of Primary Industries and Fisheries, Northern Territory Government.

Department of Primary Industry and Fisheries (DPIF), 2015. Status of Key Northern Territory Fish Stocks Report 2013 (No. Fishery Report No. 114). Department of Primary Industry and Fisheries, Darwin, Northern Territory.

Department of Primary Industry and Resources, 2018. Management arrangements for the Northern Territory offshore net and line fishery. Northern Territory Government.

Department of Sustainability, Environment, Water, Population and Communities, 2012a. Marine bioregional plan for the North-west Marine Region: prepared under the *Environment Protection and Biodiversity Conservation Act 1999*. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Department of Sustainability, Environment, Water, Population and Communities, 2012b. Species group report card - seabirds. Supporting the marine bioregional plan for the North Marine Region prepared under the *Environment Protection and Biodiversity Conservation Act 1999*. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Department of Sustainability, Environment, Water, Population and Communities, 2012c. Species group report card - sawfishes and river sharks. Supporting the marine bioregional plan for the North-west Marine Region prepared under the *Environment Protection and Biodiversity Conservation Act 1999*. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Department of Sustainability, Environment, Water, Population and Communities, 2012d. Commonwealth marine environment report card. Supporting the marine bioregional plan for the North-west Marine Region prepared under the *Environment Protection and Biodiversity Conservation Act 1999*. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Department of Sustainability, Environment, Water, Population and Communities, 2012e. Commonwealth marine environment report card. Supporting the marine bioregional plan for the North Marine Region prepared under the *Environment*

Protection and Biodiversity Conservation Act 1999. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2012. Marine bioregional plan for the North Marine Region. Department of the Environment, Water, Heritage and the Arts, Canberra, Australian Capital Territory.

Department of Environment (DoE), 2014. Issues paper for the grey nurse shark (*Carcharias Taurus*). Commonwealth of Australia.

Department of the Environment, 2013. Matters of National Environmental Significance - Significant impact guidelines 1.1. *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment, Canberra.

Department of the Environment and Energy, 2017. National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna.

Department of the Environment and Energy, n.d. Australian National Shipwreck Database [WWW Document]. Australian National Shipwreck Database. URL http://www.environment.gov.au/heritage/historic-shipwrecks/australian-national-shipwreck-database (accessed 8.17.16).

Department of the Environment and Heritage, 2005. Whale shark (*Rhyncodon typus*) recovery plan 2005-2010. Department of the Environment and Heritage, Canberra.

Department of the Environment and Heritage, 2004. Assessment of the Northern Territory Demersal Fishery. Approvals and Wildlife division.

Department of the Environment, Water, Heritage and the Arts, 2008. The North Marine Bioregional Plan: Bioregional Profile. Department of the Environment, Water, Heritage and the Arts, Canberra.

Department of the Environment, Water, Heritage and the Arts (DEWHA), 2008a. The north-west marine bioregional plan: bioregional profile. Department of the Environment, Water, Heritage and the Arts, Canberra.

Department of the Environment, Water, Heritage and the Arts (DEWHA), 2008b. The North Marine Bioregional Plan: Bioregional Profile. Department of the Environment, Water, Heritage and the Arts Marine and Biodiversity Division, Canberra.

Department of Tourism and Culture, 2017. Tourism NT Regional Profile: Greater Darwin. Northern Territory Government.

Department of Water, 2013. Liners for containing pollutants, using synthetic membranes (Water quality protection note). Department of Water, Perth.

Department of Water, 2010. Kimberley regional water plan 2010-2030. Strategic directions and actions. Department of Water, Perth.

Director of National Parks, 2018. North Commonwealth Marine Reserves Network Management Plan. Canberra, Australian Capital Territory.

DOC, 2016. Report of the Non-Standard Surveys Technical Working Group. Marine Species and Threats, Department of Conservation, Wellington, New Zealand.

DoEE, 2017. Recovery plan for marine turtles in Australia 2017-2027.

Double, M.C., Andrews-Goff, V., Jenner, K.C.S., Jenner, M.-N., Laverick, S.M., Branch, T.A., Gales, N.J., 2014. Migratory movements of pygmy blue whales

(*Balaenoptera musculus brevicauda*) between Australia and Indonesia as revealed by satellite telemetry. PloS one 9, e93578.

DPIRD (2017a). Guidance Statement Criteria for Suitably Qualified Invasive Marine Pest Experts. Version 1.0, July 2017. Prepared by Aquatic Biosecurity Section, Fisheries, Department http://www.fish.wa.gov.au/Documents/biosecurity/invasive_marine_pest_expert_guidance_statement.pdf

DPIRD (2017b). Guidance Statement Best Practice Guidelines for Invasive Marine Species Inspections. Version 1.0, July 2017. Prepared by Aquatic Biosecurity Section, Fisheries, Department http://www.fish.wa.gov.au/Documents/biosecurity/best_practice_ims_inspections_guidance_statement.pdf

DPIRD (2017c). Guidance Statement Best Practice Guidelines for Invasive Marine Species Inspections. Version 1.0, July 2017. Prepared by Aquatic Biosecurity Section, Fisheries, Department http://www.fish.wa.gov.au/Documents/biosecurity/best_practice_ims_inspections_guidance_statement.pdf

Duke, N. (NC), Burns, K. (KA), 2003. Fate and effects of oil and dispersed oil on mangrove ecosystems in Australia.

Ellison, W.T., Southall, B.L., Clark, C.W., Frankel, A.S., 2012. A New Context-Based Approach to Assess Marine Mammal Behavioral Responses to Anthropogenic Sounds. Conservation Biology 26(1): 21-28. https://doi.org/10.1111/j.1523-1739.2011.01803.x.

Environment Australia, 2002. Ningaloo marine park (Commonwealth waters) management plan. Environment Australia, Canberra.

ERM 2010. Browse Upstream LNG Development: Light Impact Assessment, Report produced for Woodside Energy Limited.

Fugro, 2016. Report on the Barossa Field Development Infield and Pipeline Routing Interim Geophysical Survey. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

Fugro, 2015. Barossa Field Meteorological, Current Profile, Wave and CTD Measurements – Final Report. Reporting Period: 8 July 2014 to 16 July 2015. Unpublished report prepared for ConocoPhillips Australia Pty Ltd. Perth, Western Australia.

Fugro, 2006. Darwin Offshore Growth Opportunities Offshore Geophysical Surveys 2005-2006 – Report for the Caldita to Bayu-Darwin Parallel Route North Intersection Volume 1A – Results and Appendices. Prepared for ConocoPhillips Australia Exploration Pty Ltd. Perth, Western Australia.

Gagnon, M.M., Rawson, C., 2010. Montara well release: Report on necropsies from a Timor Sea green turtle. Curtin University, Perth.

Geraci, J.R., St Aubin, D.J. (Eds.), 1988. Synthesis of Effects of Oil on Marine Mammals. Department of the Interior, Minerals Management Service, Atlantic OCS Region.

Groom, Dunshea, Griffiths, Mackarous, 2017. The Distribution and Abundance of Dugong and Other Marine Megafauna in Northern Territory, November 2015. Department of Natural Resources, Darwin, NT.

Guinea, M.L., 2013a. Surveys of the sea snakes and sea turtles on reefs ofthe Sahul Shelf (Monitoring Study No. S6), Monitoring program for the Montara well release Timor Sea. Charles Darwin University, Darwin.

Guinea, M.L., 2013b. Surveys of the sea snakes and sea turtles on reefs ofthe Sahul Shelf (Monitoring Study), Monitoring program for the Montara well release Timor Sea. Charles Darwin University, Darwin.

Guinea, M.L., 2006. Sea turtles, sea snakes and dugongs of Scott Reef, Seringapatam Reef and Browse Island with notes on West Lacepede Island, Report to URS. Charles Darwin University, Darwin, NT.

Guinea, M.L., Whiting S.D., 2005. Insights into the Distribution and Abundance of Sea Snakes at Ashmore Reef. The Beagle Supplement 1, 199–206.

Hamel, M.A., McMahon, C.R., Bradshaw, C.J.A., 2008. Flexible inter-nesting behaviour of generalist olive ridley turtles in Australia. Journal of Experimental Marine Biology and Ecology 359, 47–54. https://doi.org/10.1016/j.jembe.2008.02.019

Harewood, A., Horrocks, J., 2008. Impacts of coastal development on hawksbill hatchling survival and swimming success during the initial offshore migration. Biological Conservation 141, 394–401. https://doi.org/10.1016/j.biocon.2007.10.017

Harris, P, Heap, A, Passlow, V, Sbaffi, L, Fellow ,M, Porter-Smith, R, Buchanan, C, Daniell, J., 2003. Geomorphic Features of the Continental Margin of Australia. GeoScience Australia.

Hassan, A., Javed, H., 2011. Effects of Tasman Spirit oil spill on coastal birds at Clifton, Karachi coast, Pakistan. Journal of Animal and Plant Sciences 21, 333–339.

Hays, G., Luschi, P., Papi, F., Marsh, R., del Seppia, C., 1999. Changes in behaviour during the inter-nesting period and post-nesting migration for Ascension Island green turtles. Marine Ecology Progress Series 189, 263–273.

Hazel, J., Lawler, I.R., Hamann, M., 2009. Diving at the shallow end: Green turtle behaviour in near-shore foraging habitat. Journal of Experimental Marine Biology and Ecology 371, 84–92. https://doi.org/10.1016/j.jembe.2009.01.007

Heatwole, H., 1975. Voluntary submergence times of marine snakes. Marine Biology 32, 205–213.

Heyward, A., Jones, R., Meeuwig, J., Burns, K., Radford, B., Colquhoun, J., Cappo, M., Case, M., O'Leary, R., Fisher, R., Meekan, M., Stowar, M., 2012. Montara: 2011 offshore banks assessment survey (Monitoring Study). Australian Institute of Marine Science, Townsville.

Heyward, A., Jones, R., Travers, M., Burns, K., Suosaari, G., Colquhoun, J., Case, M., Radford, B., Meekan, M., Markey, K., Schenk, T., O'Leary, R.A., Brooks, K., Tinkler, P., Cooper, T., Emslie, M., 2011. Montara: 2011 Shallow Reef Surveys at Ashmore, Cartier and Seringapatam Reefs. Coral Reefs 174.

Heyward, A., Radford, B., Burns, K., Colquhoun, J., Moore, C., 2010. Montara Surveys: Final report on Benthic Surveys at Ashmore, Cartier and Seringapatam Reefs. Australian Institute of Marine Science, Crawley.

Heyward, A., Radford, B., Cappo, M., Wakeford, M., Fisher, R., Colquhoun, J., Case, M., Stowar, M., Miller, K., 2017. Barossa Environmental Baseline Study, Regional Shoals and Shelf Assessment 2015 Final Report (Final Report). A report for ConocoPhillips Australia Pty Ltd by the Australian Institute of Marine Science, Perth.

Heyward, A., Radford, B., Cappo, M., Wakeford, M., Fisher, R., Colquhoun, J., Case, M., Stowar, M., Miller, K., 2016. Barossa environmental baseline study, Regional shoals and shelf assessment 2015 (Final Report). Australian Institute of Marine Science, Townsville.

Heyward, A.A., Pinceratto, E., Smith, L.L. (Eds.), 1997. Big Bank Shoals of the Timor Sea: an environmental resource atlas. BHP Petroleum & Australian Institute of Marine Science, Melbourne.

Hook, S.E., Revill, A.T., 2016. Understanding the environmental risks of unplanned discharges - the Australian context: non-hydrocarbon chemicals (Document). Australian Petroleum Production and Exploration Association, Perth.

IMO, 2012. Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species.

INPEX Browse, 2010. Ichthys Gas Field Development Project: draft environmental impact statement. INPEX Browse, Perth.

Intecsea, 2018. Barossa FEED - Subsea Facilities and Export Pipeline Shipping and Fishing Impact Study. Report prepared for ConocoPhillips Australia Pty Ltd.

International Petroleum Industry Environmental Conservation Association, 2004. A guide to oiled wildlife response planning (IPIECA Report Series No. 13). International Petroleum Industry Environmental Conservation Association, London.

International Tanker Owners Pollution Federation, 2011. Effects of oil pollution on the marine environment (Technical Information Paper No. 13). International Tanker Owners Pollution Federation Limited, London.

International Union for Conservation of Nature (IUCN), 2017. The IUCN Red List of Threatened Species.

International Union for Conservation of Nature (IUCN), 2015. The IUCN Red List of Threatened Species [WWW Document]. URL http://www.iucnredlist.org/ (accessed 10.24.17).

Jacobs, 2019. Tiwi Islands Sensitivity Mapping Study.

Jacobs, 2017. Barossa Pipeline Environmental Survey - Water and Sediment Quality Report. Unpublished report prepared for ConocoPhillips.

Jacobs, 2016. Barossa Environmental Studies - Benthic Habitat Report. A report for ConocoPhillips Australia Pty Ltd by Jacobs, Perth.

Jacobs, 2015a. Barossa Environmental Studies – Water Quality Field Survey Report - Summer. Unpublished report prepared for ConocoPhillips, Perth, Western Australia.

Jacobs, 2015b. Barossa Environmental Studies – Water Quality Field Survey Report - Autumn. Unpublished report prepared for ConocoPhillips, Perth, Western Australia.

Jacobs, 2015c. Barossa Environmental Studies – Sediment Quality and Infauna Field Survey Report - Autumn. Unpublished report prepared for ConocoPhillips. Perth, Western Australia.

Jacobs, 2014. Barossa Environmental Studies – Water Quality Field Survey Report - Winter. Unpublished report prepared for ConocoPhillips, Perth, Western Australia.

JacobsSKM, 2014. ConocoPhillips Barossa Gas Field Development Environmental Studies, Environmental Literature Review and Gap Analysis. Report prepared for ConocoPhillips Australia Pty Ltd.

James Fischer (2018) Case study for the Tapti Field using the JFSE T8000

JASCO Applied Sciences, 2016a. Underwater Acoustics: Noise and the Effects on Marine Mammals. Compiled by Christine Erbe, Perth, Western Australia.

JASCO Applied Sciences, 2016b. Passive Acoustic Monitoring of Ambient Noise and Marine Mammals - Barosa field: July 2014 to 2015. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

JASCO Applied Sciences, 2015. Acoustic Characterisation of Subsea Choke Valve. Results from North West Shelf Measurements.

Jefferson, T.A., 2000. Population biology of the Indo-Pacific hump-back dolphin in Hong Kong waters. Wildlife Monographs 144, 1–65.

Jefferson, T.A., Rosenbaum, H.C., 2014. Taxonomic revision of the humpback dolphins (*Sousa spp.*), and description of a new species from Australia. Marine Mammal Science 30, 1494–1541.

Jenner, K., Jenner, M., McCabe, K., 2001. Geographical and temporal movements of humpback whales in Western Australian waters. APPEA Journal 41, 692–707.

Jenner, KCS, Jenner, MN, Pirzl, R, 2009. A Study of Cetacean Distribution and Oceanography in the Scott Reef/Browse Basin Development Areas During the Austral Winter of 2008. Report produced for Woodside Energy Limited.

Jensen, A., Silber, G., 2004. Large whale ship strike database (NOAA Technical Memorandum). National Marine Fisheries Service, Silver Spring.

Ketten, D.R., Bartol, S.M., 2005. Functional measures of sea turtle hearing. ONR project final report. Document Number ONR Award Number N00014-02-1-0510. Office of Naval Research (US).

King, D., Lyne, R., Girling, A., Peterson, D., Stephenson, R., Short, D., 1996. Environmental risk assessment of petroleum substances: The hydrocarbon block method (CONCAWE No. 96/52). CONCAWE, Brussels.

Laird, A., 2018. Northern Prawn Fishery Data Summary 2017. NPF Industry Pty Ltd on behalf of the Australian Fisheries Management Authority (AFMA), Civic ACT.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S., Podesta, M., 2001. Collisions between ships and whales. Marine Mammal Science 17, 35–75.

Lavender, A.L., Bartol, S.M., Bartol, I.K., 2012. Hearing capabilities of loggerhead sea turtles (Caretta caretta) throughout ontogeny. In Popper, A.N. and Hawkins, A.D. (eds.). The Effects of Noise on Aquatic Life. Volume 730. Springer. pp. 89-92. https://doi.org/10.1007/978-1-4419-7311-5_19.

Lavender, A.L., Bartol, S.M., and Bartol, I.K., 2014. Ontogenetic investigation of underwater hearing capabilities in loggerhead sea turtles (Caretta caretta) using a dual testing approach. Journal of Experimental Biology 217(14): 2580-2589. https://jeb.biologists.org/content/217/14/2580.

Last, P.R., Steven, J.D., 1994. Sharks and Rays of Australia. Commonwealth Scientific and Industrial Research Organisation, Australia.

Le Provost Dames, Moore, 1997. Darwin LNG Plant, Bayu-Undan to Darwin Gas Pipeline, Draft Environmental Impact Statement, Appendix D in Darwin LNG Plant Draft Environmental Impact Statement.

Limpus, C., 1971. Sea turtle ocean finding behaviour. Search 2, 385–387.

Limpus, C., Kamrowski, R., 2013. Ocean-finding in marine turtles: The importance of low horizon elevation as an orientation cue. Behaviour 150, 863–893. https://doi.org/10.1163/1568539X-00003083

Limpus, C.J., 2008. A biological review of Australian marine turtles. 4. Olive Ridley turtle, *Lepidochelys olivacea* (Linnaeus), A biological review of Australian marine turtles. Queensland Government Environmental Protection Agency, Brisbane.

Limpus, C.J., 2007. A biological review of Australian marine turtles. 5. Flatback turtle, *Natator depressus* (Garman), A biological review of Australian marine turtles. Queensland Government Environmental Protection Agency, Brisbane.

Lloyd, J., Puig, P., 2009. The utilisation of GIS spatial statistical methods to assist in the development of ecosystem based fishery management strategies using the Northern Territory Demersal and Timor Reef Fisheries as case studies. Fisheries Research and Development Coorporation, EWL Sciences, Northern Territory Department of Regional Development, Primary Industry, Fisheries and Resources.

Lohmann, K.J., Lohmann, C.M.F., 1992. Orientation to Oceanic Waves by Green Turtle Hatchlings. Journal of Experimental Biology 171, 1–13.

Lohmann, K.J., Salmon, M., Wyneken, J., 1990. Functional autonomy of land and sea orientation systems in sea turtle hatchlings. Biological Bulletin 179, 214–218.

Lorne, J.K., Salmon, M., 2007. Effects of exposure to artificial lighting on orientation of hatchling sea turtles on the beach and in the ocean. Endangered Species Research 3, 23–30.

Lurton, X., 2016. Modelling of the sound field radiated by multibeam echosounders for acoustical impact assessment. Applied Acoustics 101, 201–221. https://doi.org/10.1016/j.apacoust.2015.07.012

Lutcavage, M., Lutz, P., Bossart, G., Hudson, D., 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28, 417–422.

Maxwell, S.M., Breed, G.A., Nickel, B.A., Makanga-Bahouna, J., Pemo-Makaya, E., Parnell, R.J., Formia, A., Ngouessono, S., Godley, B.J., Costa, D.P., Witt, M.J., Coyne, M.S., 2011. Using satellite tracking to optimize protection of long-lived marine species: olive ridley sea turtle conservation in central Africa. PLoS ONE 6, e19905. https://doi.org/10.1371/journal.pone.0019905

McCauley, R., 1998. Radiated underwater noise measured from the drilling rig *Ocean General*, rig tenders *Pacific Ariki* and *Pacific Frontier*, fishing vessel *Reef Venture* and natural sources in the Timor Sea, Northern Australia. (Report No. C98-20). Centre for Marine Science and Technology, Curtin University of Technology, Perth.

McCauley, R., Duncan, A., 2011. Sea noise logger deployment, Wheatstone and Onslow, April 2009 to November 2010 (Technical Report No. R2011-23). Centre for Marine Science and Technology, Curtin University of Technology, Perth.

McCauley, R.D., 2011. Woodside Kimberley sea noise logger program, Septemer 2006 to June 2009: whales, fish and man made noise (Report No. R2010- 50_3). Curtin University, Perth.

McCauley, RD, 2009. Sea Noise Logger Deployment Scott Reef: 2006-2008 – Whales, Fish and Seismic Survey. Report produced for Woodside Energy Limited 88.

McLean, D.L., Partridge, J.C., Bond, T., Birt, M.J., Bornt, K.R., Langlois, T.J., 2017. Using industry ROV videos to assess fish associations with subsea pipelines. Continental Shelf Research 141, 76–97. https://doi.org/10.1016/j.csr.2017.05.006

McPherson, C. R., 2020. Assessment of survey equipment and positioning equipment for the Barossa Gas Export Pipeline Installation. Document 01977. Technical report by JASCO Applied Sciences for ConocoPhillips.

McPherson, C., Kowarski, K., Delarue, J., Whitt, C., MacDonnell, J., Martin, B., 2015. Passive acoustic monitoring of ambient noise and marine mammals - Barossa Field (JASCO Document). JASCO Applied Sciences, Capalaba.

McPherson, Craig, Kowarski, Katie, Delarue, Julien, Whitt, Christopher, MacDonnell, Jeff, Martin, Bruce, 2015. Passive Acoustic Monitoring of Ambient Noise and Marine Mammals - Barossa Field: July 2014 to July 2015 (No. JASCO Document 00997, Version 1.0). Technical report by JASCO Applied Sciences (Australia) Pty Ltd. for Jacobs.

McPherson, C.R, Quijano, J.E., Weirathmueller, M.J., Hiltz, K.R., Lucke, K., 2019. Browse to North West Shelf Project Noise Modelling Study: Assessing Marine Fauna Sound Exposures. Document 01824, Version 2.2. Technical report by JASCO Applied Sciences for Jacobs https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20D%203.pdf

Meekan, M., Radford, B., 2010. Migration patterns of whale sharks: A summary of 15 satellite tag tracks from 2005 to 2008. Australian Institute of Marine Science, Perth.

Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P., Franklin, K., 2017. The Australian Bird Guide. CSIRO Publishing.

Milton, S.L., Lutz, P.L., 2003. Physiological and genetic responses to environmental stress, in: Lutz, P.L., Musick, J.A., Wyneken, J. (Eds.), The Biology of Sea Turtles. CRC Press, Boca Raton, pp. 164–198.

Momigliano, P., Jaiteh, V.F., 2015. First records of the grey nurse shark *Carcharias taurus* (Lamniformes: Odontaspididae) from oceanic coral reefs in the Timor Sea. Marine Biodiversity Records 8.

Morgan, D., Whitty, J., Phillips, N., 2010. Endangered sawfishes and river sharks in Western Australia. Centre for Fish and Fisheries Research, Murdoch University, Perth.

Morrice, M.G., Gill, P.C., Hughes, J., Levings, A.H., 2004. Summary of aerial surveys conducted for the Santos Ltd EPP32 seismic survey, 2 - 13 December 2003. Deakin University, Warnambool.

National Oceanic and Atmospheric Administration, 2014. Oil spills in mangroves: Planning & response considerations. National Oceanic and Atmospheric Administration, Washington.

National Oceanic and Atmospheric Administration, 2010. Oil and sea turtles: Biology, planning and response. National Oceanic and Atmospheric Administration, Washington.

Neff, J.M., 2005. Composition, environmental fates, and biological effects of water based drilling muds and cuttings discharged to the marine environment: A synthesis and annotated bibliography (Prepared for:). Batelle, Duxbury.

Negri, A.P., Heyward, A.J., 2000. Inhibition of fertilization and larval metamorphosis of the coral *Acropora millepora* (Ehrenberg, 1834) by petroleum products. Marine Pollution Bulletin 41, 420–427.

Nichol, S., Howard, F., Kool, J., Stowar, M., Bouchet, P., Radke, L., Siwabessy, J., Przeslawski, R., Picard, K., Alvarez de Glasby, B., Colquhoun, J., Letessier, T., Heyward, A., 2013. Oceanic shoals Commonwealth marine reserve (Timor Sea) biodiversity survey GA0339/SOL5650 - post-survey report (Geoscience Australia Record No. 2013/38). Geoscience Australia, Canberra.

[NMFS] National Marine Fisheries Service, 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. 167 p. https://www.fisheries.noaa.gov/webdam/download/75962998.

[NMFS] National Marine Fisheries Service, 2014. Marine Mammals: Interim Sound Threshold Guidance (webpage). National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guid ance.html

Northern Territory Government, 2018. Offshore net and line fishery [WWW Document]. URL https://nt.gov.au/marine/commercial-fishing/offshore-net-and-line-fishery (accessed 1.8.19).

Northern Territory Government, 2017a. Status of Key Northern Territory Fish Stocks Report 2015 (No. Fishery Report No. 118). Department of Primary Industry and Resources, Darwin, NT.

Northern Territory Government, 2017b. Commercial fishing [WWW Document]. Boating, fishing and marine. URL https://nt.gov.au/marine/commercial-fishing (accessed 11.10.17).

Northern Territory Government, 2017c. Aquaculture research and development [WWW Document]. Department of Primary Industry and Resources. URL https://dpir.nt.gov.au/fisheries/fisheries-strategies,-projects-and-research/aquaculture-research-and-development (accessed 11.10.17).

Northern Territory Government, 2014. Reef Fish Protection Areas - Factsheet.

Otway, N.M., Burke, A.L., Morrison, NS. and Parker, P.C., 2003. Monitoring and identification of NSW Critical Habitat Sites for conservation of Grey Nurse Sharks. Final Report to Environment Australia. Project No. 22499. NSW Fisheries Final Report Series No. 47. ISSN 1440-3544. 62pp.

Patterson, H., Georgeson, L., Stobutzki, I., Curtotti, R., Noriega, R., 2016. Fishery status reports 2016 (No. CC BY 3.0). Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), Canberra.

Pendoley, 2019. ConocoPhillips Barossa Project - potential impacts of pipeline installation activities on marine turtles - literature update (No. J54001 Rev 2). 5 July 2019. Unpublished report prepared by Pendoley Environmental Pty Ltd for Jacobs.

Pendoley, K., Kamrowski, R.L., 2016. Sea-finding in marine turtle hatchlings: What is an appropiate exclusion zone to limit disruptive impacts of industrial light at night? Journal for Nature Conservation 30, 1–11.

Piniak, W.E., Mann, D.A., Eckert, S.A., Harms, C.A., 2011. Amphibious hearing in sea turtles. In: Hawkins, T. and Popper, A.N. (eds.). 2nd International Conference on the Effects of Noise on Aquatic Life. 15-20 Aug 2010. Springer-Verlag, Cork, Ireland.

Polovina, J.J., Balazs, G.H., Howell, E.A., Parker, D.M., Seki, M.P., Dutton, P.H., 2004. Forage and migration habitat of loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific Ocean. Fisheries Oceanography 13, 36–51.

Ports Australia, 2016. Trade statistics for 2014/2015 [WWW Document]. URL http://www.portsaustralia.com.au/aus-ports-industry/trade-statistics/?period=15 (accessed 11.10.17).

Preen, A., 2004. Distribution, abundance and conservation status of dugongs and dolphins in the southern and western Arabian Gulf. Biological Conservation 118, 205–218.

Preen, A., Marsh, H., Lawler, I., Prince, R., Shepherd, R., 1997. Distribution and abundance of dugongs, turtles, dolphins and other megafauna in Shark Bay, Ningaloo Reef and Exmouth Gulf, Western Australia. Wildlife Research 24, 185–208.

Prieto, R., Janiger, D., Silva, M.A., Waring, G.T., GonçAlves, J.M., 2012. The forgotten whale: a bibliometric analysis and literature review of the North Atlantic sei whale *Balaenoptera borealis*. Mammal Review 42, 235–272. https://doi.org/10.1111/j.1365-2907.2011.00195.x

Przeslawski, R., Daniell, J., Anderson, T., Barrie, J.V., Heap, A., Hughes, M., Li, J., Potter, A., Radke, L., Siwabessy, J., Tran, M., Whiteway, T., Nichol, S., 2011a. Seabed habitats and hazards of the Joseph Bonaparte Gulf and Timor Sea, Northern Australia (Record No. 2011/40). Geoscience Australia, Canberra.

Przeslawski, R., Daniell, J., Anderson, T., Barrie, J.V., Heap, A., Hughes, M., Li, J., Potter, A., Radke, L., Siwabessy, J., Tran, M., Whiteway, T., Nichol, S., 2011b. Seabed habitats and hazards of the Joseph Bonaparte Gulf and Timor Sea, Northern Australia (Record). Geoscience Australia, Canberra.

Radford, B., Heyward, A., Birt, M.J., Case, M., Colquhoun, J., Currey-Randall, L.M., Stowar, M.J., Vaughan, B.I., Wyatt, M., 2019. Oceanic Shoals Commonwealth Marine Reserve (CMR) final quantitative report on benthic habitats (Report No. AIMS/COP/RPT/002/2019). Australian Institute of Marine Science, Perth.

Radford, B., Puotinen, M., 2016. Spatial benthic habitat model for the Oceanic Shoals CMR. Australian Institute of Marine Science (AIMS).

Rees, A., Al-Kiyumi, A., Broderick, A., Papathanasopoulou, N., Godley, B., 2012. Conservation related insights into the behaviour of the olive ridley sea turtle *Lepidochelys olivacea* nesting in Oman. Marine Ecology Progress Series 450, 195–205. https://doi.org/10.3354/meps09527

Richardson, W.J., Greene Jr, C.R., Malme, C.I., Thomson, D.H., 1995. Marine Mammals and Noise. Academic Press, San Diego.

Ridgway, S.H., Wever, E.G., McCormick, J.G., Palin, J., Anderson, J.H., 1969. Hearing in the giant sea turtle, Chelonia mydas. Proceedings of the National Academy of Sciences 64(3): 884-890. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC223317/pdf/pnas00113-0080.pdf.

Rochester, W.A., Australia, Department of the Environment and Water Resources, Commonwealth Scientific and Industrial Research Organization (Australia), 2007. The North Marine Region marine bioregional plan: information and analysis for the regional profile: final report to The Department of the Environment and Water Resources. CSIRO, Cleveland, Qld.

RPS APASA, 2017a. Barossa Offshore Development Area Produced Formation Water Discharge Modelling. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

RPS APASA, 2017b. Barossa Offshore Development Area Cooling Formation Water Discharge Modelling. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

RPS APASA, 2017c. Barossa Offshore Development Area Wastewater Discharge Modelling. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

RPS APASA, 2017d. Barossa Offshore Development Area Dewatering Discharge Modelling. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

RPS APASA, 2017e. Barossa Offshore Development Area Hydrocarbon Spill Modelling Study. Report prepared for ConocoPhillips Australia Pty Ltd., Perth, Western Australia.

RPS APASA, 2015. Barossa field appraisal drilling operations hydrocarbon spill modelling study (Report). RPS APASA Pty Ltd, Perth.

RPS Environment and Planning, 2010. Marine megafauna report, Browse marine megafauna study. RPS Environment and Planning Pty Ltd, Perth.

RPS, 2019a. Export Pipeline (GEP) Installation EP. Marine Diesel Oil Spill Modelling. Document Number MAQ0772J Rev 2.

RPS, 2019b. Barossa Hydrotest Discharge Modelling Study. Document Number MAQ0835J

Runcie, J., Macinnis-Ng, C., Authority, A.M.S., 2010. The toxic effects of petrochemicals on seagrasses. Literature review. For Australian Maritime Safety Authority.

Salmon, M., 2003. Artificial night lighting and sea turtles. Biologist 50, 163–168.

Salmon, M., Witherington, B.E., 1995. Artificial lighting and seafinding by loggerhead hatchlings: evidence for lunar modulation. Copeia 931–938.

Salmon, M., Wyneken, J., Fritz, E., Lucas, M., 1992. Seafinding by Hatchling Sea Turtles: Role of Brightness, Silhouette and Beach Slope as Orientation Cues. Behaviour 122, 56–77.

SEA, 2018. Barossa Gas Export Pipeline Design Review - Span Correction Report. Unpublished report prepared for ConocoPhillips by Subsea Engineering Associates Pty Ltd. Document No.: BAS-200 0111 Rev 0. December 2018.

SEA, 2019. Barossa Gas Export Pipeline Design Review - Span Assessment Report. Unpublished report prepared for ConocoPhillips by Subsea Engineering Associates Pty Ltd. Document No.: BAS-200 0110 Rev 3. July 2019.

Sepulveda, C., Kohin, S., Chan, C., Vetter, R., Graham, J., 2004. Movement patterns, depth preferences, and stomach temperatures of free-swimming juvenile mako sharks, *Isurus oxyrinchus*, in the Southern California Bight. Marine Biology 145, 191–199.

Sheppard, J.K., Preen, A.R., Marsh, H., Lawler, I.R., Whiting, S.D., Jones, R.E., 2006. Movement heterogeneity of dugongs, *Dugong dugon* (Müller), over large spatial scales. Journal of Experimental Marine Biology and Ecology 334, 64–83.

Shigenaka, G., 2001. Toxicity of oil to reef building corals: a spill response perspective (NOAA Technical Memorandum No. NOS OR&R 8). National Oceanic and Atmospheric Administration, Seattle.

SmartWind (2013). Hornsea Offshore Wind farm. Environmental Statement. Volume 5 - Offshore Annexes. Report prepared by RPS. July 2013.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., Tyack, P.L., 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic mammals 33, 411–414.

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P., Tyack, P.L., 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals.

Stapput, K., Wiltschko, W., 2005. The sea-finding behavior of hatchling olive ridley sea turtles, Lepidochelys olivacea, at the beach of San Miguel (Costa Rica). Die Naturwissenschaften 92, 250–3. https://doi.org/10.1007/s00114-005-0619-z

Stevens, J., McAuley, R., Simpfendorfer, C., Pillans, R., 2008. Spatial distribution and habitat utilisation of sawfish (*Pristis* spp.) in relation to fishing in northern Australia. CSIRO Marine and Atmospheric Research, Hobart.

Stevens, J., Pillans, R., Salini, J., 2005. Conservation assessment of *Glyphis* sp. A (speartooth shark), *Glyphis* sp. C (northern river shark), *Pristis microdon* (freshwater sawfish) and *Pristis zijsron* (green sawfish). CSIRO Marine Research, Hobart.

Stevens, J.D., Bradford, R.W., West, G.J., 2010. Satellite tagging of blue sharks (*Prionace glauca*) and other pelagic sharks off eastern Australia: depth behaviour, temperature experience and movements. Marine biology 157, 575–591.

Taylor, H.A., Rasheed, M.A., 2011. Impacts of a fuel oil spill on seagrass meadows in a subtropical port, Gladstone, Australia – the value of long-term marine habitat monitoring in high risk areas. Marine Pollution Bulletin 63, 431–437. https://doi.org/10.1016/j.marpolbul.2011.04.039

Taylor, J.G., 1996. Seasonal occurrence, distribution and movements of the whale shark, Rhincodon typus, at Ningaloo Reef, Western Australia. Mar. Freshwater Res. 47, 637–642. https://doi.org/10.1071/mf9960637

Thorburn, D.C., Morgan, D.L., Rowland, A.J., Gill, H.S., 2007. Freshwater sawfish *Pristis microdon* Latham, 1794 (Chondrichthyes: Pristidae) in the Kimberley region of Western Australia. Zootaxa 1471, 27–41.

Thorburn, D.C., Morgan, D.L., Rowland, A.J., Gill, H.S., Paling, E., 2008. Life history notes of the critically endangered dwarf sawfish, *Pristis clavata*, Garman 1906 from the Kimberley region of Western Australia. Environmental Biology of Fishes 83, 139–145.

Threatened Species Scientific Committee, 2016a. Conservation advice *Calidris canutus* red knot. Threatened Species Scientific Committee, Canberra.

Threatened Species Scientific Committee, 2016b. Conservation advice *Limosa lapponica baueri* bar-tailed godwit (western Alaskan). Threatened Species Scientific Committee, Canberra.

Threatened Species Scientific Committee, 2016c. Conservation advice *Limosa lapponica menzbieri* bar-tailed godwit (northern Siberian). Threatened Species Scientific Committee, Canberra.

Threatened Species Scientific Committee, 2016d. Conservation advice *Calidris tenuirostris* great knot. Threatened Species Scientific Committee, Canb.

Threatened Species Scientific Committee, 2016e. Conservation Advice *Charadrius mongolus* lesser sand plover. Threatened Species Scientific Committee, Canberra.

Threatened Species Scientific Committee, 2015a. Conservation advice *Rhincodon typus* whale shark. Department of the Environment, Canberra.

Threatened Species Scientific Committee, 2015b. Conservation advice *Calidris ferruginea* curlew sandpiper. Threatened Species Scientific Committee, Canberra.

Threatened Species Scientific Committee, 2015c. Conservation advice *Numenius madagascariensis* eastern curlew. Threatened Species Scientific Committee, Canberra.

Threatened Species Scientific Committee, 2014. Approved conservation advice for *Pristis pristis* (largetooth sawfish). Threatened Species Scientific Committee, Canberra.

URS, 2010. Wheatstone Project: deepwater habitat survey. URS Australia Pty Ltd, Perth.

URS Australia Pty Ltd (URS), 2008. Timor Sea Marine Environmental Surveys Conducted at Caldita-2 Well Site. Prepared for ConocoPhillips Australia Exploration Pty Ltd. Perth, Western Australia.

URS Australia Pty Ltd (URS), 2005. Caldita-1 Pre-drilling Marine Environmental Survey 2005. Prepared for ConocoPhillips Australia Exploration Pty Ltd. Perth, Western Australia.

Waayers, D., Smith, L., Malseed, B., 2011. Inter-nesting distribution of green turtles (*Chelonia mydas*) and flatback turtles (*Natator depressus*) at the Lacepede Islands, Western Australia. Journal of the Royal Society of Western Australia 94, 359–364.

Wada, S., Oishi, M., Yamanda, T.K., 2003. A newly discovered species of living baleen whale. Nature 426, 278–281.

Warner, G.A., McCrodan, A., 2011. Underwater Sound Measurements. (Chapter 3) In Hartin, K.G., L.N. Bisson, S.A. Case, D.S. Ireland, and D.E. Hannay (eds.). Marine mammal monitoring and mitigation during site clearance and geotechnical surveys by Statoil USA E&P Inc. in the Chukchi Sea, August-October 2011: 90-day report. LGL Rep. P1193. Report from LGL Alaska Research Associates Inc, LGL Ltd. and JASCO Research Ltd. for Statoil USA E&P Inc., NMFS, and

USFWS. 202 pp + appendices. ftp://wkst189.oar.noaa.gov/noaa_documents.lib/NMFS/Auke%20Bay/AukeBayScans/Removable%20Disk/p1192.pdf.

WAMSI (2019) Dredging Science Node – Final Synthesis Report. Western Australian Marine Science Institution, Perth, Western Australia.

Wei, C.-L., Rowe, G.T., Escobar-Briones, E., Nunnally, C., Soliman, Y., Ellis, N., 2012. Standing stocks and body size of deep-sea macrofauna: Predicting the baseline of 2010 *Deepwater Horizon oil* spill in the northern Gulf of Mexico. Deep Sea Research Part I: Oceanographic Research Papers 69, 82–99. https://doi.org/10.1016/j.dsr.2012.07.008

Weng, K.C., Boustany, A.M., Pyle, P., Anderson, S.D., Brown, A., Block, B.A., 2007. Migration and habitat of white sharks (*Carcharodon carcharias*) in the eastern Pacific Ocean. Marine Biology 152, 877–894. https://doi.org/10.1007/s00227-007-0739-4

West, L.D., Lyle, J.M., Matthews, S.R., Stark, K.E., Steffe, A.S., 2012. Survey of Recreational Fishing in the Northern Territory: 2009-10 (No. Fishery report No. 109). Northern Territory Government, Darwin, NT.

Whiting, A.U., Thomson, A., Chaloupka, M., Limpus, C.J., 2009. Seasonality, abundance and breeding biology of one of the largest populations of nesting flatback turtles, *Natator depressus*: Cape Domett, Western Australia. Australian Journal of Zoology 56, 297–303.

Whiting, S., Long, J., Hadden, K. & Council, T.L. (2005) Identifying the links between nesting and foraging grounds for the Olive Ridley (*Lepidochelys olivacea*) sea turtles in northern Australia. Report to the Department of the Environment and Water Resources.

Whiting, S.D., Long, J.L. & Coyne, M. (2007) Migration routes and foraging behaviour of olive ridley turtles *Lepidochelys olivacea* in northern Australia. Endangered Species Research, 3(1), 1 - 9.

Whiting, A.U., Thomson, A., Chaloupka, M., Limpus, C.J., 2009. Seasonality, abundance and breeding biology of one of the largest populations of nesting flatback turtles, *Natator depressus*: Cape Domett, Western Australia. Australian Journal of Zoology 56, 297–303.

Whittock, P.A., Pendoley, K.L., Hamann, M., 2016. Using habitat suitability models in an industrial setting: the case for internesting flatback turtles. Ecosphere 7, e01551. https://doi.org/10.1002/ecs2.1551

Wilson, S., Polovina, J., Stewart, B., Meekan, M., 2006. Movements of whale sharks (*Rhincodon typus*) tagged at Ningaloo Reef, Western Australia. Marine Biology 148, 1157–1166.

Woodside Energy Limited, 2014. Browse FLNG Metocean Design Basis. Prepared for Woodside, Report reference JJ0013RT000002 Rev 5.

Yudhana, A., Sunardi, J.D., Abdullah, S., Hassan, R.B.R., 2010. Turtle hearing capability based on ABR signal assessment. Telkomnika 8: 187-194.

Zykov, M., Bailey, L., Deveau, T., Racca, R., 2013. South Stream Pipeline – Russian Sector – Underwater Sound Analysis. JASCO Document 00691, Version 1.0. Technical report by JASCO Applied Sciences for South Stream Transport B.V https://www.south-stream-transport.com/download/documents/pdf/en/2014/07/ssttbv_ru_esia_a123_web_ru_238_en_20140707.pdf

10 ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per litre
°C	degrees Celsius
A&OI	Asset and Operating Integrity
ABU-W	Australian Business Unit - West
ABU-E	Australian Business Unit - East
ADBAC	Alkyl Dimethyl Benzyl Ammonium Chloride
AHS	Australian Hydrographic Service
AIIMS	Australasian Inter-service Incident Management System
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
ALAN	Artificial Light At Night
ALARP	as low as reasonably practicable
ANZECC	Australian and New Zealand Environment and Conservation Council
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
APLNG	Australia Pacific liquified natural gas
ARC	AMSA Response Centre
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
ATSB	Australian Transport Safety Bureau
BIA	biologically important area
BOM	Bureau of Meteorology
BTEX	benzene, ethylbenzene, toluene and xylenes
BRUVS	baited remove underwater video systems
BU	Business Unit
CDU	Charles Darwin University
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CHARM	Chemical Hazard and Risk Management
CHIRP	Compressed High Intensity Radar Pulse
CIMP	Crisis and Incident Management Plan
CM&ER	Crisis Management and Emergency Response
CMID	Common Marine Inspection Document
CMT	Crisis Management Team
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea 1972

CO	carbon monoxide
CO2	carbon dioxide
dB	decibels
dB re 1µPa	Decibel re 1 micro Pascal
DEH	Department of Environment and Heritage
DEWHA	Department of the Environment, Water, Heritage and the Arts
DLNG	Darwin liquified natural gas
DoE	Department of Environment
DoEE	Department of the Environment and Energy
DoAWR	Department of Agriculture and Water Resources
DP	dynamic positioning
DPGS	differential global positioning system
DPIF	Department of Primary Industry and Fisheries
DPIR	Department of Primary Industry and Resources
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EC50	median effective concentration, concentration at which 50% of the test organisms are immobilised
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAPP	Engine International Air Pollution Prevention
EMBA	environment that may be affected
EOC	Emergency Operations Centre
EP	Environment Plan
EPBC Act	*Environment Protection and Biodiversity Act 1999* (Cth)
EPBC Regulations	Environment Protection and Biodiversity Regulations 2000
EPO	environmental performance outcome
EPS	environmental performance standard
ERT	Emergency Response Team
ESD	Ecologically Sustainable Development
FCGT	flooding, cleaning, gauging and testing
FPSO	floating production, storage and offloading facility
GHG	greenhouse gas
GIMAT	Global Incident Management Assist Team
GOMO	Guidelines for Offshore Marine Operations
GPS	global positioning system

g/m2	grams per square metre
ha	hectares
HAZID	hazard identification
HAZOP	hazard and operability
HF	high frequency
HFO	heavy fuel oil
HSE	health, safety and environment
HSEMS	health, safety and environment management system
HQ	hazard quotient
IAP	Incident Action Plan
IAPP	International Air Pollution Prevention
ICS	Incident Command System
IEE	International Energy Efficiency
IFO	intermediate fuel oil
IMDG Code	International Maritime Dangerous Goods code
IMCA	International Maritime Contractors Association
IMO	International Maritime Organisation
IMS	invasive marine species
IMT	Incident Management Team
IOPP	International Oil Pollution Prevention
IPP	International Pollution Prevention
ISO	International Organization for Standardization
ISPP	International Sewage Pollution Prevention
ITF	Indonesian Throughflow
JSA	job safety analysis
KEF	key ecological feature
kHz	Kilohertz
km	kilometres
km2	square kilometres
km/day	kilometres per day
km/h	kilometres per hour
KP	kilometre point
LBL	long base line
LC50	concentration at which there is mortality of 50% of a group of specific test species
LF	low frequency
LNG	liquid natural gas

MSI	Maritime Safety Information
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	multi-beam echo sounder
MEG	monoethylene glycol
MC	measurement criteria
MDO	marine diesel oil
MGO	marine gas oil
mg/L	milligrams per litre
MNES	Matters of National Environmental Significance
MOC	management of change
MODU	Mobile Offshore Drilling Unit
MoU	memorandum of understanding
MSDS	material safety data sheet
MSL	mean sea level
n/a	not applicable
National Plan	National Plan for Maritime Environmental Emergencies
NAXA	North Australian Exercise Area
NEBA	Net Environmental Benefit Analysis
NESP	Australian National Environmental Science Programme
NLC	Northern Land Council
nm	nautical miles
NMR	North Marine Region
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOx	oxides of nitrogen
NT	Northern Territory
NTEPA	Northern Territory Environment Protection Authority
NTU	nephelometric turbidity units
NWSTF	North West Slope Trawl Fishery
OCIMF	Oil Companies International Marine Forum
ODS	ozone depleting substance
OECD	Organisation for Economic Cooperation and Development
OHS	Occupational Health and Safety
OIW	oil in water
OMP	operational monitoring plan
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage

OPGGS (E) Regulations	Offshore Petroleum and Greenhouse Gas Storage Environment Regulations
OPP	Offshore Project Proposal
OSPAR	OSPAR Commission – based on the Oslo and Paris Conventions to protect the North-East Atlantic
OSMP	Operational and Scientific Monitoring Program
OVID	Offshore Vessel Inspection Database
PAR	photosynthetically active radiation
PEC:NEC	predicted effect concentration: no effect concentration
PLET	pipeline end termination
PMST	EPBC Protected Matters Search tool
POLREP	Marine Pollution Report
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
ppt	parts per thousand
PSSR	Pre-start Safety Review
PSV	pipe supply vessels
PTS	permanent threshold shift
PTW	permit to work
QLD	Queensland
rms	root mean square
RCC	Rescue coordination centres
ROV	remotely operated vehicle
RPS APASA	RPS Asia-Pacific Applied Science Associates
SBP	sub-bottom profiler
SD	sustainable development
SEEMP	Ship Energy Efficiency Management Plan
SEL	sound exposure level
SMP	scientific monitoring plan
SMPEP	Shipboard Marine Pollution Emergency Plan
SOLAS	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SO2	sulphur dioxide
SPL	sound pressure level
sr	steradian
SSS	side scan sonar

STCW Convention	International Convention on Standards of Training, Certification and Watchkeeping
TEG	triethylene glycol
THPS	tetrakis (hydroxymethyl) phosphonium sulfate
TLC	Tiwi Land Council
TTS	temporary threshold shift
UK OCNS	United Kingdom Offshore Chemical Notification Scheme
USBL	ultra-short baseline
VHF	very high frequency
VOCs	volatile organic compounds
WA	Western Australia

Appendices

APPENDIX A: RELEVANT ENVIRONMENTAL REQUIREMENTS

Legislation	Summary	Relevance to gas export pipeline Installation
Australian Maritime Safety Authority Act 1990 (Cth)	This Act establishes the Australian Maritime Safety Authority (AMSA) which manages the National Plan for Maritime Environmental Emergencies in coordination with industry. AMSA is also responsible for administering the Marine Orders in Commonwealth waters.	AMSA has been consulted as part of the stakeholder engagement process. ConocoPhillips will adhere to incident reporting requirements regarding pollution.
Biosecurity Act 2015 (Cth)	This Act relates to the management of diseases and pests that may cause harm to human, animal or plant health or the environment. The Act includes provisions for ballast water management plans and certificates, record-keeping obligations and powers to ensure compliance.	ConocoPhillips will ensure activity vessels comply with the requirements of this Act.
Environment Protection and Biodiversity Conservation Act 1999 (Cth) Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) Environment Protection and Biodiversity Conservation Amendment Regulations 2007 (Cth)	While the Environment Regulations under the OPGGS Act (see below) manage day to day petroleum activities and apply to any activity that may have an impact on the environment, the EPBC Act (Chapter 4) regulates assessment and approval of proposed actions that are likely to have a significant impact on a matter of National Environmental Significance (NES). Actions that are likely to have a significant impact on a matter of NES require approval by the Commonwealth Environment Minister; the assessment process is administered by the Department of the Environment, Water, Heritage and the Arts. The EPBC Act does not replace the need for an Environment Plan to be approved under the OPGGS(E) Regulations before an action can proceed. Schedule 8 of the EPBC Regulations outlines the Australian IUCN Reserve Management Principles.	ConocoPhillips will adhere to the requirements of the EPBC Act and Regulations, as relevant to the installation of the Gas Export Pipeline. ConocoPhillips will have regard to the Australian IUCN Reserve Management Principles, where relevant.
EPBC Regulations - Part 8 Division 8.1 Interacting with cetaceans	These Regulations provide for the protection and conservation of cetaceans.	Described requirements for vessel interactions with cetaceans.
Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007 (Cth)	This Act implements the requirements of MARPOL 73/78 Annex VI for shipping in Commonwealth waters.	ConocoPhillips, in consultation with the vessel owners, shall induct the vessel masters to this Act as relevant to the installation of the Gas Export Pipeline. Vessel owners/contractors are to ensure MARPOL and this Act are adhered to as relevant to the installation of the gas export pipeline.
Navigation Act 2012 (Cth)	A number of Marine Orders enacted under this Act apply directly to offshore petroleum activities:	ConocoPhillips, in consultation with the vessel owners/contractor shall induct the vessel masters to this

	• Marine Order 21 (Safety of navigational and emergency procedures) • Marine Order 30 (Prevention of collisions) • Marine Order 70 (Seafarer certification) • Marine Order 71 (Masters and deck officers) • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 94 (Pollution prevention – packaged harmful substances) • Marine Order 95 (Marine pollution prevention – garbage) • Marine Order 96 (Marine pollution prevention – sewage) • Marine Order 97 (Marine pollution prevention – air pollution) AMSA has the authority and responsibility for the operational activities under the Act, including vessel certification, seafarers' qualifications, marine pollution prevention, monitoring and enforcement activities.	Act and relevant Marine Orders as relevant to the installation of the gas export pipeline. Vessel owners are to ensure this Act and relevant port state Marine Orders are adhered to as relevant to the installation of the gas export pipeline.
Protection of the Sea (Harmful Antifouling Systems) Act 2006 (Cth)	This Act relates to the protection of the sea from the effects of harmful anti-fouling systems. It prohibits the application or reapplication of harmful anti-fouling compounds on Australian ships or foreign ships that are in an Australian shipping facility.	Activity vessels will comply with the relevant requirements of this Act.
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth) Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994 (Cth)	This Act and Regulations relate to the protection of the sea from pollution by oil and other harmful substances discharged from ships. This Act disallows any harmful discharge of sewage, oil and noxious substances into the sea and sets the requirements for a shipboard waste management plan. The following Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 94 (Pollution prevention – packaged harmful substances) • Marine Order 95 (Marine pollution prevention – garbage) • Marine Order 96 (Marine pollution prevention – sewage) • Marine Order 97 (Marine pollution prevention – air pollution) • Marine Order 98 (Marine pollution prevention – anti-fouling systems)	ConocoPhillips, in consultation with the vessel owners/contractor shall induct the vessel masters to this Act and relevant Marine Orders as relevant the installation of the gas export pipeline. Vessel owners/contractor are to ensure the requirements of MARPOL 73/78, this Act and Regulations, and relevant port state Marine Orders are adhered to as relevant to the installation of the gas export pipeline.

APPENDIX B: EPBC PROTECTED MATTERS SEARCH REPORT

2 files are available as supporting documents under BAA-100 0329.

APPENDIX C: PRE-SPILL NEBA ASSESSMENT AND ALARP ASSESSMENT OF RESPONSE STRATEGIES

The objective of the net environmental benefit analysis (NEBA) process is to identify the potential net environmental benefit to key sensitive receptors associated with the implementation of potential spill response options. The process allows a comparison of response options and identifies potential impacts to sensitive receptors of implementing these options, compared to the unmitigated impacts of the spill. The process also allows assessment of the value of implementing multiple response options.

The ConocoPhillips NEBA process comprised two main parts (**Figure C-1**):

- Pre-spill (or strategic) NEBA of response options (Tasks A to D), which included consideration of the credible spill scenarios, feasible response options and sensitive environmental receptors to determine primary and secondary response options. The pre-spill NEBA determined the suite of response options that are selected in the OPEP.
- Spill response (operational) NEBA of response options, which includes a review of the pre-spill NEBA and incorporation of spill surveillance observations, spill trajectory data and operational monitoring information (Tasks 1 to 3).

The pre-spill NEBA was preceded by an oil spill response workshop that identified the feasible suite of response options that were assessed in the pre-spill NEBA. Outputs from the pre-spill NEBA will be incorporated into the spill response (operational) NEBA during an incident.

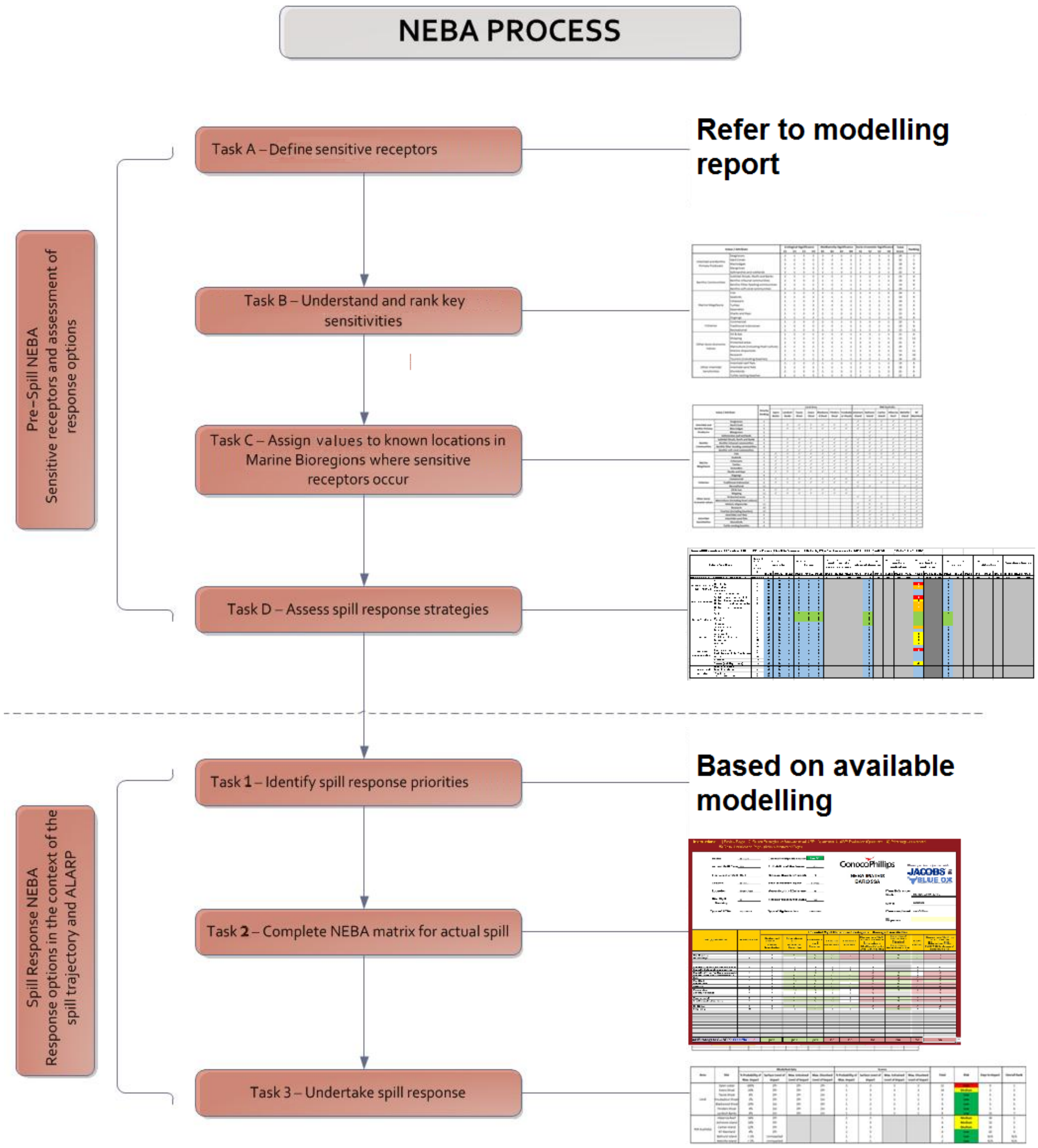


Figure C-1: Flowchart showing the NEBA process to be used during a spill response

Pre-spill NEBA

The following tasks are undertaken during the planning phase:

Task A: Define sensitive receptors

The aim of Task A was to determine the spatial extent of the adverse exposure zone defined by the spill modelling and identify the sensitive environmental receptors within this zone. The outputs from the pre-spill modelling of the worst-case credible hydrocarbon spill scenarios (**Sections 5.4.7** and **5.4.8**) were used to define the adverse exposure zone and identify sensitive receptor locations.

Task B: Understand and rank key sensitivities

Environmental, socio-economic and cultural values and sensitivities (e.g. mangroves, turtles, commercial fisheries, tourism) within the adverse exposure zone were allocated a priority value/ranking based on their sensitivity / vulnerability to hydrocarbon pollution.

Task C: Assign ranking to known locations in marine bioregions where sensitive receptors occur

The occurrence of specific values and sensitivities (e.g. hard corals, commercial shipping) were identified for each sensitive receptor within the adverse exposure zone. The priority value/ranking (Task B) were assigned to each asset/value.

Task D: Assess spill response options

Potential impacts of response options on assets/values were identified for each spill response option for each spill scenario. As part of determining the most suitable response options, consideration was given to the following:

- Benefits and drawbacks of each response option, when compared to the 'no intervention' option – this included consideration of feasibility and effectiveness;
- Specific impacts and risks of applying the response option to the credible spill scenarios listed in **Sections 5.3.7** and **5.3.8**.

A summary of this information is provided in **Table C-1**, which forms part of the ALARP assessment for response options.

Spill Response NEBA

Tasks 1 to 3 define the steps that would be taken by responders during an actual spill event. The modelling outputs and spill observations to be used during this process will be both the preparedness modelling (using the credible hydrocarbon spill scenario most appropriate to the nature and scale of the release), the oil spill trajectory modelling (OSTM) and observations of the spill. The OSTM will be used to "ground-truth" pre-spill credible hydrocarbon spill scenario modelling outputs, identify risk to sensitive receptors and to identify spill response priorities for implementation of spill response options.

Task 1: Identify spill response priorities

Validate or re-evaluate spill response priorities based on actual spill trajectory modelling, essentially repeating Task A to make sure that the priorities are representative of the actual spill.

Task 2: Complete NEBA matrix for actual spill

Review the preparedness NEBA. Where necessary, repeat the process identified in Tasks C and D to provide a revised spill-specific NEBA matrix.

Task 3: Undertake Spill Response

Identify the most appropriate spill response option/s based on the NEBA outcomes. The response option/s will then be implemented.

Table C-1: NEBA and ALARP evaluation of response options

Response Option	NEBA Considerations			Summary of ALARP Conclusions
	Benefits	**Drawbacks**	**Specific Risks/Impacts of the Response Option**	
Monitor and evaluate	• Provides situational awareness • Some components (e.g. tracking buoys, oil spill trajectory monitoring) can be rapidly mobilised/ implemented and provide early data back to the IMT • Supports a coordinated response effort • Allows re-evaluation of response priorities • Can identify significant changes in risk and presence of key sensitivities, which may trigger a revision of the NEBA • Provides information on the efficacy and potential impacts (positive or negative) of other response options • May be suitable option if there is a low threat to environment and/or people • Minimal waste footprint	• No direct effect on the spill; oil remains in the environment • Visual methods typically constrained to daylight hours • Some methods can be limited by provision of information at small spatial scales (e.g. vessel-based observations) or by environmental / weather conditions (e.g. aerial and satellite photo/video imagery) • Limited resource availability (e.g. vessels, aircraft) immediately after spill detection • Range in the time required to receive data from different components, from 2 hours (e.g. satellite tracking buoy) to up to 2 days (e.g. modelling) • Public perception of 'no response'	• Potential health and safety risks to responders close to the release location, e.g. from VOCs	The requirement for situational awareness is critical to implementing a coordinated, focussed and effective spill response. Implementation of other response options will be informed by information collected by monitor and evaluate tactics. Monitor and evaluate tactics typically present little or no environmental risk. The suite of tactics within the monitor and evaluate option allow the response to be scaled and customised based on the nature and scale of the spill. The benefits of undertaking this response outweigh the potential environmental risks/impacts. Hence, monitor and evaluate is a primary response strategy.
Wildlife response – hazing	• Potential to reduce risk of wildlife being contacted by hydrocarbons	• Dependent on monitor and evaluate response identifying aggregations, and therefore likely to be reactive rather than proactive, thereby limiting effectiveness • Many species may not be visible during monitor and evaluate due to the lack of time they spend on the ocean surface • Limited resources in the response area to support this response, resulting in delays in relocating individuals to suitable rehabilitation facilities • Potential regulatory issues with regards to disturbance of protected species (e.g. potential permit requirements) • Time to respond to reports of aggregations may be prolonged due to distance from the point of mobilisation – aggregations may have been exposed to hydrocarbons, moved or dispersed in the intervening period • Of limited use in remote offshore locations	• Wildlife aggregations identified from the monitor and evaluate option are likely to have moved during the period required to mobilise a response, making it difficult to relocate the target • May cause additional stress and disorientation to hazed wildlife • Wildlife may become acclimatised to hazing, which may reduce hazing effectiveness	Although this approach may reduce environmental risk from a spill, success rate is likely to be low due to the time to mobilise a response and likelihood of finding the target, particularly given there are unlikely to be significant aggregations of wildlife amenable to hazing. Competing needs for limited resources may mean that this response is unlikely to be actionable at all times throughout the response phase. The benefits of undertaking this response, in accordance with the conditions discussed above, outweigh the potential environmental risks / impacts in some circumstances. Hence, wildlife response – hazing is a secondary response strategy. This means that this response would not be automatically triggered but will be considered where it is safe and practicable to implement, and where significant aggregations of wildlife are detected during the monitor and evaluate response. Implementing wildlife hazing on the shoreline would result in health and safety risks to personnel due to the remote tropical location and lack of infrastructure (e.g. access roads). Shoreline-based hazing is likely to be effective for birds, which are not at high risk from spilled oil as little MDO is predicted to accumulate on shorelines. Displacing seabirds from the shoreline may expose them to floating oil at sea. Hence, the wildlife hazing secondary response strategy would only be implemented in offshore or nearshore waters.
Pre-emptive capture/post-contact wildlife response	• Potential to reduce risk of wildlife being contacted by hydrocarbons • Potential to rehabilitate some oiled fauna	• Time to respond to reports of aggregations may be prolonged due to distance from the point of mobilisation (e.g. oiled fauna may be deceased prior to arrival of oiled wildlife personnel) • Limited resources in the response area to support this response • Potential regulatory issues with regards to disturbance of protected species (e.g. potential permit requirements) • Of limited use in remote offshore locations	• Wildlife aggregations identified from the monitor and evaluate option may have moved (pre-emptive) or are deceased (post-contact), limiting effectiveness • Pre-emptive capture and oiled wildlife activities may cause additional stress or mortality to wildlife • Not practicable for many marine fauna (e.g. cetaceans)	Wildlife that have been exposed to spilled oil may be captured, treated and subsequently released, potentially reducing the effects of oil exposure. Spilled MDO is expected to spread rapidly due to its low viscosity in tropical waters, forming very thin surface slicks. Given the nature of MDO, significant oiling (i.e. such at capture and cleaning would be effective) is likely to be restricted to the area immediately around the release location. Likewise, pre-emptive capture is likely to be restricted to the area immediately around the release location. The effectiveness of this strategy will be highly dependent on the receptors present and the nature and scale of the hydrocarbon spill. The benefits of undertaking this response, in accordance with the conditions discussed above, outweigh the potential environmental risks / impacts in some circumstances. Pre-emptive capture / post contact wildlife response is a secondary response strategy. This means that this response would not be automatically triggered but will be considered where it is safe and practicable to

Response Option	NEBA Considerations			Summary of ALARP Conclusions
	Benefits	Drawbacks	Specific Risks/Impacts of the Response Option	
				implement, and where significant aggregations of wildlife are detected during the monitor and evaluate response.
(Mechanical) Physical dispersion	• Easy to complete where support/ response vessels are already in place • No additional equipment required • Minimal waste footprint • Potential for vessel collision with marine fauna	• Entrained fuel will weather more slowly – better to leave it on the surface to enhance weathering • Only suitable for small spills • Limited effects of the technique in highly volatile, rapidly evaporating spills • Vessel may be diverted to support additional response operations • Does not remove oil from the environment	• Practice may be dangerous for response personnel given the volatile nature of MDO	Mechanical dispersion may result in increased entrainment of MDO in the water column, which may reduce weathering as the oil is no longer exposed to the atmosphere. Given MDO is expected to weather rapidly at the surface, physical dispersion may slow down the weathering process and prolong the period during which the spill may harm environmental receptors. Hence, mechanical dispersion is not an effective response option and has been excluded from implementation.
Chemical dispersants (surface application)	• Potential reduction of hydrocarbon on sea surface, thereby protecting sensitive surface-dwelling and shoreline receptors • Potential reduction in exposure of responders to VOCs • No recovered oil storage and therefore waste • Less labour intensive than other options	• Potential impacts from toxicity of dispersed oil on sub-surface marine fauna and habitats • Limited window of opportunity for instantaneous spills and long mobilisation times (due to remote location) • Does not directly remove hydrocarbons from the environment, but disperses them into the water column • Potential impact to market confidence for fisheries	• MDO will weather rapidly following release and will naturally disperse in most conditions. Application of dispersant may result in the dispersed droplets dropping through the thin film on the surface and into the water column causing 'herding/clumping' of hydrocarbons	Chemical dispersion may result in increased entrainment of MDO in the water column, which may reduce weathering as the oil is no longer exposed to the atmosphere. Given MDO is expected to weather rapidly at the surface, chemical dispersion may slow down the weathering process, which may prolong the period during which the spill may harm environmental receptors. Hence, chemical dispersion is not an effective response option and has been excluded from implementation.
Containment and recovery	• Deployment of boom may contain surface hydrocarbons for recovery • Low potential for adverse environmental impacts • Will reduce the volume of the surface slick, reducing potential impact	• Limited window of opportunity for instantaneous spills as spilled MDO is expected to spread rapidly • Resource intensive and requires specialised equipment and trained personnel • Containment boom not suited to strong currents (0.8 knots and greater), winds (<15 knots) or high sea state (Beaufort scale 3 to 4) (i.e. offshore) • Skimmers capacity may be reduced for low viscosity hydrocarbons. Skimmer types that may be effective offshore for low viscosity hydrocarbons include oleophilic or screw weir skimmers. • Disposal of recovered product and contaminated boom require allocation of resources and transport to registered disposal sites (potentially interstate or internationally) • Most effective close to source, where there are likely to be HSE considerations (re: VOCs at the surface)	• Potential risk of deploying this option from VOCs • Open, offshore environment and properties of MDO would reduce the efficacy of this option	Not practicable for smaller spills, as the time to mobilise would be too long to be able to respond as the spill will have dispersed to a point where containment and recovery is no longer practicable. Booming is likely to be of low efficacy, as recovery rates of MDO are low, especially in open offshore waters. Hence, containment and recovery is not an effective response option and has been excluded from implementation.
Shoreline protection and deflection	• Protective booming may mitigate or prevent shoreline impacts • Can combine with shoreline clean-up or wildlife response activities to reduce cumulative impacts	• Labour intensive and typically requires constant tending or monitoring, which may not be feasible in remote locations • Not feasible in many remote coastal environments due to access constraints and high tidal ranges • Significant health and safety risks when working on remote Tiwi Islands shorelines (e.g. crocodiles, feral pigs, remote locations, high temperatures) • Very little infrastructure in the region (e.g. roads, access points to beaches etc.)	• Potential for disturbance to nearshore and shoreline habitats (e.g. turtle nesting beaches, bird nesting/feeding areas) from equipment and personnel, especially if several teams are deployed	Modelling indicates low probability of shoreline contact by non-persistent hydrocarbons. Shoreline protection and deflection activities involve mobilising personnel and equipment to remote coastal environments, which can result in physical disturbance to intertidal and shoreline habitats. Leaving the product to degrade naturally would cause less harm than active methods of protection and deflection. Given the nature of the hydrocarbon and the shoreline environments of the Tiwi Islands, shoreline protection and deflection is not expected to be an effective response strategy. The benefits of undertaking this response, in accordance with the conditions discussed above, do not outweigh the potential risks / impacts in most circumstances. Considerable health and safety risks would need to be managed

Response Option	NEBA Considerations			Summary of ALARP Conclusions
	Benefits	Drawbacks	Specific Risks/Impacts of the Response Option	
		• Secondary contamination is possible from equipment and/or personnel involved in the activities		in implementing this response and may preclude implementation of this response. Hence, shoreline protection and deflection has been excluded from implementation.
Shoreline clean-up	• Removes hydrocarbons from the environment • Reduces potential for remobilisation of the hydrocarbons • Reduces potential of oiling of fauna	• Labour, logistics and equipment intensive, which may not be feasible in remote locations • Not feasible in many remote coastal environments due to access constraints and high tidal ranges • Some clean-up methods are harmful and create longer-term damage than natural degradation (particularly for small volumes) • Significant waste generation • Significant health and safety risks when working on remote Tiwi Islands shorelines (e.g. crocodiles, feral pigs, remote locations, high temperatures) • Very little infrastructure in the region (e.g. roads, access points to beaches etc.) • Can result in direct and indirect impacts (e.g. trampling, secondary waste contamination, disturbance to wildlife and changes to the geomorphological form of the shoreline)	• Potential to damage sensitive shoreline receptors if clean-up activities are initiated for shoreline accumulation concentrations < 100 g/m^2. • Potential for disturbance to nearshore and shoreline habitats (e.g. turtle nesting beaches, bird nesting/feeding areas) from equipment and personnel • Large numbers of clean-up teams have potential of causing longer term damage to sensitive receptors than if the hydrocarbons were left to degrade naturally • Remote shorelines in the region reduce effectiveness due to the lack of infrastructure (e.g. roads, access points etc.) • Considerable health and safety risks due to fauna and remote tropical location.	Modelling indicates low probability of shoreline contact and contact exposure levels well below thresholds that would cause significant impact. Shoreline clean-up activities involve mobilising personnel and equipment to remote coastal environments, which can result in physical disturbance to intertidal and shoreline habitats. Given the small volumes and area of shoreline predicted to be impacted, leaving the product to degrade naturally would cause less harm than active methods of clean-up. Given the nature of the hydrocarbon and the shoreline environments of the Tiwi Islands, shoreline clean-up is not expected to be an effective response strategy. The benefits of conducting this response option do not outweigh the potential risks / impacts. Hence, shoreline protection and deflection has been excluded from implementation.

Barossa Gas Export Pipeline Installation Pre-spill NEBA Outcomes

Table C-2 presents a summary of the outcomes of the NEBA process and outlines response options which may result in a net environmental benefit for the credible hydrocarbon spill scenarios defined in **Sections 5.3.7**and **5.3.8**.

Table C-2: Proposed spill response options for each credible hydrocarbon spill scenario following the NEBA

Response Option	Scenario 1 – Vessel CollisionResulting in 700 m³ Release of MDO	Scenario 2 – Bunkering Incident Resulting In 10 M³ Release Of MDO
Monitor and evaluate	+ Primary response option.	
Wildlife response – hazing	+ Secondary response option. Only likely to be applied where wildlife is identified as being at risk of being oiled.	**N/A**
Pre-emptive capture/post-contact wildlife response strategy	+ Secondary response option. Only likely to be applied where wildlife is identified as being at risk of being/have been oiled.	**N/A**
(Mechanical) physical dispersion	**N/A**	**N/A**
Chemical dispersion – surface application	**N/A**	**N/A**
Chemical dispersion – subsurface application	**N/A**	**N/A**
Containment and recovery	**N/A**	**N/A**
Protection and deflection	**N/A**	**N/A**
Shoreline clean-up	**N/A**	**N/A**

+ - possible positive environmental benefit

- - likely to have a negative environmental benefit or are not feasible or practicable

N/A – Response option excluded after ore-spill NEBA

APPENDIX D: NOPSEMA REPORTING FORMS

Appendix D1: Recordable Environmental Incident Monthly Report

Appendix D2: Report of an accident, dangerous occurrence or environmental incident

See https://www.nopsema.gov.au/environmental-management/environment-resources/

APPENDIX E: STAKEHOLDER CONSULTATION

File is available as a supporting document under BAA-100 0329.

APPENDIX F: OSMP SUMMARY TABLE

(Refer to next page)

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
Operational Monitoring Plans							
OMP01	Oil properties and weathering behaviour at sea	To provide in field information on the oil properties, behaviour and weathering of the spilled oil to assist in spill response activities	Tier 2 or tier 3 hydrocarbon or other chemical spill	The IMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or The IMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or This OMP is no longer contributing to or influencing spill response decision-making; or Relevant scientific monitoring components initiation criteria have been triggered.	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the OMP has been triggered Deployment of field personnel and equipment into the field within 7 days of receipt of notification	Personnel with appropriate training and expertise in field sampling Suitable vessels Sampling and sample storage equipment Accredited National Association of Testing Authorities (NATA) Laboratory	AMSA OSRL AMOSC Vessel contractor/aerial contractor Environmental Service Provider under contract
OMP02	Pre-emptive assessment of sensitive receptors at risk	To undertake a rapid assessment of the presence, extent and current status of sensitive receptors based on a desktop review, prior to contact from a hydrocarbon spill	A probable hydrocarbon impact (or impact of dispersed hydrocarbon) on a resource, habitat or shoreline is anticipated on the basis of trajectory modelling or other	Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or The assessment of sensitive receptors that were identified as being potentially impacted/contact by the hydrocarbon spill are	< 24 hours	Personnel with appropriate training and expertise to undertake a desktop review, identify key information gaps in baseline data, assist with determining study design	Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
			assessment of the incident; or Damage to a natural resource or sensitive receptor is possible as a result of that impact	completed			
OMP03	Shoreline clean-up assessment technique (SCAT)	To provide in field information on the physical and biological characteristics of shorelines within the predicted trajectory of the hydrocarbon spill or that have been exposed to the spill. It also provides a baseline for determining the effectiveness of the response	The ConocoPhillips IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred; and Analysis of data from hydrocarbon spill modelling, monitoring, evaluation and/or surveillance predicts an exposure of oil to shoreline habitat; or Relevant response activities are being undertaken	This OMP will not result in a change to the scale or location of active response options; or Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or Continuation of monitoring of this OMP is likely to increase overall environmental impact; or Relevant scientific monitoring components initiation criteria have been triggered	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the OMP has been triggered Deployment of field personnel and equipment into the field within 7 days of receipt of notification	Personnel with aerial, satellite and/or vessel surveillance experience Personnel with appropriate training and expertise in shoreline clean-up assessment Suitable vessels and/or aircraft	AMSA OSRL AMOSC Vessel/aerial contractor Environmental Service Provider
OMP04	Water quality assessm	To provide a rapid assessment of the presence, type,	The ConocoPhillips IMT has	The IMT Incident Commander (or delegate) considers that continuation of monitoring	Preparation to deploy field personnel and	Personnel with appropriate training and expertise in water	Vessel contractor Environmental Service Provider

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
	ent	concentrations and character of hydrocarbons and dispersants (if applicable) in marine water to assess the extent of spill contact and verify trajectory predictions to inform other monitoring plans	determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred	under this OMP will not result in a change to the scale or location of active response options; or The IMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or The spill is or is likely to be below visible criteria for surface oil and low thresholds for entrained and dissolved hydrocarbon concentrations; or The Monitoring Coordinator (or delegate) considers that continuation of monitoring under this OMP is likely to increase overall environmental impact; or Relevant scientific monitoring components initiation triggers have been assessed	equipment will commence on notification from ConocoPhillips IMT that the OMP has been triggered. Deployment of field personnel and equipment into the field within 7 days of receipt of notification	quality sampling Suitable vessels Sampling and sample storage equipment Accredited NATA Laboratory	under contract
OMP05	Sediment quality assessment	To provide a rapid assessment of the presence, type, concentrations and character of hydrocarbons in marine sediments to assess the extent of spill contact and verify trajectory predictions to inform other monitoring	The ConocoPhillips IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred; and Modelling and/or	The IMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or The IMT Incident Commander (or delegate) has advised that agreement has been reached	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the OMP has been triggered.	Personnel with appropriate training and expertise in sediment quality sampling Suitable vessels Sampling and sample storage equipment Accredited NATA Laboratory	Vessel contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		plans	analysis of data from surveillance activities predicts an exposure of oil to marine and/or coastal sediment	with the Jurisdictional Authority relevant to the spill to terminate the response; or The Monitoring Coordinator (or delegate) considers that continuation of monitoring under this OMP is likely to increase overall environmental impact; or Relevant scientific monitoring components initiation triggers have been assessed	Deployment of field personnel and equipment into the field within 7 days of receipt of notification		
OMP06	Marine fauna assessment	To undertake a rapid assessment of marine fauna at risk to assist in decisions on appropriate management and response actions during an oil spill event to minimise the potential impact on marine fauna	The IMT/EMT has determined that Tier 2 or 3 oil spill to marine or coastal waters has occurred, and Modelling and/or analysis of data from surveillance activities predicts, or has reported, an exposure of oil to known sensitive fauna habitat	The IMT/EMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or The IMT/EMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or The Monitoring Coordinator (or delegate) considers that continuation of monitoring under this OMP is likely to increase overall environmental impact; or Relevant scientific monitoring components initiation triggers have been assessed	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the OMP has been triggered Deployment of field personnel and equipment into the field within 7 days of receipt of notification	Personnel with appropriate training and expertise in marine fauna monitoring Suitable vessels and/or aircraft Sampling and sample storage equipment Accredited NATA Laboratory	Vessel contractor/aerial contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
OMP07	Air quality modelling (responder health and safety)	To assess the impact of the hydrocarbon spill on human health, particularly that of the public and response personnel	The ConocoPhillips IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred; and Response activities that may pose a risk to the air quality of response personnel and/or public will occur	Completion of the gas, vapour and oil discharge, oil containment and recovery, dispersant operations and shoreline clean-up activities; or Continuing hazardous and noxious plume detection and monitoring has a low probability of contributing or influencing spill response decision making	Commence within 12 hours	Air quality modelling software Personnel with appropriate training and expertise in air quality modelling	Service Provider under contract
Scientific Monitoring Plans							
SMP01	Water quality impact assessment	Detect and monitor the presence, concentration and persistence of hydrocarbons in marine waters following the spill and associated response activities. The specific objectives of this SMP are as follows: Assess and document the temporal and spatial distribution of hydrocarbons and dispersants in marine waters; and Consider the potential sources of any identified	Operational monitoring has indicated that contact on a sensitive resource is possible and it is considered likely that ongoing (scientific) monitoring of impacts will be required, supported by scientifically rigorous water quality monitoring; or Water quality	Hydrocarbon concentrations in marine waters are below benchmark levels which can be defined as: ANZECC Water Quality Objectives for the Protection of Aquatic Ecosystems, or The relevant regulatory site-specific trigger level (where these exist); or Below baseline levels, or Reference site values (whichever is applicable); or When appropriate, meaningful and defensible scientific monitoring results have been	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP has been triggered. Deployment of field personnel and equipment into the field within 7 days of receipt of notification	Personnel with appropriate training and expertise in water quality sampling Suitable vessels Sampling and sample storage equipment Accredited NATA Laboratory	Vessel contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		hydrocarbons; and Verify the presence and extent of hydrocarbons (both on water and in water) that may be directly linked to the source of the spill; and Assess hydrocarbon/dispersant content of water samples against accepted environmental guidelines or benchmarks to predict potential areas of impact; and Provide information that may be used to interpret potential cause and effect drivers for environmental impacts recorded for sensitive receptors monitored under other SMPs	monitoring (OMP04) has identified hydrocarbon and/or dispersant concentrations exceed accepted guidelines and benchmarks; or Chemical dispersants have been applied as part of the spill response program	achieved for marine waters			
SMP02	Sediment quality impact assessment	Detect and monitor the presence, concentration and persistence of hydrocarbons in sediments following the spill and associated response activities. The specific objectives of this SMP are as follows: Assess and document the temporal and spatial distribution of	Sediment quality monitoring (OMP05) has identified hydrocarbon concentrations exceed accepted guidelines and benchmarks; and Operational monitoring has indicated that an	All hydrocarbon concentrations in sediments are below benchmark levels, which can be defined as: Revised ANZECC/ARMCANZ sediment quality guidelines related to petroleum hydrocarbons (Simpson et al.,2013); or The relevant regulatory site-specific trigger level (where these exist); or	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP has been triggered. Deployment of field personnel and	Personnel with appropriate training and expertise in sediment quality sampling Suitable vessels Sampling and sample storage equipment Accredited NATA Laboratory	Vessel contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		hydrocarbons in marine sediments; and Consider the potential sources of any identified hydrocarbons; and Verify the presence and extent of hydrocarbons that may be directly linked to the source of the spill; and Assess hydrocarbon content of sediment samples against accepted environmental guidelines or benchmarks to predict potential areas of impact; and Provide information that may be used to interpret potential cause and effect drivers for environmental impacts recorded for sensitive receptors monitored under other SMPs	impact on a sensitive resource that is closely linked to marine sediments is possible, and it is considered likely that ongoing (scientific) monitoring of a biological parameter will be required that supported by scientifically rigorous sediment quality monitoring	Below baseline levels; or Reference site values (whichever is applicable); or No ongoing impacts to biological receptors can be linked to sediment quality	equipment into the field within 7 days of receipt of notification		
SMP03	Intertidal and coastal habitat assessment	To assess the impact (extent, severity, and persistence) and subsequent recovery of intertidal and coastal habitats and associated biological communities in response to a hydrocarbon release and associated response activities	Operational monitoring predicts or confirms exposure of coastal or intertidal habitats or communities to hydrocarbons	There has been no demonstrable impact to coastal and intertidal habitats and associated biological communities (confirmation that habitats and species were not exposed to hydrocarbons); or Measured parameters of coastal and intertidal habitats	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP has been triggered Deployment of field	Personnel with appropriate training and expertise in field sampling (intertidal habitat/communities) Suitable vessels and/or vehicles Sample collection and sample storage	Vessel contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
				and associated biological communities impacted by hydrocarbons spills have returned to within the expected natural dynamics of baseline state (taking into account natural variability) and/or reference sites	personnel and equipment into the field within 7 days of receipt of notification	equipment Accredited NATA Laboratory	
SMP04	Benthic habitat assessment	To assess the impact (extent, severity, and persistence) and subsequent recovery of subtidal benthic habitats and associated biological communities in response to a hydrocarbon release and associated response activities	Operational monitoring predicts or confirms exposure of benthic habitats or communities to hydrocarbons	There has been no demonstrable impact to benthic habitats and associated biological communities (confirmation that benthic habitats were not exposed to hydrocarbons); or Measured parameters of benthic habitats and associated biological communities impacted by hydrocarbons spills have returned to within the expected natural dynamics of baseline state (taking into account natural variability) and/or reference sites.	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP has been triggered Deployment of field personnel and equipment into the field within 7 days of receipt of notification	Personnel with appropriate training and expertise in field sampling (i.e. coral reef, seagrass, macroalgae) Suitable vessels Sample collection and sample storage equipment Accredited NATA Laboratory	Vessel contractor Environmental Service Provider under contract
SMP05	Seabird and shorebird assessment	Document and quantify shorebird and seabird presence; and any impacts and potential recovery from hydrocarbon exposure. The objectives are to: Identify and quantify, if time allows, the post-spill/pre-impact presence	Operational monitoring predicts contact is possible to seabirds or shorebird populations or any of their habitats of importance for breeding, nesting or foraging; or	There has been no demonstrable evidence of an impact on seabirds and/or shorebirds or key biological activities from the hydrocarbon/chemical spill; or Key seabird and shorebird behaviour and breeding activities have been quantified in the zone of exposure and	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP has been triggered Deployment of field	Suitable survey platform Personnel with appropriate training and expertise in field sampling (avian ecologists) Photographic/video equipment Tissue sample collection and sample storage	Vessel/aerial contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		and status (e.g. foraging and/or nesting activity) of shorebirds and seabirds in the study area; and Observe, and if possible quantify and assess, the impacts from exposure of shorebirds and seabirds to hydrocarbons (i.e. post-impact) and to the response activities, including abundance, oiling, mortality, and sub-lethal effects; and Identify, quantify and evaluate the post-impact status and if applicable, recovery of key behaviour and breeding activities of shorebirds and seabirds (e.g. foraging and/or nesting activity and reproductive success) over time and with regard to reference sites	Operational monitoring has identified contact or an impact to seabirds or shorebird populations as a result of the hydrocarbon spill; or There are reports or scientific evidence of oiled seabirds or shorebird populations	are comparable to reference sites; or Measured parameters have returned to baseline conditions (taking into account natural variability) in terms of breeding population (for seabirds) or counts (for shorebirds) and impacts on species and taxa are no longer detectable, with regard to reference sites	personnel and equipment into the field within 7 days of receipt of notification	equipment Accredited NATA laboratory	
SMP06	Marine mega-fauna assessm ent	Document and quantify the status and recovery of marine megafauna related to a hydrocarbon/chemical spill. The objectives are to: Observe and quantify the post-impact presence of marine megafauna within the areas that have been exposed to the	Operational monitoring predicts contact is possible to marine megafauna populations or any of their habitats of importance for breeding or foraging; or	There has been no demonstrable evidence of an impact on marine megafauna or key biological activities from the hydrocarbon/chemical spill; or The extent of damage of impacted marine mega-fauna has been quantified; and Key biological processes (e.g.	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP has been triggered Deployment of field	Personnel with appropriate training and expertise in field sampling (Marine megafauna ecologists) Photographic/video equipment Tissue sample collection and sample storage equipment	Vessel/aerial contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		hydrocarbon/chemical spill; and Observe and record any changes in the levels of marine fauna strandings; and Assess and quantify lethal and/or sub-lethal impacts to indicator marine megafauna species (e.g. behaviour, body condition changes, disease level changes, reproductive success) directly related to the spill or related response activities; and Identify, quantify and evaluate the post-impact status and if applicable, recovery of key biological activities (e.g. foraging activity, breeding etc.) for indicator marine megafauna; and Investigate short term or long term environmental effects on marine megafauna which may have resulted from a hydrocarbon spill	Operational monitoring has identified contact or an impact to marine megafauna populations as a result of the hydrocarbon spill; or There are reports or scientific evidence of oiled marine megafauna	abundance, distribution, breeding) are similar to pre-spill or reference sites	personnel and equipment into the field within 7 days of receipt of notification	Accredited NATA laboratory	
SMP07	Marine fish impacts	To assess the impacts to and subsequent recovery of fish assemblages associated with specific benthic habitats (as	Operational monitoring predicts or confirms exposure to fish areas or fish	There has been no demonstrable impact on fish and fish population structure; or Measured parameters of fish,	Preparation to deploy field personnel and equipment will commence on	Personnel with appropriate training and expertise in field sampling (Marine ecologists)	Vessel contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		identified in SMP04) in response to a hydrocarbon release and associated response activities. The specific objectives of this SMP are as follows: Characterise the status of resident fish populations associated with habitats monitored in SMP04 that are exposed/contacted by released hydrocarbons; and Quantify any impacts to species (abundance, richness and density) and resident fish population structure (representative functional trophic groups); and Determine and monitor the impact of the released hydrocarbons and potential subsequent recovery to residual demersal fish populations.	habitat.	fish habitat, and marine fisheries locations impacted by hydrocarbon spills have returned to within the expected natural dynamics of baseline state and/or reference sites.	notification from ConocoPhillips IMT that the SMP has been triggered Deployment of field personnel and equipment into the field within 7 days of receipt of notification	Photographic/video equipment Tissue sample collection and sample storage equipment Accredited NATA laboratory	
SMP08	Fisheries impacts	To monitor potential contamination and tainting of important finfish and shellfish species from commercial, aquaculture and recreational fisheries to evaluate the likelihood that a hydrocarbon spill will	Operational monitoring predicts contact is possible to commercial, recreational, traditional species and or aquaculture species; or	Contamination in the edible portion or in the stomach/intestinal contents attributable to the spill is no longer detected; or No differences are detected in commercial, recreational or aquaculture fisheries from	Preparation to deploy field personnel and equipment will commence on notification from ConocoPhillips IMT that the SMP	Personnel with appropriate training and expertise in field sampling (i.e. ecotoxicology, fisheries sampling) Fishing equipment Tissue sample collection	Vessel contractor Environmental Service Provider under contract

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time	Resources required	Monitoring support/providers
		have an impact on the fishing and/or aquaculture industry. The specific objectives of this SMP are as follows: Assess any physiological impacts to important fish and shellfish species and if applicable, seafood quality and safety; and Assess targeted fish and shellfish species for hydrocarbon contamination; and Provide information that can be used to make inferences on the health of fisheries and the potential magnitude of impacts to fishing industries (commercial, aquaculture and recreational)	Advice has been provided to government to restrict, ban or close a fishery; or Declarations of intent by commercial fisheries or government agencies to seek compensation for alleged or possible damage	reference and impact sites; or The physiological and biochemical parameters of commercial, traditional, recreational or aquaculture species are comparable between reference and impact sites; or Evidence that catch rates, species composition, community abundance, distribution and age structure of commercial fisheries and by-catches have returned to baseline levels (taking into account natural variability); or Agreement has been reached with the relevant Jurisdictional Authorities to cease monitoring of fisheries	has been triggered Deployment of field personnel and equipment into the field within 7 days of receipt of notification	and sample storage equipment NATA accredited laboratory	

APPENDIX G: COMPARISON OF OPP AND THE ENVIRONMENT PLAN

As described in **Section 2** of the EP, engineering design has progressed since NOPSEMA accepted the OPP in March 2018. Further engineering work has been completed for the pipeline and more details are known about the gas export pipeline installation campaign based on further discussions with potential installation contractors, which has resulted in some changes to the way the Activity was described in the OPP. **Table G-1** presents the changes and details why there is no overall change in environmental impacts or risks. The changes are not considered major and the overall activity description, risk assessment and conclusions in this EP are consistent with those presented in the OPP. **Table G-2** provides a comparison of the EPOs presented in the OPP and this EP and evaluates

Table G-1: Comparison of the Project description in the OPP to the differences identified in the Activity description in this Environment Plan

Project Description in the Barossa OPP	Activity Description in this EP	Comparison between Barossa OPP and this EP
Discharge of Fluids - Total volumes of fluids (gas export pipeline and in-field flowlines) in the order of approximately 107,500 m^3 and 145,000 m^3 - Dewatering will include ~97,000 m^3 of treated seawater released subsea at the FPSO facility end of the gas export pipeline (e.g. within the Barossa offshore development area) - Hydrotest conducted to test structural integrity of the gas export pipeline, treated seawater ~1,300m^3 in one event up to a total of 3,000m^3. Hydrotest water will be released at the sea surface at either the FPSO facility end of the export pipeline or at the Bayu-Undan pipeline tie-in end of the export pipeline.	Volumes have been refined as follows: - Dewatering ~85,000 m^3 - During flooding ~12,000 m^3 or ~15,000 m^3, depending on release location - Hydrotest ~2000 m^3 - MEG ~1,000 m^3 - Total ~102,000 m^3 There is the potential for the FCGT water (12,000 m^3 or 15,000 m^3) to be a surface release.	The OPP stated that *'EPs will detail dewatering requirements, including locations and volumes'*. As per the OPP commitment the bulk dewatering (~85,000 m^3) will be discharged at the FPSO PLET location. However, all other treated seawater discharges may occur at either end of the pipeline, subject to contractor methodology. The volumes have been refined based on more detailed information. The dewatering volume has decreased from the OPP, however the volumes for the FCGT were not specified in the OPP as they were unknown at the time. The total volume of treated seawater is still within the total volume that was used for the impact assessment in the OPP and there has been no change to the severity of the consequence level for this impact (**Section 5.2.7**)

Table G-2: Comparison of EPOs in the OPP and the EP

Environmental Impacts / Risks	Relevant EPOs from the Barossa OPP (Section/Table reference)	EPOs in this EP (Section reference)	Comparison between Barossa OPP and this EP
Interaction with other marine users	No vessel collisions or significant adverse interactions with other marine users. (**Table 6-9**)	No substantial adverse effect on other marine users (EP **Section 5.2.1**)	Level of environment protection / outcome as included in the OPP EPO has been maintained for the EP.
Seabed Disturbance	No permanent disturbance to benthic habitats beyond the physical footprint of offshore facilities/infrastructure within the Barossa offshore development area and gas export pipeline, as relevant to both direct and indirect sources of disturbance to seabed and associated benthic habitats. (**Table 6-15**)	Direct impacts to benthic habitats will be restricted to the footprint of the pipeline and supporting structures. Beyond the footprint of the pipeline and supporting structures impact will be limited to localised, short term disturbance associated with suspension and deposition of surface sediment. (EP **Section 5.2.2**)	Wording of the EP EPO is consistent with the OPP EPO.
	No anchoring or mooring of the FPSO facility and MODU/vessels on shoals/banks, except in emergency conditions. (**Table 6-15**)		This has been included as a control within the EP (C2.6)
	The gas export pipeline route will be designed to minimise, where practicable, impacts to areas of seabed that are associated with the seafloor features/values of KEFs and shoals/ banks. (**Table 6-15**)		Gas export pipeline route selection has been detailed in the risk assessment and is not considered an EPO for the EP.
	To minimise impact to representative species, assemblages and associated values of the Oceanic Shoals marine park, further studies will be used to inform final pipeline routing so the pipeline will not be installed on those representative species, assemblages and associated values if they have not been found in the marine park outside the pipeline corridor. (**Table 6-15**)		
	No significant impacts to turtle or dugong populations from impacts (direct or indirect) associated with installation of the gas export pipeline. (**Table 6-15**)		As detailed in the impact assessment no significant impacts are expected from the activity

Environmental Impacts / Risks	Relevant EPOs from the Barossa OPP (Section/Table reference)	EPOs in this EP (Section reference)	Comparison between Barossa OPP and this EP
Underwater Noise	No significant impacts to turtle populations from noise generated during installation of the gas export pipeline. (**Table 6-26**)	No significant impacts to marine fauna from noise generated during the gas export pipeline installation campaign No displacement of marine turtles from habitat critical to the survival of marine turtles during the pipelay installation activities and biologically important behaviour to continue in BIAs. (**Section 5.2.3**)	EPO in the EP is consistent with the OPP and has been expanded to include all marine fauna, resulting in a better level of environment outcome than the OPP.
Light emissions	Light spill from the MODUs/drill ships, FPSO facility and project vessels will be limited to that required for safe operations and working requirements. (**Table 6-31**)	No significant impacts to marine fauna from the gas export pipeline installation campaign No displacement of marine turtles from habitat critical to the survival of marine turtles during the pipelay installation activities and biologically important behaviour to continue in BIAs. (**Section 5.2.4**)	This has not been included as an EPO in the EP because it is a legislative requirement related to health and safety risks.
	No significant impacts to turtle populations from installation of the gas export pipeline. (**Table 6-31**)		EPO in the EP is consistent with the OPP and has been expanded to include all marine fauna, resulting in a better level of environment outcome than the OPP.
Atmospheric Emissions	Atmospheric emissions associated with the project will meet all regulatory source emission standards. (**Table 6-28**)	No substantial change in air quality during the pipeline installation campaign that may adversely impact biodiversity, ecological integrity, social amenity or human health. (**Section 5.2.5**)	EPO in the EP is consistent with the OPP and has been further refined for the activity, resulting in the same level of environmental protection outcome as the OPP.
	Combustion engines and flaring equipment will be maintained according to vendor specifications to achieve optimal performance. (**Table 6-28**)		This is not an EPO and is achieved through the vessel vetting procedure which is detailed in the implementation strategy
Planned Discharges - Treated seawater	Dewatering discharges will not extend beyond the Barossa offshore development area and will not impact areas of seabed that are associated with the seafloor features/ values of KEFs or the nearest shoals/banks of Lynedoch Bank, Tassie Shoal or Evans Shoal. (**Table 6-39**)	No substantial change in water quality during the pipeline installation campaign that may adversely impact biodiversity, ecological integrity, social amenity or human health. (**Section 5.2.6**)	Has not been included as an EPO however the impact assessment and modelling impacts demonstrate that this will be achieved.

Environmental Impacts / Risks	Relevant EPOs from the Barossa OPP (Section/Table reference)	EPOs in this EP (Section reference)	Comparison between Barossa OPP and this EP
	Reduce impacts to the marine environment from planned discharges through the application of a chemical assessment process, which includes an environment risk assessment. (**Table 6-39**)		Has not been included as an EPO in the EP however it has been incorporated as a control for the risk
Dropped object	Minimise disturbance beyond the physical footprint by preventing the loss of significant equipment/ cargo overboard from the MODU/ drill ship, FPSO facility or vessels. (**Table 6-15**)	No loss of equipment/cargo overboard from vessels resulting in a Consequence Severity greater than Minor (**Section 5.3.1**)	Wording is consistent with the intent of the EPO meeting the level of environmental protection as provided in the OPP.
IMS	Prevent the displacement of native marine species as a result of the introduction and establishment of IMS via project-related activities, facilities and vessels. (**Table 6-17**)	No introduction of IMS (**Section 5.3.2**)	Wording is consistent with the intent of the EPO meeting the level of environmental protection as provided in the OPP.
Collision with marine fauna	Vessel speeds restricted in defined operational areas within the project area, to reduce the risk of physical interactions between cetaceans/marine reptiles and project vessels. (**Table 6-12**)	Zero incidents of injury/mortality of cetaceans/marine reptiles from collision with activity vessels operating within the Operational Area (**Section 5.3.3**)	This is a control to achieve the EPO – and has been included
	Zero incidents of injury/mortality of cetaceans/marine reptiles from collision with project vessels operating within the project area. (**Table 6-12)**		EPO has been adopted for the activity
Unplanned Subsea release - treated seawater	Reduce impacts to the marine environment from planned discharges through the application of a chemical assessment process, which includes an environment risk assessment. (**Table 6-39**)	Zero unplanned discharge of chemicals to the marine environment as a result of gas export pipeline installation activities (**Section 5.3.4)**	This has been included as a control to minimise any impacts however the adopted EPO results in a better environmental outcome than that presented in the OPP.
Deck and Minor subsea spills	Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of project activities. (**Table 6-48**)	Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of gas export pipeline installation activities (**Section 5.3.5**)	EPO has been adopted for the activity
Loss of hazardous and non-hazardous waste	Zero unplanned discharge of hazardous and non-hazardous wastes into the marine environment as a result of project activities. (**Table 6-42**)	Zero unplanned discharge of hazardous and non-hazardous wastes into the marine environment as a result of project activities. (**Section 5.3.6**)	EPO has been adopted for the activity

Environmental Impacts / Risks	Relevant EPOs from the Barossa OPP (Section/Table reference)	EPOs in this EP (Section reference)	Comparison between Barossa OPP and this EP
	Hazardous waste will be transported onshore for treatment and/or disposal at licenced treatment and disposal facilities. (**Table 6-42**)		EPO has not explicitly been adopted as Activities outside the operational Area are out of the scope of this EP
Vessel diesel spill	Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of project activities. (**Table 6-48**)	Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of a vessel collision (**Section 5.3.7**)	EPO has been adopted for the activity
	An activity specific OPEP that demonstrates adequate arrangements for responding to and monitoring oil pollution, in the event of a major unplanned release, will be accepted by NOPSEMA prior to commencing the activity. (**Table 6-48**)		This has been included as a control to minimise impacts
Bunkering diesel spill	Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of project activities. (**Table 6-48**)	Zero unplanned discharge of hydrocarbons or chemicals to the marine environment as a result of bunkering (**Section 5.3.8**)	EPO has been adopted for the activity

<table>
<tr><th>Key management controls included in the OPP</th><th>OPP Section Reference</th><th>How the Barossa OPP controls are addressed in the EP</th><th>EP Section Reference</th></tr>
<tr><td colspan="4">Gas Export Pipeline Route</td></tr>
<tr><td>The project will be undertaken in accordance with ConocoPhillips' CPMS, which provides the framework to achieve acceptable health, safety and environment outcomes such as:
• design planning throughout concept select phase to avoid placement of facilities/ infrastructure within the Barossa offshore development area in areas of regional environmental importance (e.g. shoals/banks, coral reefs, islands, and known regionally important feeding and breeding/nesting biologically important areas for marine mammals and marine reptiles).
• use of gas export pipeline selection route surveys to inform route optimisation and reduce environmental impact.</td><td>6.4.2
6.4.3
6.4.5</td><td rowspan="3">A number of additional studies were undertaken to better understand the bathymetry and natural environment along the pipeline route (See Section 4.2). This information was used to inform route optimisation and reduce environmental impacts as described in Section 5.3.2 Physical Presence: Seabed Disturbance.</td><td rowspan="3">Section 4.2 and 5.2.2</td></tr>
<tr><td>Pre-lay surveys of the gas export pipeline installation route will be used to identify areas of seabed that are associated with the seafloor features/values of the shelf break and slope of the Arafura Shelf and carbonate bank and terrace system of the Van Diemen Rise KEFs, seabed related conservation values associated with the Oceanic Shoals marine park or nearby shoals and banks (including Goodrich Bank, Marie Shoal and Shepparton Shoal). The outcomes of the pre-lay surveys will be used to inform route optimisation and reduce environmental impacts.</td><td>6.4.3</td></tr>
<tr><td>Further surveys within the pipeline corridor will be used to supplement existing knowledge from habitat assessments to date, to support an evaluation of the representativeness of species and species assemblages found within the portion of the gas export pipeline corridor that intersects the Oceanic Shoals marine park, with other areas of the marine park.</td><td>6.4.3</td></tr>
<tr><td colspan="4">Planned discharges</td></tr>
<tr><td>All planned discharges from vessels will comply with relevant MARPOL 73/78 and Australian Marine Order requirements (as appropriate for vessel classification).</td><td>6.4.8.7</td><td rowspan="4">The following controls have been included
• All wastes managed in accordance with vessel waste management plan (C13.1)
• Routine discharges of treated sewage, grey-water, putrescible waste, deck drainage, and bilge water in accordance with standard maritime practice (C6.1)</td><td rowspan="4">Section 5.2.6 and 5.2.7</td></tr>
<tr><td>Oily bilge water from machinery space drainage is treated to a maximum concentration of 15 ppm OIW prior to discharge from vessels, as specified in MARPOL 73/78 (Annex I).</td><td>6.4.8.7</td></tr>
<tr><td>Offshore discharge of sewage from vessels will be in accordance with MARPOL 73/78 (Annex IV) and Marine Order 96.</td><td>6.4.8.7</td></tr>
<tr><td>Food wastes from vessels will be macerated to < 25 mm diameter prior to discharge, in accordance with MARPOL 73/78 (Annex V) and Marine Order 95.</td><td>6.4.8.7</td></tr>
</table>

All wastes generated offshore will be managed in accordance with relevant legal requirements, including MARPOL 73/78 and Australian Marine Order requirements (as appropriate for vessel classification).	6.4.9		
Detailed performance criteria for planned discharges will be defined in the activity-specific EPs.	6.4.8.7	See **Section 5.3.6** and **5.3.7** for detailed Environmental Performance Standards for planned discharges.	**Sections 5.2.6** and **5.2.7**
The location of the dewatering discharge will be selected to minimise impact on areas of regional environmental importance (e.g. shoals, banks, coral reefs, islands, etc.) to the extent practicable.	6.4.8.7	A control requiring bulk dewatering will occur at the FPSO PLET location (C7.3)	**Section 5.2.7**
The dewatering of flooding fluid will be detailed in the relevant activity-specific EPs developed during the detailed engineering and design studies for the project. The EPs will detail dewatering requirements, including definition of discharge characteristics (i.e. chemical additives and concentrations), discharge location and volumes, methodology and species thresholds.	6.4.8.7	The details on the dewatering provided in **Section 5.2.7**	**Section 5.2.7**
Products that meet at least one of the following environmental criteria are considered suitable by ConocoPhillips for use and controlled discharged to the marine environment is permitted: • rated as Gold or Silver under OCNS CHARM model • if not rated under the CHARM model, have an OCNS group rating of D or E (i.e. are considered inherently biodegradable and non-bioaccumulative). The use of products that do not meet these criteria will only be considered following assessment and approval through a chemical assessment process, as outlined above. The assessment will also be informed by an environmental risk assessment which will help ensure that any potential environmental impacts resulting from chemical use and discharge are minimised.	6.4.8.7	All chemicals planned to be discharged to the marine environment will be assessed through the chemical selection procedure C7.1 - Chemical Selection Procedure for all chemicals planned to be release to the marine environment	**Section 5.2.7**
Flooding fluid chemicals (e.g. biocide, oxygen scavengers and dye) will be selected for environmental performance (i.e. low toxicity chemicals), whilst maintaining technical performance requirements, and follow the chemical assessment process (as detailed above).	6.4.8.7		
Subsea infrastructure and pipelines will be clearly marked on Australian nautical charts published by the AHO.	6.4.1	The following has been included in the EP: EPS 1.2.3 Subsea infrastructure and gas export pipeline will be clearly marked on Australian nautical charts published by the AHO	**Section 5.2.1**
Project-vessels operating within the Barossa offshore development area and gas export pipeline corridor will comply with maritime standards such as COLREGS, Chapter V of SOLAS, Marine Order 21 (Safety of Navigational and Emergency Procedures) and Marine Order 30 (Prevention of collisions) (as appropriate to vessel class).	6.4.1	The following controls have been included • activity vessels equipped and crewed in accordance with Australian Maritime requirements (C1.1)	**Section 5.2.1**

The interaction of the vessels associated with the project with listed cetacean species will be consistent with the EPBC Regulations - Part 8 Division 8.1 Interacting with cetaceans (except in emergency conditions or when manoeuvring is not possible, such as in the case of pipelay activities), which include: • vessels will not knowingly travel > 6 knots within 300 m of a whale • vessels will not knowingly approach closer than 100 m to a whale • vessels will not knowingly restrict the path of cetaceans.	6.4.2	The suggested control has been included in the EP (C10.1)	**Section 5.3.3**
Vessel speed restrictions will be implemented within the defined operational area of the gas export pipeline route, except where necessary to preserve the safety of human life at sea. This will be reinforced through training of selected vessel crew to sight and manage interactions with turtles.	6.4.2	These controls have been adopted in the EP • Vessel speed restrictions within the Operational Area (C10.3) • Crew inductions (C10.2)	**Section 5.3.3**
Personnel associated with vessel activities will be subject to project inductions which will address the requirements for vessel operators in relation to interactions with marine fauna.	6.4.2		
No pipeline installation activities will occur within the internesting BIA for olive ridley turtles at any time, including peak nesting and hatchling emergence periods.	6.4.2	This control has been adopted in the EP (C2.8)	**Section 5.2.2**, **5.2.3, 5.2.4**
No pipeline installation activities will occur within the internesting BIA for olive ridley turtles at any time, including peak nesting and hatchling emergence periods.	6.4.3		

Installation schedule of the gas export pipeline will take into consideration seasonal presence/activity of marine turtles to prevent significant adverse impacts during peak seasonal internesting period for flatback (June to September) and olive ridley turtles (April to August) in proximity to the Tiwi Islands. Should pipeline installation activities be required to be undertaken during this period, within proximity (60 km) of the Tiwi Islands, the following process will be undertaken to identify how the pipeline will be installed to reduce impacts to ALARP and acceptable levels 1. identify the pipeline installation methods that can achieve the technical requirements of the project and use this to define the operational area within which all pipeline installation activities will be undertaken and within which all environmental impacts and risks relating to pipeline installation will be assessed and managed to achieve the EPOs 2. update of latest knowledge on marine turtle density and seasonal movements within the internesting habitat critical to the survival of flatback and olive ridley turtles, drawing on latest literature, any field observations from future pipeline survey work and advice from discipline experts – building on the information presented in this OPP 3. combine the outputs from items 1 and 2 above with understanding of the existing environment to identify key environmental values/sensitivities at risk from pipeline installation activities with consideration of any seasonal presence 4. undertake an additional impact assessment that builds on the assessment presented in this OPP and incorporates the information from items 1, 2 and 3 above to evaluate the environmental impacts and risks and verify the impact assessment conclusions are consistent with those presented in this OPP. Note: if required, additional controls and/or mitigation measures will be identified to demonstrate consistency with the impact assessment presented in this OPP.	6.4.2	The timing of the campaign is dependent on a number of factors including the availability of vessels, contracting and mobilisation process, project approvals. Therefore, the actual timing of the campaign is still subject to a planning process	
As part of the development and implementation of the gas export pipeline installation EP, measures will be defined including no anchoring on shoals/ banks, definition of speed limits that will be enforced during pipeline installation, and implementation of practical controls for key aspects (e.g. sedimentation/turbidity, underwater noise emissions and light emissions).	6.4.3	The following controls have adopted in the EP • No anchoring on shoals and banks (C2.7) • Vessel speed restrictions within the Operational Area (C10.3) • See **section 5.2.2** and **5.2.4** for controls around noise and light emissions.	**Section 5.2.2, 5.2.4**
The location of subsea infrastructure within the Barossa offshore development area will be informed by pre-installation surveys/studies that identify and avoid areas of seabed that are associated with the seafloor features/values of the shelf break and slope of the Arafura Shelf KEF (i.e. patch reefs and hard substrate pinnacles).	6.4.3	The following controls have been adopted in the EP • Confirmation of gas export pipeline route prior to and during installation (C2.2) • Anchoring plan for PLET installation to avoid sensitive benthic habitats and mitigate anchor dragging (C2.6)	**Section 5.2.2**

A Vessel Anchoring Plan will be prepared which will take into consideration anchoring locations and will confirm no anchoring on shoals/banks.	6.4.3	A PLET anchoring plan has been included as a control C2.6 and no anchoring on shoals and banks has been included as a control (C2.7).	**Section 5.2.2**
Dredging/trenching activities for the gas export pipeline installation (if required) will occur outside the peak flatback (June to September) and olive ridley (April to August) turtle internesting period when within the internesting habitat critical to the survival of these species.	6.4.3	Not applicable – the pipeline route remains within the Oceanic Shoals marine park and therefore there is no requirement for dredging or trenching	NA
If trenching/dredging activities for the gas export pipeline installation are required, i.e. if the pipeline has to remain outside the Oceanic Shoals marine park in the shallow water area of the pipeline corridor, they will occur outside the peak flatback (June to September) and olive ridley (April to August) turtle internesting period. The following process will be used to identify how the pipeline in the section to be trenched/dredged will be installed to reduce impacts and risks to ALARP and acceptable levels: 1. undertake numerical modelling to predict the extent, intensity and persistence of sediment plumes arising from trenching/dredging activity 2. use the outputs of the numerical modelling to identify key environmental values/sensitivities at risk from trenching/dredging activities with consideration of background/baseline conditions and any seasonal presence 3. update of latest knowledge of how aspects arising from trenching/dredging activities can impact the marine environment, including marine turtles and benthic communities 4. undertake an additional impact assessment that builds on the assessment presented in this OPP and incorporates the information from items 1, 2 and 3 above with the understanding of the environment (e.g. benthic habitat maps) to evaluate the environmental impacts and risks and verify the impact assessment conclusions are consistent with those presented in this OPP, i.e. confirm impacts from trenching/dredging will be temporary and localised. Note: if required, additional controls and/ or mitigation measures will be identified to demonstrate consistency with the impact assessment presented in this OPP. 5. develop a dredge management plan that: details how trenching/dredging will be undertaken (which will be informed by the information derived from items 1-4 above) • identifies the control and mitigations measures, environmental performance outcomes, environmental performance standards and measurement criteria that demonstrate the environmental impacts and risks can be reduced to ALARP and acceptable levels • includes an adaptive management strategy for how trenching/ dredging activity will be managed, including what information and/or data will be used to provide early warning of adverse trends and trigger adaptive management before environmental performance outcomes are compromised	6.4.3		

A Quarantine Management Plan will be developed and implemented, which will include as a minimum: • compliance with all relevant Australian legislation and current regulatory guidance • outline of when an IMS risk assessment is required and the associated inspection, cleaning and certification requirements • implementation of management measures commensurate with the level of risk (based on the outcomes of the IMS risk assessment), such as inspections and movement restrictions • anti-fouling prevention measures including details on maintenance and inspection of anti- fouling coatings.	6.4.4	Has been included as a control 9.3	**Section 5.3.2**
Ballast water exchange operations will comply with the IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004 – MARPOL 73/78 (as appropriate to vessel class), Australian Ballast Water Management Requirements (DoAWR 2017) and *Biosecurity Act 2015* (Cth), including: • all ballast water exchanges conducted > 12 nm from land and in > 200 m water depth • vessel Ballast Water Management Plan stipulating that ballast water exchange records will be maintained • completion of DoAWR Ballast Water Management Summary sheet for any ballast water discharge in Australian waters.	6.4.4	Control 9.2 requires all vessels to undertake ballast water management	**Section 5.3.2**
The International Convention on the Control of Harmful Anti-fouling Systems on Ships will be complied with, including vessels (of appropriate class) having a valid IAFS Certificate.	6.4.4	Control 9.1 requires all vessel, appropriate to class, to be equipped with effective anti-fouling coating	**Section 5.3.2**
Key noise-generating equipment will be maintained in accordance with the manufacturer's specifications, facility planned maintenance system and/or regulatory requirements.	6.4.5	This is achieved through the implementation strategy and the marine vetting and auditing process	**Section 7**
All MODUs/drill ships and vessels (as appropriate to vessel class) will comply with Marine Order 97 (Marine pollution prevention – air pollution), which requires vessels to have a valid IAPP Certificate (for vessels > 400 tonnage) and use of low sulphur diesel fuel, when possible.	6.4.6	Control 5.1 requires all atmospheric emissions form combustion engines to be in accordance with standard maritime practice	**Table 6.1**
The sulphur content of fuel used by project vessels will comply with Regulation 14 of MARPOL Annex VI (appropriate to vessel class) in order to control SOx and particulate matter emissions.	6.4.6	Control 5.1 requires all atmospheric emissions form combustion engines to be in accordance with standard maritime practice	**Table 6.1**
A preventative maintenance system will be implemented, which includes regular inspections and maintenance of engines and key emission sources and emissions control equipment in accordance with the vendor specifications.	6.4.6	This is achieved the implementation strategy and the marine vetting and auditing process	**Section 7**

All vessels in Australian waters adhere to the navigation safety requirements contained within COLREGS, Chapter 5 of SOLAS, the Navigation Act 2012 (Cth) and subordinate Marine Order 30 (Prevention of Collisions) (as appropriate to vessel class) with respect to navigation and workplace safety equipment (including lighting).	6.4.7	Control 1.1 requires all activity vessels equipped and crewed in accordance with Australian maritime requirements	**Table 6.1**
A project Waste Management Plan will be developed and implemented, and will include details of: • the types of waste that will be generated by the project and will require containment, transport to, and disposal at, a licensed facility onshore • management protocols for the handling, segregation and responsible disposal of wastes. For example, non-hazardous and hazardous solid and liquid wastes will be transported safely to shore and disposed onshore at licensed treatment and disposal facilities. • measurable performance criteria • competency and training • audits, reporting and review, including compliance checks via waste manifests.	6.4.9	A waste management plan has been adopted as a control in the EP (13.1)	**Section 5.3.6**
Hydrocarbon and chemical storage and handling procedures will be implemented, including: • secure storage of bulk hydrocarbons and chemicals in areas with secondary containment • storage of hydrocarbon and chemical residues in appropriate containers • stocks of SOPEP spill response kits readily available to respond to deck spills of hazardous liquids and personnel trained to use them • planned maintenance system including maintenance of key equipment used to store and handle hydrocarbons/chemicals (e.g. bulk transfer hoses, bunding) • MSDS available on board for all hazardous substances.	6.4.9 6.4.10.13	Control 12.1 requires Chemical and hydrocarbon storage areas designed to contain leaks and spills	**Table 6.1**
Non-hazardous and hazardous wastes will be managed, handled and stored in accordance with their MSDS, and tracked from source to their final destination at an appropriately licensed waste facility.	6.4.9	Control 13.1 requires All wastes managed in accordance with vessel waste management plan	**Table 6.1**
Bunkering procedures will be implemented, which include: • use of bulk hoses that have dry break couplings, weak link break-away connections, vacuum breakers and floats • correct valve line-up • defined roles and responsibilities – bunkering to be undertaken by trained staff • visual inspection of hose prior to bunkering to confirm they are in good condition • testing emergency shutdown mechanism on the transfer pumps • assessment of weather/sea state • maintenance of radio contact with vessel during bunkering operations.	6.4.10.13	Control 13.2 requires Vessel-specific bunkering procedures and equipment consistent with ConocoPhillips marine vessel vetting requirements	**Table 6.1**

Vessel specific controls will align with MARPOL 73/78 and Australian Marine Orders (as appropriate for vessel classification), which includes managing spills aboard, emergency drills and waste management requirements.	6.4.10.13	All relevant Marine Orders have been adopted as controls in the EP	**Section 5.3.5**
Vessel movements will comply with maritime standards such as COLREGS and Chapter V of SOLAS.	6.4.10.13	All relevant Marine Orders (which implement COLREGS and SOLAS) have been adopted as controls in the EP	Throughout **Section 5.2** and **Section 5.3**
All marine contracted vessels will undergo the ConocoPhillips Global Marine vetting process, which involves inspection, audit and a review assessment for acceptability for use, prior to working on the project.	6.4.10.13	Included in the implementation Strategy in Section 7	**Section 7.2.3**
Vessel selection criteria will make considerations for designs and operations which reduce the likelihood of hydrocarbon spills to the marine environment as a result of a vessel collision.	6.4.10.13	Included in the implementation Strategy in Section 7	**Section 7.2.3**
All vessels involved in the project will have a valid SOPEP or SMPEP (as appropriate for vessel classification).	6.4.10.13	This control has been adopted in the EP (C14.1)	**Section 5.3.7**
Spill response in the event of a hydrocarbon or chemical spill will be implemented safely and be commensurate with the type, nature, scale and risks of the spill to key values and sensitivities, as defined in activity-specific OPEPs.	6.4.10.13	A tiered response will be implemented in the event of a spill (C 14.2)	**Section 5.3.7**
A Crisis Management Plan will be implemented in the event of a spill, which includes: • emergency response planning • emergency management structure • incident notification • emergency response responsibilities and support providers.	6.4.10.13	Details of incident (including spills) management is provided in the implementation Strategy	**Section 7**
An OSMP will be initiated and implemented as appropriate to the nature and scale of the spill and the existing environment, as informed by a net environmental benefit assessment.	6.4.10.13	OPEP	**Appendix H**
The Stakeholder Engagement Plan will include consultation with commercial fisheries, shipping, Australian Hydrographic Office (AHO) and other relevant stakeholders operating in the Barossa offshore development and gas export pipeline to inform them of the proposed project. Ongoing consultation will also be undertaken throughout the life of the project.	6.4.1	Section 8 details the stakeholder consultation undertaken for the Gas Export Pipeline Installation EP.	**Section 8**

APPENDIX H: OIL POLLUTION EMERGENCY PLAN

(Refer to BAA-100 0330)